GL01905

THERMAL POWER COMPANY

10¾" CSG 35
7" CSG.
4.5" CSG. 488
" CSG. 526
LINER 3.5" 4205
TIE-BACK

WELL NO. CTGH 1 AFE NO.
REPORT NO. 80 DATE 7 SEP 86
TOTAL RIG DAYS 80 TIME FROM SPUD
DEPTH @ 2400 HRS. 4800 FOOTAGE DRLD.
HRS. DRILLED HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Rigged down Core Rig,
Cleaned cellar and pits
RELEASED RIG 1300 hrs
1 Sept 86

OPERATION @ 0500 HOURS FOLLOWING DAY:
Will get location smoothing and
access trail detailing damage
cost estimates Plus HX 108 w/ GS
INOPERATIVE EQUIP'T, EXPLAIN csg costs to add in

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	$ 3000 DEMOB
RIG	$ 750
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	2400 < BAKER TA + POOP RETO
LOGGING SERVICES	
FISHING & DIRECTIONAL	
OTHER	BYLES 250
DAILY TOTAL	$ 6700
FORWARD	$ 432,018
ACCU. TOTAL	$ 438,718
AFE	86 DOO1 4300 02

SUPERVISOR BOWDEN

DO 8 Sept

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 19 DATE 6 SEPT 86
TOTAL RIG DAYS 19 TIME FROM SPUD
DEPTH @ 2400 HRS. 4800 FOOTAGE DRLD.
HRS. DRILLED HRS. TRIPPED
HRS. OTHER 24 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG	35'
7" CSG.	488'
4.5 CSG.	526'
LINER 3.5	4205'
TIE-BACK	

HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Finished laying down DC's & kelly.
Removed rig floor; pumped out cellar; removed BOP.
Installed 11" 4 thick plate flange on Larkin casing head with ring groove and bolts.
6" long nipple and 3" full opening valve on top
Shut down rig at 2400 hrs 6 Sept 86

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	3000
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	15,500 !
FISHING & DIRECTIONAL	
OTHER BOYLES	250
WELLHEAD	2150
DAILY TOTAL	21,500
FORWARD	410,518
ACCU. TOTAL	432,018
AFE 8h DAOT	4300 02

DO 8 Sept 86

SUPERVISOR BOWDEN

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 18 DATE 5 SEPT 86
TOTAL RIG DAYS 18 TIME FROM SPUD 7 1/2 mos
DEPTH @ 2400 HRS. 4801 FOOTAGE DRLD. 0
HRS. DRILLED — HRS. TRIPPED — HRS. REPAIR — RIG NO.
HRS. OTHER 24 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. — VIS. — W.L. — CK. — PH — CHL — YP —
P.V. — GELS — % SAND — % SOLIDS — % LOST CIRC. MTL. —
GALVONIC PROBE — CORRATOR — SULPHIDE — OXY. — AIR-H,O RATIO 1
FORM. DRLD. — FLOW LINE TEMP. — °F. SUCTION TEMP. — °F.
MAX. TEMP. — °F. DEVIATION SURVEYS: —

10¾" CSG 35
7" CSG. 488'
4.5" CSG. 526'
LINER 3.5 4205'
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO — CFM — PSI — TEMP. °F — CHEM. — RATIO — RATE —
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: —

TOTAL STRING WT. — TOTAL PICKUP WT. — ROTARY TORQUE (HIGH AVERAGE LOW)
STEAM ENTRIES, DEPTH, LBS. —

REMARKS FOR 24 HOUR PERIOD:

Accomplished geophysical bore hole logging: Velocity and Sonic.

Completed logging at 2400 hrs 5 Sept 86 No problems with HX rod break at 823'.

All core boxes, from 526' to 4800' shipped out to UURI Salt Lake City

OPERATION @ 0600 HOURS FOLLOWING DAY:
Laying down DCC rods

INOPERATIVE EQUIP'T, EXPLAIN —

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3000
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	
FISHING & DIRECTIONAL	
OTHER Bonnes Pass	250
DAILY TOTAL	$ 3850
FORWARD	406,668
ACCU. TOTAL	410,518
AFE	86-4201, 4300.02

SUPERVISOR BOWDEN

ND 6 Sept 86

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 11 DATE 4 SEPT 86
TOTAL RIG DAYS 11 TIME FROM SPUD
DEPTH @ 2400 HRS. 4800 FOOTAGE DRLD.
HRS. DRILLED HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 32 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG	35
7" CSG.	488
4.5" CSG.	526
LINER 3.5	4205
TIE-BACK	

HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
				11	350			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Completed 11 hrs of borehole geophysical logging: SP, Resistivity, Caliper, etc

13 hrs RIH Cooling Off for additional logs

Geologist DOBRANZ onsite last two days sampling the rock cores per his DOE contract

USFS rep. onsite stating Access Road site requirements including mulching / reseeding

OPERATION @ 0600 HOURS FOLLOWING DAY:

Logging.

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3000
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	100
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	
FISHING & DIRECTIONAL	
OTHER Boxes	250
DAILY TOTAL	3950
FORWARD	402,718
ACCU. TOTAL	$ 406,668
AFE	86 DOE 4300.02

SUPERVISOR

NO 5 Sept 86

THERMAL POWER COMPANY

WELL NO. CTGH AFE NO.
REPORT NO. 76 DATE 3 SEPT 86
TOTAL RIG DAYS 16 TIME FROM SPUD
DEPTH @ 2400 HRS. 4800 FOOTAGE DRLD.
HRS. DRILLED HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 32 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7" CSG. 488
4.5" CSG. 526
LINER 3.5" 4205
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	300			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

POH, dropped DX bit from string
RIH with NC rods open-ended to
4800' TD. Circulated light-drilling
fluid and water for 8 hours & cool
hole for logs.
POH rigging up loggers at 2400 hrs

OPERATION @ 0600 HOURS FOLLOWING DAY:
Logging borehole with final
Geophysical Program

INOPERATIVE EQUIP'T, EXPLAIN

SUPERVISOR

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3000
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	100
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	4065 PRUETT 27 AUG 86
FISHING & DIRECTIONAL	
OTHER BOILER	250
DAILY TOTAL	$ 7715
FORWARD	365,023
ACCU TOTAL	$ 402,178
AFE	86 D100 (4300.02

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO. _____
REPORT NO. 15 DATE 2 SEPT 86
TOTAL RIG DAYS 15 TIME FROM SPUD _____
DEPTH @ 2400 HRS. 4800 FOOTAGE DRLD. —
HRS. DRILLED _____ HRS. TRIPPED _____
HRS. OTHER _____ COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. _____ VIS. _____ W.L. _____ CK. _____ PH ___ CHL _____ YP _____
P.V. _____ GELS _____ % SAND _____ % SOLIDS _____ % LOST CIRC. MTL. _____
GALVONIC PROBE _____ CORRATOR _____ SULPHIDE _____ OXY. _____ AIR-H₂O RATIO 1
FORM. DRLD. _____ FLOW LINE TEMP. _____ °F. SUCTION TEMP. _____ °F.
MAX. TEMP. 204 °F. DEVIATION SURVEYS: _____
three MRTs at 4800'

10¾" CSG 35'
7" CSG. 488'
4½" CSG. 526
LINER 3½ 4208
TIE-BACK _____
HRS. REPAIR _____ RIG NO. ____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO ___ CFM _____ PSI ___ TEMP. °F ___ CHEM. _____ RATIO 1 RATE ___
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: _____
TOTAL STRING WT. _____ TOTAL PICKUP WT. _____ ROTARY TORQUE (HIGH AVERAGE LOW) ___ ___ ___
STEAM ENTRIES, DEPTH, LBS. _____

REMARKS FOR 24 HOUR PERIOD:

Trust Service lifted Fire Precaution Class E on 8-30-86

Boyles Bros crews arrived back on drillsite afternoon of 9-2-86. Started kep rig at 2000 hrs.

R/U with wireline; found water level at 50-foot depth.

R/U with NCE rod - DX bit from 450' to 4800'; no problems and no fill on bottom. Ran three MRTs to 4800'; all recorded 204°F

OPERATION @ 0600 HOURS FOLLOWING DAY:
Pull and removed DX bit. Going in hole with open ended NCE rods to circulate & cool hole for final GP

INOPERATIVE EQUIPT. EXPLAIN Manhole Loss.

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	...? OMISSION
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	4200 - ? Mud pump $ 2000
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	" 990 N.W. 21 Aug @ $330/day
FISHING & DIRECTIONAL	
OTHER Loads	" 750
WATCHMAN	4030 Wash " 750
DAILY TOTAL	?
FORWARD	$ 385,263
ACCU. TOTAL	
AFE 86 D001, 4300 02	

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 74 DATE 27 Aug '86
TOTAL RIG DAYS 74 TIME FROM SPUD 818 + 10 hrs
DEPTH @ 2400 HRS. 4805 FOOTAGE DRLD. —
HRS. DRILLED — HRS. TRIPPED
HRS. OTHER — COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE DXY. AIR-H₂O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾ " CSG CSG. 35 feet
7 " CSG. 488
4.5 " CSG. 526
LINER 3.5 4205
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
												I B G
												I B G
												I B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE high average low
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Prugh Industries, Inc. ran a temperature-pressure survey from surface to total depth

Field readings are as follows:

DEPTH (ft)	TEMPERATURE (°F)	PRESSURE (psi)
100	BTL*	22
1010	BTL	420
2100	78	902
3000	~~[illegible]~~ 120	1297
4000	171	1730
4800	210/208	2094

4800 feet pick-up.

* BTL = Below tool limit of 50°F
** Two temperature tools run.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Suspended - shut down for USFS for hazard completion "E"

COSTS

TANGIBLES
CASING
VALVES
Pruett survey
Total Costs reported as $4065
- to be added into COSTS

TRANSPORTATION
LOGGING SERVICES
FISHING & DIRECTIONAL
OTHER Survey

DAILY TOTAL
FORWARD 385,263
ACCU. TOTAL
AFE 86 D001 4300 02

JLI 1 Oct '86

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO. _____
REPORT NO. 13 DATE 18 Aug 86
TOTAL RIG DAYS 13 TIME FROM SPUD 20 days
DEPTH @ 2400 HRS. 4800 FOOTAGE DRLD. 40
HRS. DRILLED 13 HRS. TRIPPED _____ HRS. REPAIR _____ RIG NO. _____
HRS. OTHER 11 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. _____ CK. _____ PH _____ CHL _____ YP _____
P.V. _____ GELS _____ % SAND _____ % SOLIDS _____ % LOST CIRC. MTL. _____
GALVONIC PROBE _____ CORRATOR _____ SULPHIDE _____ OXY. _____ AIR-H_2O RATIO 1
FORM. DRLD. _____ FLOW LINE TEMP. _____ °F. SUCTION TEMP. _____ °F.
MAX. TEMP. 191 °F. DEVIATION SURVEYS: _____
MR @ 4790

	CSG	35
10¾	" CSG.	
7	" CSG.	488
4.5	" CSG.	526
	LINER	35 4205
	TIE-BACK	

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
1	7⅞	Chris	DX	652304		4226	526		160½	1000	100	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	300			

AIR COMP. NO ___ CFM _____ PSI ___ TEMP. °F ___ CHEM. _____ RATIO 1 RATE ___
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: _____

TOTAL STRING WT. _____ TOTAL PICKUP WT. _____ ROTARY TORQUE (HIGH AVERAGE LOW) _____
STEAM ENTRIES, DEPTH, LBS. _____

REMARKS FOR 24 HOUR PERIOD:

Cored from 4760 to 4800 feet
Obtained 100% core recovery;
No drilling fluid returns
Received Forest Service order
to shut down rig and operations
due to high fire hazards. All
timber logging operations also
shut down today by this
Condition E determination
Pulled string off bottom
and cut DX rod with DX bit
at 4150. Closed rams on DC rod
string. Nedrul and Kelly cock
Shut down at mid day Aug 18

OPERATION @ 0600 HOURS FOLLOWING DAY:
Suspended - Shut down per USFS
Condition E

INOPERATIVE EQUIP'T, EXPLAIN _____ SUPERVISOR _____

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3120
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	200
FUEL, WATER POWER	
MUD	100
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	4400
FORWARD	$ 380,863
ACCU. TOTAL	$ 385,263
AFE	86-1001 4300.02

DO 19 Aug

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 12 DATE 17 Aug 80
TOTAL RIG DAYS 12 TIME FROM SPUD 710 + 11hrs
DEPTH @ 2400 HRS. 4760 FOOTAGE DRLD. 60
HRS. DRILLED 18 HRS. TRIPPED
HRS. OTHER 6 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 46 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 165 °F. DEVIATION SURVEYS:
MRT AT 4750'

10 3/4" CSG	35
7" CSG.	488
4.5" CSG.	326
LINER 3.5	4205
TIE-BACK	

HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
4	2.88"	Chris	NX	1652301		4226	4536	147.5	10	90	63	B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	300			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 4700 & 4760 feet
Recovered 100% cores; no
drilling fluid returns
1 hr temperature survey
5 hrs recovering and repairing
broken wire line and core
barrel.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 4780 feet

INOPERATIVE EQUIP'T, EXPLAIN

SUPERVISOR BOWDEN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4975
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	200
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	$ 6185
FORWARD	374,678
ACCU. TOTAL	380,863
AFE	86 0001 4300 02

10.18 Cu

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO. _____
REPORT NO. 11 DATE 16 Aug 86
TOTAL RIG DAYS 11 TIME FROM SPUD 10 x 10 hrs
DEPTH @ 2400 HRS. 4700 FOOTAGE DRLD. 80
HRS. DRILLED 23 HRS. TRIPPED _____
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. _____ CK. _____ PH ___ CHL _____ YP _____
P.V. _____ GELS _____ % SAND ___ % SOLIDS ___ % LOST CIRC. MTL. _____
GALVONIC PROBE _____ CORRATOR ___ SULPHIDE ___ OXY. ___ AIR-H₂O RATIO 1
FORM. DRLD. _____ FLOW LINE TEMP. _____ °F. SUCTION TEMP. _____ °F.
MAX. TEMP. 104 °F. DEVIATION SURVEYS: _____
CHCT at 4701 ±

10 3/4" CSG	35
7" CSG.	1488
4.5" CSG.	5216
LINER 3.5	4205
TIE-BACK	

HRS. REPAIR ___ RIG NO. ___

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
4	8 3/8"	Chcs	NX 65	2201		4226	4716	129.5	1000	60		T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				515	350			

AIR COMP. NO ___ CFM _____ PSI ___ TEMP. °F ___ CHEM. _____ RATIO 1 RATE ___
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: _____

TOTAL STRING WT. _____ TOTAL PICKUP WT. _____ ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS. _____

REMARKS FOR 24 HOUR PERIOD:

Cored from 4620 to 4700'
Got 100% core recovery
No drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:

Circ at 4720'

INOPERATIVE EQUIP'T, EXPLAIN _____

SUPERVISOR _____

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 6365
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	$ 7745
FORWARD	366,933
ACCU. TOTAL	374,678
AFE	86 D001 4300 02

DO. 17 Aug

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.

REPORT NO. 10 DATE 15 Dec 86

TOTAL RIG DAYS 10 TIME FROM SPUD 60 + Days

DEPTH @ 2400 HRS. 4630 FOOTAGE DRLD. 90

4620 →

HRS. DRILLED 22.5 HRS. TRIPPED

HRS. OTHER 1.5 COOLING TOWER IN USE, YES ☐ NO ☐

MUD WT. VIS. W.L. CK. PH CHL YP

P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.

GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1

FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.

MAX. TEMP. 184 °F. DEVIATION SURVEYS:

MRT AT 4630

10 3/4" CSG	35
7" CSG.	488
4.5" CSG.	526
LINER 3.5	4205
TIE-BACK	

HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
9	8 1/2	CHRS	NR	65230	4226		396	106	2	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	300			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE

DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW

STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 4530 to 4620'
Obtained 100% core recovery;
no drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:

Coring at 4640'

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	86347
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOYLES 250
DAILY TOTAL	$ 1847
FORWARD	359,186
ACCU. TOTAL	361,033
AFE	86 0001 4320 02

SUPERVISOR BRODEN

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 61 DATE 14 Aug 86
TOTAL RIG DAYS 61 TIME FROM SPUD 60 d + 10 HRS
DEPTH @ 2400 HRS. 4530 FOOTAGE DRLD. 30
HRS. DRILLED 23.5 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 0.5 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.5 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 82 °F. DEVIATION SURVEYS:
MRT AT 4540

10¾" CSG 35
7" CSG. 488
4.5" CSG. 526
LINER 3.5" 4205
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
9	7 7/8	HTC	NX	65 2301		4226	—	306	85	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1					350-650			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 80', from 4450 & 4530'
Got 100% core recovery; no mud returns.
Stirrup Creek water supply continues adequate yield; enough to keep 500 barrel Baker tank full and to meet daily reg-coring requirement.
Forest Service visit drillsite every 2-3 days to assure own water supply status and fire compliance.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 4550 feet

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 5320
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOILER 250
DAILY TOTAL	6700
FORWARD	352,406
ACCU. TOTAL	359,106
AFE	86 601 4300 0

SUPERVISOR Bowden

NO. 18

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 69 DATE 13 Aug '86
TOTAL RIG DAYS 68 TIME FROM SPUD 68 DAYS
DEPTH @ 2400 HRS. 4450 FOOTAGE DRLD. 79
HRS. DRILLED 23 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 183 °F. DEVIATION SURVEYS:
@ 4470' ; Fluid level = 60'

10¾" CSG CSG. 35
7" CSG. 483
4.5" CSG. 526
LINER 3.5" 4205'
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
9	2.375"	Christ	NX	652301		4226	—	226	59.5	500-10000 lbs	300-400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	650			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (MIN AVERAGE MAX)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 4371 to 4450'. No fluid returns; 100% core recovery

Picked up torque at 4405-4407'; attempting to improve mud system

Worked BOPE and pipe rams.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring @ 4470'.

INOPERATIVE EQUIPMENT:

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	
ABATEMENT	
BITS	5315
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Boyles Sup:	250
Trucking	2400
DAILY TOTAL	9095
FORWARD	343 311
ACCU. TOTAL	352 406
AFE	Reridan / JCI

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 67 DATE 12 Aug 86
TOTAL RIG DAYS 67 TIME FROM SPUD 1600 HRS
DEPTH @ 2400 HRS. 4371 FOOTAGE DRLD. 92
HRS. DRILLED 23 HRS. TRIPPED
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 85 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 182 °F. DEVIATION SURVEYS:
MRT AT 4383

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 526
LINER 3.5" 4205
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
9	6 1/8	Chris	NX	652301		4226		147	36.5	1000	100	B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	450			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 92 feet from 4279 to 4371 feet
Obtained 100% core recovery.
No drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:

Coring NX hole at 4390'

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 6170
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	700
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Boxes 250
DAILY TOTAL	7550
FORWARD	$ 335,761
ACCU. TOTAL	$ 343,311
AFE	80 201 4300 02

DOlii
13 Aug
BOYDEN

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 16 DATE 11 AUG 86
TOTAL RIG DAYS 16 TIME FROM SPUD 65D+10HRS
DEPTH @ 2400 HRS. 4279 FOOTAGE DRLD. 53
HRS. DRILLED 13.5 HRS. TRIPPED
HRS. OTHER 10.5 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 9.5 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 178 °F. DEVIATION SURVEYS:
AT 4296'

10¾ CSG. 35'
7" CSG. 488'
4.5" CSG. 526'
LINER 3.5 4205'
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
9	7.88	Cdco	NX	65301		4226	-	53	13.5	1000	400	I R G
												I R G
												I R G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	450			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 4226 feet to 4279 feet.
Obtained 100% Core Recovery;
No drilling fluid returns

Liquid level in core hole is 70 feet below surface

OPERATION @ 0600 HOURS FOLLOWING DAY:

Coring NX hole at 4300 feet

COSTS	
TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3545
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOILER 250
DAILY TOTAL	$ 4975
FORWARD	330,836
ACCU. TOTAL	335,769
AFE	86D01 4300 02

DD-12A

BOWDEN

THERMAL POWER COMPANY

WELL NO. CGH #1 AFE NO. _____
REPORT NO. 15 DATE 10 Aug 86
TOTAL RIG DAYS 15 TIME FROM SPUD 14 hours
DEPTH @ 2400 HRS. 4226 FOOTAGE DRLD. 23'
HRS. DRILLED 4 HRS. TRIPPED _____
HRS. OTHER 20 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.9 VIS. 45 W.L. _____ CK. _____ PH _____ CHL _____ YP _____
P.V. _____ GELS _____ % SAND _____ % SOLIDS _____ % LOST CIRC. MTL. _____
GALVONIC PROBE _____ CORRATOR _____ SULPHIDE _____ OXY. _____ AIR-H₂O RATIO 1
FORM. DRLD. _____ FLOW LINE TEMP. _____ °F. SUCTION TEMP. _____ °F.
MAX. TEMP. _____ °F. DEVIATION SURVEYS: _____

" CSG. _____
" CSG. _____
" CSG. _____
LINER _____
TIE-BACK _____
HRS. REPAIR _____ RIG NO. _____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
8	2.875	CHRist	NX	052302		4203	4226	23	4	500	300	T B G worn
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	600-800			

AIR COMP. NO. ___ CFM _____ PSI ___ TEMP. °F ___ CHEM. _____ RATIO ___ RATE ___
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: _____

TOTAL STRING WT. _____ TOTAL PICKUP WT. _____ ROTARY TORQUE (HIGH AVERAGE LOW) _____
STEAM ENTRIES, DEPTH, LBS. _____

REMARKS FOR 24 HOUR PERIOD:

Milled out HX diamond coreHead on bottom with NX diamond coreHead (bit 8) and cored to 4226'.
Recovered 100% core, had returns!
POH to replace worn bit 8

OPERATION @ 0600 HOURS FOLLOWING DAY:
RIH with new NX diamond core head and new core barrel

INCREMENTAL POWER FUEL ____

COSTS

TANGIBLES
CASING _____
VALVES _____
FLANGES _____
OTHER _____

INTANGIBLE
LOCATION _____
RIG MOVES _____
RIG # 3057
ABATEMENT _____
BITS _____
DRILL EQUIP. MAIN. _____
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER _____
MUD 250
SUPERVISION & LABOR 300
CEMENT SERVICES _____
TRANSPORTATION _____
LOGGING SERVICES 330
FISHING & DIRECTIONAL _____
OTHER BOILER 250

DAILY TOTAL 4487
FORWARD 326,349
ACCU. TOTAL 330,836
AFE 86 DOI 4300 02

DO 11 Aug
Brad Ec

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 64 DATE 6 Aug 86
TOTAL RIG DAYS 64 TIME FROM SPUD 63a + 10 mos
DEPTH @ 2400 HRS. 4203 FOOTAGE DRLD. —
HRS. DRILLED HRS. TRIPPED
HRS. OTHER 24 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG. 35
7" CSG. 688
4½" CSG. 326 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Started up rig at noon
RIH with new bits; found
core barrel at 4193 feet
latched to core barrel. POH slowly
recovered core barrel

OPERATION @ 0600 HOURS FOLLOWING DAY:
RIH with new NX core head

INCORPORATING COLUMBIA PUBLISHING

COSTS

TANGIBLES
- CASING
- VALVES
- FLANGES
- OTHER

INTANGIBLE
- LOCATION
- RIG MOVES
- RIG $1502
- ABATEMENT
- BITS
- DRILL EQUIP. MAIN.
- DRILL. EQUIP. RENTAL 300
- FUEL, WATER POWER
- MUD
- SUPERVISION & LABOR 300
- CEMENT SERVICES
- TRANSPORTATION
- LOGGING SERVICES 330
- FISHING & DIRECTIONAL
- OTHER Powles 250

DAILY TOTAL 2680
FORWARD 353,669
ACCU. TOTAL 326,349
AFE 8600 (4300 02

LSO-100
Bowe

THERMAL POWER COMPANY

10 3/4" CSG @ 35
7" CSG. 488
4.5" CSG. 526 Temporary
LINER
TIE-BACK

WELL NO. CTG#1 AFE NO.
REPORT NO. 63 DATE 8 Oct 86
TOTAL RIG DAYS 63 TIME FROM SPUD 620 + 10 hrs
DEPTH @ 2400 HRS. 4203 FOOTAGE DRLD. —
HRS. DRILLED — HRS. TRIPPED
HRS. OTHER 24 COOLING TOWER IN USE, YES ☐ NO ☑
HRS. REPAIR RIG NO.
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE high average low
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Ran latching assembly on WL, tools to top of core barrel at 4193 feet. Latched & POOH. No core barrel. Examined latch assembly, suspect release of core barrel at 823 feet

OPERATION @ 0600 HOURS FOLLOWING DAY:
Rig shut down. Latching assembly going to machine shop for modification.

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $ 3000
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD —
SUPERVISION & LABOR 300
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER COILED TBG 250

DAILY TOTAL $ 4180
FORWARD 314,989
ACCU. TOTAL 323,669
AFE 86 DOI 4300 02

WD Allen
BOWDEN

THERMAL POWER COMPANY

WELL NO. CGH-1 AFE NO.
REPORT NO. 62 DATE 7 Aug 86
TOTAL RIG DAYS 62 TIME FROM SPUD
DEPTH @ 2400 HRS. 4203' FOOTAGE DRLD.
HRS. DRILLED HRS. TRIPPED 10
HRS. OTHER 10.7 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG. 35
7" CSG. 488
4½" CSG. 526 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LBS.
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

12 hrs: Shut down, waiting on DX rods

12 hrs Unloaded truck picked up DX rods; RIH open ended. Found break in DX rods at 823' depth and at a connection per driller's record

POH, picked up latching assembly

OPERATION @ 0600 HOURS FOLLOWING DAY:

Running in hole at 2500' with DX rods and latching assembly

COSTS	
TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	@ 1500
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Dave 250
DAILY TOTAL	2680
FORWARD	316,809
ACCU. TOTAL	319,489
AFE	86 DO1 4309 02

80.8 Acres Bowden

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 61 DATE 10 Nov 86
TOTAL RIG DAYS 61 TIME FROM SPUD 60 + 10 days
DEPTH @ 2400 HRS. 4203 FOOTAGE DRLD. 0
HRS. DRILLED HRS. TRIPPED
HRS. OTHER 24 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10 3/4" CSG. 35
7" CSG. 438
4.5" CSG. 326 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE MIN AVERAGE MAX
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Wells Shut down;
Waiting on DC tools

OPERATION @ 0600 HOURS FOLLOWING DAY:

As above

INCREASING COLUMN FUEL ...

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 0
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Bowles	250
DAILY TOTAL	1180
FORWARD	315,629
ACCU. TOTAL	$ 316,809
AFE	86 D01 4300 02

No Charge for BOWLES

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 60 DATE 5 Aug 86
TOTAL RIG DAYS 60 TIME FROM SPUD 59 + Hours
DEPTH @ 2400 HRS. FOOTAGE DRLD.
HRS. DRILLED HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG @ 35
7" CSG. 488
4½" CSG. 5726 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
7	3.937	Cobo	MC	105 2938								T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (HIGH AVERAGE LOW)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Shut down; waiting on WX
Rods

OPERATION @ 0600 HOURS FOLLOWING DAY:

As above

COSTS	
TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 0
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	0
SUPERVISION & LABOR	
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Gayles 250
DAILY TOTAL	1480
FORWARD	314,109
ACCU. TOTAL	315,629
AFE	86401 4300 02

NO Glycol powder

THERMAL POWER COMPANY

WELL NO. CTGH 1 APE NO. _____
REPORT NO. 54 DATE 4 Aug 86
TOTAL RIG DAYS 34 TIME FROM SPUD 510 + 10 hrs
DEPTH @ 2400 HRS. 4203 FOOTAGE DRLD. 60
HRS. DRILLED 13.5 HRS. TRIPPED _____ HRS. REPAIR _____ RIG NO. _____
HRS. OTHER 10.5 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. _____ CK. _____ PH _____ CHL _____ YP _____
P.V. _____ GELS _____ % SAND _____ % SOLIDS _____ % LOST CIRC. MTL. _____
GALVONIC PROBE _____ CORRATOR _____ SULPHIDE _____ OXY. _____ AIR-H$_2$O RATIO 1
FORM. DRLD. _____ FLOW LINE TEMP. _____ °F. SUCTION TEMP. _____ °F.
MAX. TEMP. 171 °F. DEVIATION SURVEYS: _____
MRT at 4173'

10¾" CSG. 35
7" CSG. 488
4½" CSG. 526 temporary
LINER _____
TIE-BACK _____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
1	5.937	CHRIS	MC 65	7458	—	3721	—	482	30	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				513	350			

AIR COMP. NO ___ CFM _____ PSI ___ TEMP. °F ___ CHEM. _____ RATIO ___ L RATE ___
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: _____

TOTAL STRING WT. _____ TOTAL PICKUP WT. _____ ROTARY TORQUE _____ HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS. _____

REMARKS FOR 24 HOUR PERIOD:

Cored 60 feet, from 4143 to 4203 feet
Recovered 100% cores; no mud returns
Sudden failure of HX core rods, while coring at 4203'. Core rod string weight suggests break at 1000-1200' depth range.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Waiting on HX rods for fishing run with Wall Spear.

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4187
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Services	250
DAILY TOTAL	$ 5667
FORWARD	308,482
ACCU. TOTAL	$ 314,149
AFE 86 001	4300 02

No Slu
1 DWEC

THERMAL POWER COMPANY

WELL NO. CGit 1 AFE NO.
REPORT NO. 58 DATE 3 AUG 86
TOTAL RIG DAYS 58 TIME FROM SPUD 570 + 10 HRS
DEPTH @ 2400 HRS. 4143 FOOTAGE DRLD. 81
HRS. DRILLED 23 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 1 COOLING TOWER IN USE. YES ☐ NO ☐
MUD WT. 8.9 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 167 °F. DEVIATION SURVEYS:
NOT AT 4133'

10 3/4" CSG. 35
7" CSG. 488
4.5" CSG. 526 Temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
1	3.937	CHRC	NC	652458	-	3721	-	422	116.5	1000	40	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	350			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Drld 81 feet, from 4062 & 4143 feet. Obtained 100% core recovery; six mud returns

Water level in coalbed at 75 feet below ground surface

OPERATIONS @ 0600 HOURS FOLLOWING DAY:
Coring at 4163 feet

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $ 5609
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 300
SUPERVISION & LABOR 302
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 350
FISHING & DIRECTIONAL
OTHER BOYLES 250

DAILY TOTAL 7089
FORWARD 301,393
ACCU. TOTAL $ 308,482
AFE 8600 [illegible] 02

DO Hang Lower

THERMAL POWER COMPANY

WELL NO. CGH 1 AFE NO.
REPORT NO. 37 DATE 2 AUG 86
TOTAL RIG DAYS 37 TIME FROM SPUD 560 HOURS
DEPTH @ 2400 HRS. 4062 FOOTAGE DRLD. 80
HRS. DRILLED 23 HRS. TRIPPED
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.7 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 167 °F. DEVIATION SURVEYS:
NRT AT 4052

10¾" CSG @ 35
7" CSG. @ 488
4½" CSG. @ 526 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
1	9.937	HTC	HP	6052458	-	3721	-	341	93	1001	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				575	3572			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 80 feet, from 3982 & 4062 feet
Got 100% core recovery. No mud
returns

Water level at 70 feet below
surface

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 4083 feet

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 5379
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOILER 250
DAILY TOTAL	$ 6859
FORWARD	294,534
ACCU. TOTAL	$ 301,393
AFE	86201 4300.02

DO diesel power

...POWER COMPANY

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 526 Temporary
LINER
TIE-BACK

WELL NO. CTGH AFE NO.
REPORT NO. 56 DATE 1/14/86
TOTAL RIG DAYS 56 TIME FROM SPUD 550+10mos
DEPTH @ 2400 HRS. 3482 FOOTAGE DRLD. 81
HRS. DRILLED 23 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 162 °F. DEVIATION SURVEYS:
MRT AT 3972

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
1	3.97"	CHRIS	MC	65258	—	3721	—	761	10.5	1000	4000	I 8 G
												I 8 G
												I 8 G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	350			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 81 feet from 3401 to 3482 feet
Recovered 100%; no drilling fluid
returns

Water level in borehole at 75'
below surface

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 4002 feet

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4880
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Miles 250
DAILY TOTAL	$ 6360
FORWARD	288174
ACCU. TOTAL	$ 744,534
AFE	86-201 4300.02

JD-Denver
LOWERY

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 33 DATE 31 JULY 1986
TOTAL RIG DAYS 33 TIME FROM SPUD 540 HOURS
DEPTH @ 2400 HRS. 3901 FOOTAGE DRLD. 90
HRS. DRILLED 23 HRS. TRIPPED
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 155 °F. DEVIATION SURVEYS:
MRT AT 3891'

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 328 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
7	3.95"	CHRIS	MC	657958		3721	INC	180	47.5	100	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1								

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (HIGH AVERAGE LBS.)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Core 90 feet from 3811 to 3901 feet
Got 100% Core Recovery; No
drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 3921

INOPERATIVE EQUIPMENT THIS DAY:

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $ 4787
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 302
FUEL, WATER POWER
MUD 300
SUPERVISION & LABOR 300
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER BOILER 750

DAILY TOTAL $ 6267
FORWARD 281907
ACCU. TOTAL $ 288174
AFE 86001 4300-02

DO Mayer
Engineer

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 54 DATE 30 July 1986
TOTAL RIG DAYS 54 TIME FROM SPUD 530 Hours
DEPTH @ 2400 HRS. 3811 FOOTAGE DRLD. 88
HRS. DRILLED 23½ HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER ½ COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 43 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 146 °F. DEVIATION SURVEYS:
MCI AT 3763'

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 526 temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
7	3.951"	Cmbs	MC 65	2888		3721	TWC	90	24½	7000	460	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	350			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (ft-lbs average lbs)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 3723 to 3811 feet
Obtained 100% core recovery.
Lost drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:

Coring at 3831 feet

INCREASING DRILLING FLUID VOL.

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG 9 462
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 300
SUPERVISION & LABOR 300
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER BOILER 250

DAILY TOTAL 6101
FORWARD 275,806
ACCU. TOTAL 281,907
AFE 86001 430002

DO 3/5
BROOKS

THERMAL POWER COMPANY

WELL NO. CTG H 1 AFE NO.
REPORT NO. 53 DATE 20 June 1986
TOTAL RIG DAYS 53 TIME FROM SPUD 520 + 10 HRS
DEPTH @ 2400 HRS. 3723 FOOTAGE DRLD. 2
HRS. DRILLED 1 HRS. TRIPPED
HRS. OTHER 23 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. None °F. DEVIATION SURVEYS:

10 3/4" CRG - CSG. 35
7" CSG. 488
4.5" CSG. 526 Temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
7	3.937	CHRS	MC	652958		3721		2	1	1000	400	I B G
												I B G
												I B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5.15	550			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored only 2' (3721-23') with new 3.937" corehead

Ran new corehead - bit #7, corebarrel, latch couple and reamer shell

RIH Washed 8006965' interval and chased casings to bottom

Worked BOP equipment

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 3743'

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $ 1982
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 300
SUPERVISION & LABOR 330
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER BOILER 250

DAILY TOTAL $ 3462
FORWARD $ 272,344
ACCU. TOTAL $ 275,806
AFE 86 DOT 4300 02

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 52 DATE 28 July 1986
TOTAL RIG DAYS 52 TIME FROM SPUD 51e + 1eve
DEPTH @ 2400 HRS. 3721 FOOTAGE DRLD. 80
HRS. DRILLED 23 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 137 °F. DEVIATION SURVEYS:
MKT AT 3711

10¾" CSG. 35
7" CSG. 468
4.5" CSG. 526 temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
6	5 7/8	CHRS	MC	652460		2336	3721	1385	34½	1/1000	40V	T 1 G 1/8 HOLEN
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	350			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 80 feet, from 3641 to 3721 feet.
Got 100% Core Recovery; no
drilling fluid returns

Water level in corehole is 65 feet

OPERATION @ 0600 HOURS FOLLOWING DAY:
Trip for new diamond corehead,
and then core tunnel at 3721'

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG Fb 4821
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 300
SUPERVISION & LABOR 300
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER Boxes 50

DAILY TOTAL 630
FORWARD 266,043
ACCU. TOTAL $272,344
AFE 8601 4300 02

D. Olin 29 July
Bowden

WELL NO. CTGH-1 AFE NO.
REPORT NO. 37 DATE 27 JULY 1986
TOTAL RIG DAYS 37 TIME FROM SPUD 36 1/2 HOURS
DEPTH @ 2400 HRS. 3641 FOOTAGE DRLD. 79
HRS. DRILLED 21 HRS. TRIPPED
HRS. OTHER 3 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 4 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 138 °F. DEVIATION SURVEYS: 3300 · 3/4° N16°W
MRT AT 3641

10 3/4" CSG. CSG. 35
7" CSG. CSG. 488
4.5" CSG. CSG. 526 Temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
6	3.937	CHRIS	MC	652460	—	2336	—	1306	217.5	1000	40/60	I P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-13	350			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE MIN AVERAGE MAX
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 79 feet, from 3562 to 3641 feet. 100% core recovery. No mud returns

Corehole water level at 90 feet

OPERATIONS @ 0600 HOURS FOLLOWING DAY:

Coring at 3661 feet

INOPERATIVE EQUIPMENT:

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 476.3
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Packers 250
DAILY TOTAL	$ 1,626.3
FORWARD	254,800
ACCU. TOTAL	266,043
AFE	86,021 4300.02

DO-28

BROOKS

THERMAL POWER COMPANY

WELL NO. CTG #1 AFE NO.
REPORT NO. 30 DATE 26 July 1986
TOTAL RIG DAYS 30 TIME FROM SPUD 440 HRS
DEPTH @ 2400 HRS. 3562 FOOTAGE DRLD. 101
HRS. DRILLED 23½ HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER ½ COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.9 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,D RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 131 °F. DEVIATION SURVEYS: MCI 3542

10 3/4" CSG. 35
7" CSG. 488
4.5" CSG. 5216 temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
10	3.937	CHRS	MC	125460		2336	1221		286	1000	100	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				575	350			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE MIN AVERAGE MAX
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 3461 to 3562 feet
Total 101 feet
90% Core Recovery
no drilling fluid returns

Core hole water level at 10 feet

OPERATION @ 0600 HOURS FOLLOWING DAY:

Coring at 3582 feet

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $ 5723
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 300
SUPERVISION & LABOR 300
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER BOXES 250

DAILY TOTAL 7203
FORWARD $ 252,397
ACCU. TOTAL 259,600
AFE 86.001 430 02

DO 27 Jul
Gordon

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 44 DATE 25 July 1986
TOTAL RIG DAYS 44 TIME FROM SPUD 43 D + 11 HRS
DEPTH @ 2400 HRS. 3461 FOOTAGE DRLD. 106
HRS. DRILLED 24 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☑
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 127 °F. DEVIATION SURVEYS:
MRT 3451

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 526 temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
16	5.937	CHRG	MC 62460			2336	TD	1126	273	1000		T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15		200		

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Drld 106 feet from 3355 to 3461

Got 100% core recovery; no mud returns

Borehole water level at 70 feet

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring below 3483 feet

INCREMENTAL POWER FUEL ....

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $3492
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 300
SUPERVISION & LABOR 300
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER 250

DAILY TOTAL 6172
FORWARD $245,628
ACCU. TOTAL 252,597
AFE 86001 4300 02

DD 26 Jul
BOWDEN

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 48 DATE 24 June 1986
TOTAL RIG DAYS 48 TIME FROM SPUD 47 + 10 hrs
DEPTH @ 2400 HRS. 3355 FOOTAGE DRLD. 86
HRS. DRILLED 22 1/2 HRS. TRIPPED
HRS. OTHER 1 1/2 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 43 W.L. 12 CK. 1/32 PH 6.5 CHL 1000 YP 10
P.V. 15 GELS 4 % SAND 0 % SOLIDS .5 % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 176 °F. DEVIATION SURVEYS: 3350

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 526 Temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
6	3.937	Chris	MC	652460		2336	TOC	1019	249	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	150			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 3268 to 3355 feet
Obtained 100% core recovery;
no drilling fluid returns
Water level in core hole at 80 feet

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 3382 feet

COSTS

TANGIBLES
- CASING
- VALVES
- FLANGES
- OTHER

INTANGIBLE
- LOCATION
- RIG MOVES
- RIG $4543
- ABATEMENT
- BITS
- DRILL EQUIP. MAIN.
- DRILL. EQUIP. RENTAL 300
- FUEL, WATER POWER
- MUD 300
- SUPERVISION & LABOR 300
- CEMENT SERVICES
- TRANSPORTATION
- LOGGING SERVICES 330
- FISHING & DIRECTIONAL
- OTHER Boyles 250

DAILY TOTAL 6023
FORWARD 739,602
ACCU. TOTAL $745,625
AFE 86001 4300 02

DO-207
Baud

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 47 DATE 22 June 1986
TOTAL RIG DAYS 47 TIME FROM SPUD 46d 7 Hours
DEPTH @ 2400 HRS. 3269 FOOTAGE DRLD. 96
HRS. DRILLED 24 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 131 °F. DEVIATION SURVEYS:
MRT at 3259

10¾" CSG @ 35'
7" CSG. 488
4½" CSG. 526 Temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
10	3.937	Hughes	MC	62460		2336	INC	933	226	1000	480	I P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	185			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 3173 to 3269'

Got 100% core recovery; no drilling fluid returns

Liquid level in borehole at 60' depth

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 3290'

INOPERATIVE EQUIPT. EXPL.:

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $ 4973
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 350
SUPERVISION & LABOR
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER Boxes 250

DAILY TOTAL 6503
FORWARD $ 233,099
ACCU. TOTAL $ 239,602
AFE 86 DOI 4200 02

Dillingham 24 Hole Bowden

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 46 DATE 7-22-86
TOTAL RIG DAYS 46 TIME FROM SPUD 45+10 hr
DEPTH @ 2400 HRS. 3173 FOOTAGE DRLD. 109
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: MRT @ 3159 - .124°

CSG
" CSG.
" CSG.
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
6	3.937	Chr	NC	652460		2336	ine	837	202.5	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				515	1750			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO L RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:
water level 80 feet
Cored 3069-3173'
No mud returns
100% recovery

OPERATION @ 0600 HOURS FOLLOWING DAY:
coring @ 3189

INCREASING FOR NEXT TOUR ....

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG 5388
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 350
SUPERVISION & LABOR 300 Boyle Bros 250
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES
FISHING & DIRECTIONAL
OTHER Geologists 330

DAILY TOTAL 6918
FORWARD 226,181
ACCU. TOTAL 233,099 (D.D.H.)
AFE

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 45 DATE 7-21-86
TOTAL RIG DAYS 45 TIME FROM SPUD 444 hrs
DEPTH @ 2400 HRS. 3069 FOOTAGE DRLD. 89
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 9.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: 3059' - 1/9° F MRT

CSG 10¾" - 351'
" CSG.
" CSG. 7" - 488
" CSG. cmt to surf.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
6	3.937	Chr.	NC	652460	—	2336	inc	733	178.5	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	250			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE high average low
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:
Cored 2980' - 3069'
no mud returns
100% recovery

OPERATION @ 0600 HOURS FOLLOWING DAY:
coring @ 3089

INCREMENTAL FUEL USE:

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG 4501
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 350
SUPERVISION & LABOR 300 / Boyle Bros 250
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES
FISHING & DIRECTIONAL
OTHER geologists - 330

DAILY TOTAL 6031
FORWARD 220,150
ACCU. TOTAL 226,181
AFE

R.K.B. (98H)

THERMAL POWER COMPANY

CSG 10 3/4, set @ 35'
CSG. 7" Act - 488'
CSG.
CSG.
LINER
TIE-BACK

WELL NO. CTGH #1 AFE NO.
REPORT NO. 44 DATE 7/20/86
TOTAL RIG DAYS 44 TIME FROM SPUD 43 D + 10 Hr
DEPTH @ 2400 HRS. 2980 FOOTAGE DRLD. 68'
HRS. DRILLED 15 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 9 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: MRT 2942, 1 1/2°, Fair level @ 63'

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
6	3.937	CHRISTEN	NC	652460		2336	In corp	644	144.5	1000	400	I B G
												I B G
												I B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	300			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cores form 2912 to 2980, No mud returns. Core recovery 100%. 1 hr MRT. Survey and fluid level

8 hrs drilling w/ N Core ah bottom, Pick it out w/ N rods. lost 4 foot of Core out of inner barrel

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2993'

INCREMENTAL REPORT FOR [illegible]

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	3152
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	
FISHING & DIRECTIONAL	
OTHER	Supervisor - 250
	2-Geologists - 330
DAILY TOTAL	4682
FORWARD	215,468
ACCU. TOTAL	220150
AFE	

THERMAL POWER COMPANY

WELL NO. CHH 1 AFE NO.
REPORT NO. 43 DATE 19 JULY 1986
TOTAL RIG DAYS 43 TIME FROM SPUD 420 + 10 HRS
DEPTH @ 2400 HRS. 2912' FOOTAGE DRLD. 103
HRS. DRILLED 24 HRS. TRIPPED — HRS. REPAIR RIG NO.
HRS. OTHER — COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 114 °F. DEVIATION SURVEYS:
MRT AT 2903'

10¾" CSG @ 35
7" CSG. 488
4.5" CSG. 326 Temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
6	3.937	Chris	MC	650260		2336'	—	576	139	1000	400	I P G
												I P G
												I P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	300			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 2809 to 2912'
Recovered 100% cores from the 103-foot interval
No drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2933' No rod chatter.

COSTS	
TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4774
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOYLES 250
DAILY TOTAL	$ 6304
FORWARD	$ 209,164
ACCU. TOTAL	215,468
AFE	86.001.4300.02

DO 20 July
BROWDEN

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 42 DATE 18 July 86
TOTAL RIG DAYS 42 TIME FROM SPUD 40+ HOURS
DEPTH @ 2400 HRS. 2809 FOOTAGE DRLD. 101
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 43 W.L. CK. PH . CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 103 °F. DEVIATION SURVEYS:
AT 2802'

10¾" CSG 35
7" CSG. 468
4.5" CSG. 526 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
6	5.937	CHRIS	MC16	2460		2336	Inc	473	15½	1000	40	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	225			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 101', from 2708' to 2809'.
Got 100% Core recovery; use drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2831'. Some rod chatter

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4681
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	302
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	6211
FORWARD	202,953
ACCU. TOTAL	$ 209,164
AFE	86-01-4300-02

D Olin Bowden

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO. _____
REPORT NO. 41 DATE 17 July
TOTAL RIG DAYS 41 TIME FROM SPUD _____
DEPTH @ 2400 HRS. 2708 FOOTAGE DRLD. 114
HRS. DRILLED 23½ HRS. TRIPPED _____
HRS. OTHER ½ COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. _____ CK. _____ PH _____ CHL _____ YP _____
P.V. _____ GELS _____ % SAND _____ % SOLIDS _____ % LOST CIRC. MTL. _____
GALVONIC PROBE _____ CORRATOR _____ SULPHIDE _____ OXY. _____ AIR-H,O RATIO 1
FORM. DRLD. _____ FLOW LINE TEMP. _____ °F. SUCTION TEMP. _____ °F.
MAX. TEMP. 101 °F. DEVIATION SURVEYS: _____
2663' MRTS Water level 85'

10-¾" CSG 35
7" CSG. 488
4.5" CSG. 526 Temp
LINER _____
TIE-BACK _____
HRS. REPAIR _____ RIG NO. _____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
6		Chris	MC	652460		2336	TWC	372	91½	1000	40	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	175			

AIR COMP. NO ___ CFM ___ PSI ___ TEMP. °F ___ CHEM. ___ RATIO 1 RATE ___
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: _____

TOTAL STRING WT. _____ TOTAL PICKUP WT. _____ ROTARY TORQUE (MIN AVERAGE MAX) _____
STEAM ENTRIES, DEPTH, LBS. _____

REMARKS FOR 24 HOUR PERIOD:

Cored from 2594 to 2708'
Recovered 114' or 100% Cores
No drilling fluid losses.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2733'

INOPERATIVE EQUIPT. EXPLAIN: _____

COSTS

TANGIBLES
- CASING _____
- VALVES _____
- FLANGES _____
- OTHER _____

INTANGIBLE
- LOCATION _____
- RIG MOVES 5
- RIG $ 5348
- ABATEMENT _____
- BITS _____
- DRILL EQUIP. MAIN. _____
- DRILL. EQUIP. RENTAL 300
- FUEL, WATER POWER _____
- MUD 350
- SUPERVISION & LABOR 300
- CEMENT SERVICES _____
- TRANSPORTATION _____
- LOGGING SERVICES 330
- FISHING & DIRECTIONAL _____
- OTHER 250

DAILY TOTAL 6878
FORWARD 196,075
ACCU. TOTAL $ 202,953
AFE 86 E01 4300-02

DOR July
Barnes

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 49 DATE 7-16-86
TOTAL RIG DAYS 40 TIME FROM SPUD 294 10h
DEPTH @ 2400 HRS. 2594 FOOTAGE DRLD. 59
HRS. DRILLED 16 HRS. TRIPPED
HRS. OTHER 8 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE DXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:
MRT @ 2584' = 199°F

10 3/4 CSG 35
7 " CSG. 498
4.5 " CSG. 1526 Temp
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
6	3.937	Chris	NC	652460	—	2336	—	258	68	10W	40	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				515	1150			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 2535 - 2594', NO mud returns, 100% core recovery

RIH w/ wireline to retrieve core @ 2584', core barrel stuck on way out at 400', pulled wireline in two, pulled 10 stands, retrieved core barrel, laid down 1 bad joint of core tubing, installed new wireline; RIH 10 stands to 2584', continued to core to 2544'.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring @ 2613'

INOPERATIVE EQUIP'T. EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	2770
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	
Boyles SUP	250
DAILY TOTAL	4300
FORWARD	191775
ACCU. TOTAL	196075
AFE	

R. E. Boulton

JLI
17 July '86

THERMAL POWER COMPANY

WELL NO. CTCH-1 AFE NO.
REPORT NO. 39 DATE 7/15/86
TOTAL RIG DAYS 39 TIME FROM SPUD 38D+10hr
DEPTH @ 2400 HRS. 2535 FOOTAGE DRLD. 69
HRS. DRILLED 19 HRS. TRIPPED ~5hrs HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:
MRT @ 2544 – 96°F

10¾" CSG CSG. 35'
7 " CSG. 488
4.5 " CSG. 526 Temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
#6	3 7/7	CH	NC	652460		2336	—	199	52	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
#1				5-15	150			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE high average low
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

5hrs on trip. Run in hole with wireline to retrieve core at 2476. Pulled out of hole with core in a barrel lining up inside core tubing. Pulled wire line into. Pulled out of hole, 17 stands, retrieve core barrel, laid down 1 joint of bad core tubing. Rim in hole at 2476 - Washed coal bridge from 1776 to 1780. Washed out 5' of fill on bottom. 19 hrs coring from 2476' to 2535'. No mud problems at 100% core recovery.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2562'

INOPERATIVE EQUIP'T. EXPLAIN

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER (Trucking) Mercaptan
INTANGIBLE Dtx Cap - $ 9140
LOCATION
RIG MOVES
RIG 3046
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL $ 300
FUEL, WATER POWER
MUD $ 350.
SUPERVISION & LABOR $ 300.
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES $ 250
FISHING & DIRECTIONAL Boyles Sup
OTHER Unload/loading mud $ 750
2 Geolog - $ 330

DAILY TOTAL $ 5566
FORWARD $ 186209
ACCU. TOTAL $ 191775
AFE

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 38 DATE 14 July 1986
TOTAL RIG DAYS 38 TIME FROM SPUD 37 7/10 days
DEPTH @ 2400 HRS. 2466 FOOTAGE DRLD. 98
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER HRS. REPAIR / RIG NO.
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 85 °F. DEVIATION SURVEYS:
MRT AT 2395

10 3/4" CSG 35
" CSG.
7 5/8" CSG 488
" CSG. 526 Temporary
LINER
TIE-BACK
COOLING TOWER IN USE, YES ☐ NO ☒

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
6	3.937	Chas	ATM	165246		2336	TRC	130	33	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	150			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (HIGH AVERAGE LOW)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 2368 to 2466'
100% Core recovery; no drilling fluid returns

Had cored to 2476'. Core barrel jammed in core hole at ± 600' depth upon retrieval. Broke wireline again. POH

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIPT. EXPLAIN:

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4106
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOYLES 250
DAILY TOTAL	5636
FORWARD	180,573
ACCU TOTAL	186,209
AFE	86.80 / 4300.02

DO 15 July
BOWDEN

THERMAL POWER COMPANY

WELL NO. CTGit 1 AFE NO.
REPORT NO. 37 DATE 13 July 1980
TOTAL RIG DAYS 37 TIME FROM SPUD
DEPTH @ 2400 HRS. 2368 FOOTAGE DRLD. 32
HRS. DRILLED 9 HRS. TRIPPED
HRS. OTHER 15 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾ CSG 35
7 " CSG. 488
5 " CSG. 526 Temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
6	3.937	CHRIS	MC	1652460		2336		32	9	1010	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	150			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Washed from 1000' to 2336' TD
No significant debris on bottom
Cored from 2336 to 2368'
Full core recovery obtained;
no drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2385'

INOPERATIVE EQUIPT. FOR LAST

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 1340
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Barges	250
1" WATER LINE	500
DAILY TOTAL	3370
FORWARD	177,203
ACCU. TOTAL	$ 180,573
AFE 8600	4300 02

DO'Kelly
BOWDEN

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 36 DATE 12 July 1986
TOTAL RIG DAYS 36 TIME FROM SPUD 350 + Hours
DEPTH @ 2400 HRS. 2336 FOOTAGE DRLD. 50
HRS. DRILLED 8 HRS. TRIPPED
HRS. OTHER 16 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: None

10¾" CRG - CSG. 55'
7⅝" CSG. 488
4½" CSG. 326 Temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
5	3.937	CHRIS	MC	652461		1775	2336	561	140	1000	400	T B G ½ worn
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	150			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 2286 to 2336 *
Wohen wireline parted pulling core barrel off bottom
POH Recovered core barrel; ran next diamond core bit, greased, TOOH
RIH Reamed and worked from 880' to 1000'

* Full core recovery; no drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
Washing below 1800'

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 2095
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Pipes 250
DAILY TOTAL	3575
FORWARD	$ 173.628
ACCU. TOTAL	$ 177.203
AFE	86001 42m 02

DO 13 [illegible]
- Brudel

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 35 DATE 11 JULY 1986
TOTAL RIG DAYS 35 TIME FROM SPUD 340+ HRS
DEPTH @ 2400 HRS. 2286 FOOTAGE DRLD. 105
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER 0 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.9 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 69 °F. DEVIATION SURVEYS:
MRT at 2243'

10 3/4" CSG @ 35'
7" CSG. @ 488'
4.5" CSG. @ 526' temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
5	CHRS	INC	GS	2461		1775	INC	511	132	1000	400	I B G
												I B G
												I B G

3.937"

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				512	1500			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cut from 2181 to 2286'
Recved 105' = 100%
No fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2306'

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4400
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOYLES 250
DAILY TOTAL	5880
FORWARD	167,745
ACCU. TOTAL	$ 173,625
AFE	86 D01 4300 02

SUPERVISOR

DO17 Jul
BOWDEN

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 33 DATE 4 July 1988
TOTAL RIG DAYS 33 TIME FROM SPUD 320+10 hrs
DEPTH @ 2400 HRS. 2083 FOOTAGE DRLD. 85
HRS. DRILLED 24
HRS. OTHER
MUD WT. 8.4 Pump Pressure → 0
P.V.
GALVONIC PI Fluid level drop to 150'
FORM. DRLD.
MAX. TEMP. 140°F may be due to water level
BIT # SIZE M maintenance down to pump pressure
3 3.937 activity

PUMP	LINER
1	

AIR COMP. NO
DRILLING AS!

10¾" CSG 35
7" CSG. 488
4½" CSG. 526 Temporary
LINER
TIE-BACK
HRS. REPAIR / RIG NO.
YES ☐ NO ☒
PH . CHL YP
% LOST CIRC. MTL.
OXY. AIR-H₂O RATIO 1
SUCTION TEMP. °F.

FT.	HRS.	WT.	RPM	COND
324	89	1000	400	T B G
				T B G
				T B G

PM	NOZZLE VEL.	ANNULUS VEL.

EM. RATIO 1 RATE

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (HIGH AVERAGE LOW)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 3.937" hole from 1998 to 2083' Obtained 100% recovery. No drilling fluid returns

H₂S detection equipment NOT OPERATING. Awaiting electric outage. Will repair or replace and leave at functioning by 2500' depth

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 2103'. Pump pressure fell to zero at 2102' Fluid level fell to +150'.

INOPERATIVE EQUIP'T. EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3557
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	250
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	$ 250
DAILY TOTAL	$ 4981
FORWARD	157,131
ACCU. TOTAL	$ 162,112
AFE	86001-4300-02

DD. 10 July Bohlken

THERMAL POWER COMPANY

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 526 temporary
LINER
TIE-BACK

WELL NO. CTG14 AFE NO.
REPORT NO. 34 DATE 10 July 1986
TOTAL RIG DAYS 34 TIME FROM SPUD 330 + 10 yrs
DEPTH @ 2400 HRS. 2181 FOOTAGE DRLD. 98
HRS. DRILLED 24 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 75 °F. DEVIATION SURVEYS:
MRT 2130

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
5	7.751	HTC	XIC	7461		1775	loc	906	108	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	150			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 98' from 2083 to 2181'
Recovered 100% ; NO DRLG FLUID
Returns

OPERATIONS @ 0600 HOURS FOLLOWING DAY:
Coring at 2201' Some
mod chatter.

INOPERATIVE EQUIPT. EXPLAIN:

COSTS

TANGIBLES
CASING
VALVES
FLANGES
OTHER

INTANGIBLE
LOCATION
RIG MOVES
RIG $4106
ABATEMENT
BITS
DRILL EQUIP. MAIN.
DRILL. EQUIP. RENTAL 300
FUEL, WATER POWER
MUD 350
SUPERVISION & LABOR 300
CEMENT SERVICES
TRANSPORTATION
LOGGING SERVICES 330
FISHING & DIRECTIONAL
OTHER $250

DAILY TOTAL 5636
FORWARD 162112
ACCU. TOTAL 167748
AFE 86 DOI 4300-02

DO 11 July
Bowden

THERMAL POWER COMPANY

WELL NO. CT&H-1 AFE NO.
REPORT NO. 32 DATE 8 July 1986
TOTAL RIG DAYS 32 TIME FROM SPUD 310 + 10 hrs
DEPTH @ 2400 HRS. 1998 FOOTAGE DRLD. 81
HRS. DRILLED 24 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.5 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR:H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35'
7" CSG. 488
5" CSG. 526 temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
5	5.97	DI	HC	652461		1775	1998	223	60	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	200			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (HIGH AVERAGE LOW)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 1917 to 1998
100% core recovery; no drilling fluid returns
All training on H₂S safety and detection completed with all these drilling crews

OPERATION @ 0600 HOURS FOLLOWING DAY:

Coring at 2016

COSTS	
TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	8 2972
RIG	
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	4932
FORWARD	134619
ACCU. TOTAL	139,131
AFE	86 D01-4300-02

RD 9 July Bowden

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 31 DATE 7 July 1986
TOTAL RIG DAYS 31 TIME FROM SPUD 300 + 10 HRS
DEPTH @ 2400 HRS. 1917 FOOTAGE DRLD. 89
HRS. DRILLED 24 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 75 °F. DEVIATION SURVEYS:
ART AT 1939

10 3/4" CSG. @ 35
7" CSG. @ 488
4.5" CSG. @ 326 Temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
5	3.781"	CHRG	MC	652WJd		1775	INC	142	36	1000	Your	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	200			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 89' from 1828 to 1917'
Obtained 100% core recovery
No drilling fluid returns.

D. Walters Exlog Smith
On location July 7th
· installed H$_2$S detection system
· trained two crews on H$_2$S
safety and detection system

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 1939'

INOPERATIVE EQUIPT. EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	# 326
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	4646
FORWARD	130033
ACCU. TOTAL	134,679
AFE	86201-4300-02

D.O. 8 July
B. WOOD

THERMAL POWER COMPANY

WELL NO. CTGH1 AFE NO.
REPORT NO. 19 DATE 5 JULY 1986
TOTAL RIG DAYS 19 TIME FROM SPUD 280+ Cores
DEPTH @ 2400 HRS. 1775 FOOTAGE DRLD. 10'
HRS. DRILLED 6 HRS. TRIPPED
HRS. OTHER 18 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.5 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7⅝" CSG. 488
4½" CSG. 526 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
4	3 7/8	CHRC	MC	454920		1271	1775	504	116	1000	45	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (min) (average) (max)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored only 10' 1765-1775 when mislatch to core barrel occured. Circ rate lost dropped. POH; picked up new core head. RIH. Had to wash down from 560 to 963'

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coming out of hole. Core barrel jammed at 1779'

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	# 1117
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	250
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	2547
FORWARD	144111
ACCU. TOTAL	# 146658

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 28 DATE 4 July 1986
TOTAL RIG DAYS 28 TIME FROM SPUD 2 To + Weeks
DEPTH @ 2400 HRS. 1765 FOOTAGE DRLD. 24 75.
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7" CSG 498
4.5" CSG 526 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
4	3937	Hughes	MC	J54430		1271	TW	494	110	1800	100	I P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				545	1500			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOCK
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cut from 1690 to 1765'
Obtained 100% Core Recovery.
No drilling fluid returns!

OPERATION @ 0600 HOURS FOLLOWING DAY:
Trip for new Core bead. after reaching 1775' depth

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 2752
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	325
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Boyles	250
DAILY TOTAL	4257
FORWARD	$ 139,854
ACCU. TOTAL	$ 144,111

NO. 5 July
LINDEN

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 27 DATE 3 JULY 1986
TOTAL RIG DAYS 27 TIME FROM SPUD 260 + 10 hrs
DEPTH @ 2400 HRS. 1690 FOOTAGE DRLD. 100'
HRS. DRILLED 23 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 1 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: 1620' 1/2° N 39° E

10¾" CSG 35
7" CSG. 488
4.5" CSG. 526 temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
4	5.937"	CHRO	INC	454430	-	1071	INC.	419	86	1000	400	T P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	150			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (HIGH AVERAGE LOW)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 1590 to 1690'
100% core recovery; no drilling fluid returns
1 hr - Survey at 1620'

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 1711'

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3670
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER COKES	250
DAILY TOTAL	5150
FORWARD	134,704
ACCU. TOTAL	$ 139,854

No. 4 July
Bowden

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 26 DATE 2 July 1986
TOTAL RIG DAYS 26 TIME FROM SPUD 25 DAYS
DEPTH @ 2400 HRS. 1590 FOOTAGE DRLD. 137
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 61 °F. DEVIATION SURVEYS: FLUID LEVEL 15'
MRT AT 1600'

10¾" CSG. 35
7" CSG. 408
4½" CSG. 526 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
4	3.937	CHRC	MC	434952		1271	TAK	319	62	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				3-75	100-150			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Drill 1453' to 1590' in
24 hrs of coring operations
137/24 hrs = 5.7083 feet/hour
as "coring operating rate"

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIPT. EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$4894
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER BOILES	250
DAILY TOTAL	6274
FORWARD	$128,430
ACCU. TOTAL	$134,704
AFE	8620 / 4300-02

DO 3 Jr
Brodel

THERMAL P WER COMPANY

WELL NO. CTG#1 AFE NO.
REPORT NO. 25 DATE 1 JULY 1986
TOTAL RIG DAYS 25 TIME FROM SPUD 240+10 HRS
DEPTH @ 2400 HRS. 1453' FOOTAGE DRLD. 137'
HRS. DRILLED 24 HRS. TRIPPED HRS. REPAIR / RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H,O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 67 °F. DEVIATION SURVEYS:

10¾" CSG 35
7" CSG. 488
4.5" CSG. 526 Temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
4	3.937"	CHRIS	MC	454430	-	1271	-	182	39	1000	400	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5-15	25-50			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 1316' - 1453'
100% core recovery
No drilling fluid returns
Liquid level in wellbore at 40-45' depth.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 1491'

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4447
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	450
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Bowles	250
DAILY TOTAL	6277
FORWARD	$ 122,153
ACCU. TOTAL	$ 128,430
AFE	86 D01 4300-02

SUPERVISOR Bowden

DO 2 Ja 86

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 24 DATE 30 JUNE 1986
TOTAL RIG DAYS 24 TIME FROM SPUD 230 +10 HRS
DEPTH @ 2400 HRS. 1316 FOOTAGE DRLD. 71
HRS. DRILLED 15 HRS. TRIPPED 4
HRS. OTHER 5 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 ppg VIS. 45 sec W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG. 35
7" CSG. 488
4.5" CSG. 326 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
4	3.937"	CHRIS	MC	454930	—	1271	INC	74		1000	600	T B G
								45	15			T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Core bit no. 3 was 4/3 worn upon replacement at 1271' depth; had cored 412' total interval from 859' to 1271' in ± 85 hrs.

Core bit no. 4 has some diameter 3.937". Had to wash at 660' on way in.

Cored 1245 to 1316' without getting fluid returns. Obtained 100% core recovery

* BOWDEN thinks a water zone at 690', 660' and 680' is cause of both water and rock entry into corehole and is also the chief lost circulation zone.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 1348' depth.

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 3528
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER BOILER SUP	250
Rod GREASE	150
DAILY TOTAL	$ 5258
FORWARD	$ 116,895
ACCU. TOTAL	$ 122,153
AFE 86 D01 4300-02	

DO, July
Bowden

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 23 DATE 29 JUNE 1986
TOTAL RIG DAYS 23 TIME FROM SPUD 220 HRS 10 MINS
DEPTH @ 2400 HRS. 1245 FOOTAGE DRLD. 162
HRS. DRILLED 24 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.5 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7" CSG. 488
4.5" CSG. 526 temporary
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
3	3.937	CHRIS	MC	65142	-	859	-	386	82	1000	480	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
				5-15	25-50			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 3.937" hole from 1083' to 1245'. No drilling fluid returns. Obtaining 100% core recovery.

DO reported to D. Davis - BLM Progress to Noodles 30 JUNE 1986

OPERATION @ 0600 HOURS FOLLOWING DAY:
Trip for new core head at 1271' depth

INOPERATIVE EQUIP'T, EXPLAIN

SUPERVISOR Bob DEN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 5483
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	300
FUEL, WATER POWER	
MUD	300
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Bowles 500 250	
DAILY TOTAL	$ 1463
FORWARD	$ 109,932
ACCU. TOTAL	$ 116,895
AFE 86 DOT 4300-02	

DO 30 Jun

THERMAL POWER COMPANY

WELL NO. CTGH1 AFE NO.
REPORT NO. 22 DATE 28 JUNE 86
TOTAL RIG DAYS 22 TIME FROM SPUD 210+10HRS
DEPTH @ 2400 HRS. 1083 FOOTAGE DRLD. 121
HRS. DRILLED 20 HRS. TRIPPED
HRS. OTHER 4 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. — CK. — PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7" CSG. 488
4.5" CSG. 526 Temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
3	3.937			651492	—	859	—	221	58	1000	480	T P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				5.15	25-50			

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 3.937" hole from 962' to 1083'. Released fish Sulped
No drilling fluid returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
CORING AT 1123

INOPERATIVE EQUIP'T. EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 4004
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	275
FUEL, WATER POWER	
MUD	250
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	BOYLES SP 250
DAILY TOTAL	$ 5409
FORWARD	104,523
ACCU. TOTAL	$ 109,932
AFE	86 HOT 4300-02

BOWDEN 20 29

THERMAL POWER COMPANY

WELL NO. CTG#1 AFE NO.
REPORT NO. 21 DATE 27 JUNE 1986
TOTAL RIG DAYS 21 TIME FROM SPUD 200+10 HRS
DEPTH @ 2400 HRS. 962 FOOTAGE DRLD. 94
HRS. DRILLED 13 HRS. TRIPPED
HRS. OTHER 11 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH . CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG. @ 35
7" CSG. @ 488
4.5" CSG. @ 526 Temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
3	3937			651492	-	859	10C	103	34	1000	440	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
				25-35	50-100			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE (MIN. AVERAGE MAX.)
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 5.937" hole from 918 to 962'. Modelling fluid losses

Pulled out to grease core rods at 947'.

Had to work back through two bridges at 600-620' and at 698-710'

At 962', banded in the inner core barrel; broke wire line in recovery attempt. POH

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIPT. EXPLAIN:

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 2335
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	275
FUEL, WATER POWER	
MUD	150
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Boiler Sol. 250
DAILY TOTAL	$ 3640
FORWARD	$ 100,885
ACCU. TOTAL	$ 104,525
AFE	86 101 4300-02

BOWDEN
AD-289

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 20 DATE 2-26-96
TOTAL RIG DAYS 20 TIME FROM SPUD 144+10 hr
DEPTH @ 2400 HRS. 918 FOOTAGE DRLD. 59
HRS. DRILLED 21 HRS. TRIPPED
HRS. OTHER 3 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 68 °F. DEVIATION SURVEYS:
MRT @ 918' = 65°F

10¾" CSG	35'
7" CSG.	488
4½" CSG.	526 TF MEASURED
LINER	
TIE-BACK	

HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
3	3.937	CHRIS	NC	651492		959	INC	59	21	1000	340	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
2				25-35	50-100			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

CORED FROM 959 TO 918 FT

TRIP FOR BIT CHANGE @ 959 FT

TRIP FOR MIS @ 959 FT

1 HR WASH & REDRILL FROM 900 TO 913 FT

2 HR RIG MAINT.

27 JUNE 96

OPERATION @ 0600 HOURS FOLLOWING DAY:
CORING @ 938 FT

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	2165
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	275
FUEL, WATER POWER	
MUD	216
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	
FISHING & DIRECTIONAL	P
OTHER BOYLES SUP	250
2 GEOLOGISTS	330
DAILY TOTAL	3536
FORWARD	97,349
ACCU. TOTAL	100,885
AFE	

BUDGET

THERMAL P_WER COMPANY

WELL NO. CTG H-1 AFE NO.
REPORT NO. 19 DATE 6.25.86
TOTAL RIG DAYS 19 TIME FROM SPUD 13d + 10h
DEPTH @ 2400 HRS. 859' FOOTAGE DRLD. 85'
HRS. DRILLED 24 HRS. TRIPPED
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. CK. PH . CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. 67 °F. DEVIATION SURVEYS: 733' = .2½° S32°E
MRT @ 865' = 67° F

10¾" CSG CSG. 35'
7" CSG. 488'
4.5" CSG. 526' (Temp)
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
2	3.937"	Chris.	NC	651489		588	859	271	67.5	1-2000	320	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
2				25-35	100			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored 774 to 859'; No returns

Water flow into hole thinning mud, losing lubricity. Rod vibration being monitored to determine if grooving is required.

JLI
26 June '86

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring @ 864'.

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	
ABATEMENT	
BITS	2579
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	275
FUEL, WATER POWER	
MUD	626 (2 days)
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	
Boyles SUP	250
DAILY TOTAL	4360
FORWARD	93 989
ACCU. TOTAL	97 349
AFE	

SUPERVISOR Buddy Bowden

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 18 DATE 6/24/86
TOTAL RIG DAYS 18 TIME FROM SPUD 17½ 10½
DEPTH @ 2400 HRS. 774 FOOTAGE DRLD. 80
HRS. DRILLED 19½ HRS. TRIPPED
HRS. OTHER 4½ COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. 12 CK. film PH 6-5 CHL 400 YP 10
P.V. 13 GELS 4/8 % SAND 0 % SOLIDS 0.5 % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: 738' = 2x2° No direction yet

10¾" CSG.	35
7" CSG.	498
4.5" CSG.	526 temporary
LINER	
TIE-BACK	

HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
2	3.937"	Chris	NC	651489		588	INC	186	43½	1-20"	350	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				25-33	100			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored from 694 - 774', NO returns
3½ hrs Pulled bit to 7" casing shoe @ 498', mixed LCM & mud trying to plug LCZ, NO success.
1½ hr rig maintenance

OPERATION @ 0600 HOURS FOLLOWING DAY:

Coring @ 797'

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	1200 (caller)
RIG MOVES	
RIG	2991
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	275
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	1130 (trucking)
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	
Boyles SUP	250
DAILY TOTAL	6476
FORWARD	86513
ACCU. TOTAL	92989
AFE	

SUPERVISOR Buddy Bowden/JS 25J

THERMAL POWER COMPANY

WELL NO. CTCH-1 AFE NO.
REPORT NO. 17 DATE 6/23/86
TOTAL RIG DAYS 17 TIME FROM SPUD 16 1/2 HRS
DEPTH @ 2400 HRS. 694 FOOTAGE DRLD. 97
HRS. DRILLED HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 60 W.L. 12 CK. thin PH 6.5 CHL 400 YP 10
P.V. 20 GELS 4/8 % SAND 0 % SOLIDS 0.5 % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10 3/4 " CSG.	35
7 " CSG.	488
4.5 " CSG.	571 temporary
LINER	
TIE-BACK	

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
2	3.937	Christ.	NC	65 1489		588	INC	106	24	1-2000	350	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1				255	1000			

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Cored f 597 to 694'
No mud returns

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 719'

INOPERATIVE EQUIP'T, EXPLAIN

SUPERVISOR Bradley Bowden / JC

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	2943
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	675
FUEL, WATER POWER	
MUD	696
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	
Boyles	250
DAILY TOTAL	5194
FORWARD	81319
ACCU. TOTAL	86513
AFE	

25½

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 16 DATE 22 JUNE 1986
TOTAL RIG DAYS 16 TIME FROM SPUD 50+ Days
DEPTH @ 2400 HRS. 597 FOOTAGE DRLD. 70
HRS. DRILLED 22 HRS. TRIPPED
HRS. OTHER 2 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.4 VIS. 45 W.L. 10 CK. 1/32 PH 6.5 CHL 400 YP 15
P.V. 20 GELS 4/8 % SAND 0 % SOLIDS 0.5 % LOST CIRC. MTL. ± 1
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG. CSG. 35
7.5" CSG. 488
LINER CSG. 526 temporary
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
1	5.937	C	20-305-454	—	527	588	61	22	20	350		B G
			65 1490								T	B G
											T	B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1	—	—		35	100	35	Small triplex pump for coring	

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Lost mud circulation just below 530' ±

Hunted Christensen diamond core head was worn at end of 61' run.

Using 10" core barrel

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 613' without returns

INOPERATIVE EQUIP'T, EXPLAIN

SUPERVISOR Hamilton

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 2291
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	750
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Boyles 252
DAILY TOTAL	$ 3921
FORWARD	$ 777,398
ACCU. TOTAL	$ 781,319
AFE	86 DO1-4300-02

NO. 23 Jun 1986

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 15 DATE 21 JUNE 1986
TOTAL RIG DAYS 15 TIME FROM SPUD 10 Days
DEPTH @ 2400 HRS. 527 FOOTAGE DRLD. 2
HRS. DRILLED 6 HRS. TRIPPED
HRS. OTHER 13 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG @ 35
7" CSG. @ 488
4.5" CSG. @ 526 temporary
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Ran 5½" BOWEN overshot with 4½" grapples. Latched on to fish; POH with same.

Ran 26 joints of 4.5" Core Guide casing. Welded two straps at each coupling and slipped on 11 solid bow centralizers. Hung this Core Guide string at 526' (To be recorded before running any protection casing); hung from 7" Larkin casinghead.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Coring at 534' without returns

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	@ 1625
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	350
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER Bowles	250
Fishing tools	2215
DAILY TOTAL	$ 5070
FORWARD	$ 72,328
ACCU. TOTAL	$ 77,398
AFE 86-DRL-4200-02	

SUPERVISOR BOWDEN DO 22 June

THERMAL POWER COMPANY

WELL NO. CTG 4-1 AFE NO.
REPORT NO. 14 DATE 20 JUNE 1986
TOTAL RIG DAYS 14 TIME FROM SPUD 30 7/10ths
DEPTH @ 2400 HRS. 529 FOOTAGE DRLD. 12
HRS. DRILLED 2 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 17 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.4 VIS. 45 W.L. — CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7" CSG. 488
" CSG.
" CSG.
LINER
TIE-BACK

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
3	6"	HTC	RR162	DCS	NONE	517	529	12	2	500	120	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1	5"	6"	80	131	1012	131		

AIR COMP. NO. CFM PSI TEMP. °F CHEM. RATIO L RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: 6" BIT 4.5" JOINT D.P. X SUB, T.L. 21'
TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Picked up 6" bit, drilling assembly and 3½" core rods RIH

Pulled float collar at 466' and cement in bottom joint of 7" to 488'.

Cleaned out 8¾" hole to 517' and pulled 6" hole to 529'. Circulated 30 minutes and POH

Found that 6" bit and 4.5 joint left on bottom. Shut down at 1900 hrs after calling for overshot

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	2250
ABATEMENT	
BITS	307
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	225
FUEL, WATER POWER	
MUD	502
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER	Boyles 250
	Machining 50
DAILY TOTAL	4205
FORWARD	68,123
ACCU. TOTAL	72,328
AFE	86-201 4500-02

SUPERVISOR BORDEN 20 June

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 13 DATE 19 JUNE 1986
TOTAL RIG DAYS 13 TIME FROM SPUD 12d 10hrs
DEPTH @ 2400 HRS. 517' FOOTAGE DRLD. 0
HRS. DRILLED 0 HRS. TRIPPED
HRS. OTHER 17 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7 " CSG. 488
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Aligned - stabilized core rig over BOP stack and cellar.
Built rig floor and doghouse
Commenced picking up core rods at 2345 hrs

OPERATION @ 0600 HOURS FOLLOWING DAY:
Cleaned out cement to 490'; cleaned out hole to 507'. Prep to set hole below 517' to seat 4.5" liner

INOPERATIVE EQUIPT. EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	2125
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	504
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	WELDEL 844
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	700 GR/RES, ADDL
FISHING & DIRECTIONAL	
OTHER	GEOL 1530 CATCH UP
DAILY TOTAL	5703
FORWARD	62,420
ACCU. TOTAL	68,123
AFE	86-DOE-4300-02

THERMAL POWER COMPANY

WELL NO. CTGH 1 AFE NO. _____
REPORT NO. 12 DATE 18 JUNE 1986
TOTAL RIG DAYS 12 TIME FROM SPUD 110 + 10 HRS
DEPTH @ 2400 HRS. 517 FOOTAGE DRLD. —
HRS. DRILLED — HRS. TRIPPED _____
HRS. OTHER 12 COOLING TOWER IN USE, YES ☐ NO ☐

10¾" CSG 35'
7" " CSG. 488'
" CSG. _____
LINER _____
TIE-BACK _____
HRS. REPAIR _____ RIG NO. _____

MUD WT. _____ VIS. _____ W.L. _____ CK. _____ PH _____ CHL _____ YP _____
P.V. _____ GELS _____ % SAND _____ % SOLIDS _____ % LOST CIRC. MTL. _____
GALVONIC PROBE _____ CORRATOR _____ SULPHIDE _____ OXY. _____ AIR-H₂O RATIO _____/1
FORM. DRLD. _____ FLOW LINE TEMP. _____ °F. SUCTION TEMP. _____ °F.
MAX. TEMP. _____ °F. DEVIATION SURVEYS: _____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
												T P G
												T P G
												T P G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO ___ CFM _____ PSI ___ TEMP. °F ___ CHEM. _____ RATIO ___/___ RATE ___
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: _____

TOTAL STRING WT. _____ TOTAL PICKUP WT. _____ ROTARY TORQUE (HIGH AVERAGE LOW) _____
STEAM ENTRIES, DEPTH, LBS. _____

REMARKS FOR 24 HOUR PERIOD:

Installed replacement flange in 7" Larken casing head. Installed BOP: double gate and Hydril units and 40 gallon accumulator. Tested blind rams and pipe rams with 1000 psig (water) for 30 mins each. Tested Hydril with 1750 psig (water) for 30 min. Pressured accumulator to 2800 psig. At remote station worked blind rams, pipe rams and Hydril with test then 10% pressure bleed down. BOP TEST OBSERVED AND APPROVED BY DENNIS DAVIS BLM 18 JUNE 86. Rained all day at Dillsite. Snowed at the higher elevations!

OPERATION @ 0600 HOURS FOLLOWING DAY:
Adjusting DC rig base and cables. Prep & clean out hole to 517', then run 4.5" casing core guide.

INOPERATIVE EQUIP'T, EXPLAIN _____

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 1500
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	
FISHING & DIRECTIONAL	
OTHER	250
DAILY TOTAL	$ 2050
FORWARD	60,370
ACCU. TOTAL	$62,420
AFE	86-609-430002

SUPERVISOR BOWDEN DO 19 June 86

THERMAL POWER COMPANY

WELL NO. Ciriti 1 AFE NO.
REPORT NO. 11 DATE 17 JUNE 1986
TOTAL RIG DAYS 11 TIME FROM SPUD Dot + Dne
DEPTH @ 2400 HRS. FOOTAGE DRLD.
HRS. DRILLED 17 HRS. TRIPPED
HRS. OTHER 8 COOLING TOWER IN USE, YES ☐ NO ☑
MUD WT. VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG CSG. 35
7 " CSG. 488
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

8 hrs Worked on 8 3/8" x 6" 900 Series flange. Recut threads, still would not seat.

Replacement flange are delivered in PORTLAND.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Csg delivered flange seated and tested in Larkin Casing head. Prep for BOP pressure test

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING 10¾ and 7"	9 1405
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	1000
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	300 + 1430 330 1760
FISHING & DIRECTIONAL	
OTHER	Boyles 250
DAILY TOTAL	3235
FORWARD	57115
ACCU. TOTAL	860.370
AFE	86-00 1-4320-02

SUPERVISOR BOWDEN D.O. 18 June

THERMAL P WER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 10 DATE 16 JUNE 1986
TOTAL RIG DAYS TIME FROM SPUD 10 days
DEPTH @ 2400 HRS. 317' FOOTAGE DRLD.
HRS. DRILLED 6 HRS. TRIPPED
HRS. OTHER 11 COOLING TOWER IN USE,
MUD WT. VIS. W.L. CK.
P.V. GELS % SAND % SOLIDS
GALVONIC PROBE CORRATOR SULPHIDE
FORM. DRLD. FLOW LINE TEMP. °F. S
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35
7 " CSG. 488
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.
yes ☐ no ☐

Dennis Davis

• Accumulator w't Oregon Spec

• requirement ① hydraulic control

not present → ② electric remote

③ manual check pipe + blind rams

WOS specified in drilling plan

Cellar to mouth

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM

AIR COMP. NO. CFM PSI TEMP. °F CHEM.
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Rigged up BOPs and 2" choke manifold

Could not obtain pressure buildup; found leak in 9 5/8" x 6" 900 Series flange that screws into 7" LARKIN thread.

Must repair or recut threads on flanged to proceed with the BLM required BOP test.

Ordered replacement flange from Hotco - Farmington by 9 a.m. delivery.

OPERATION @ 0600 HOURS FOLLOWING DAY:
Seeking local thread checking capacity.

INOPERATIVE EQUIP'T, EXPLAIN

SUPERVISOR BOWDEN DD. 17 June

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$ 1375
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	2300
FISHING & DIRECTIONAL	
OTHER	Boyles 750
DAILY TOTAL	$ 4425
FORWARD	$ 52,990
ACCU. TOTAL	$ 57,115
AFE 86 DD1-4300-02	

2900 logging
1200 geolog catch-up
4100
-2200 cost
1900

THERMAL F WER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 9 DATE 15 June 1986
TOTAL RIG DAYS 9 TIME FROM SPUD 80+ Hours
DEPTH @ 2400 HRS. 317 FOOTAGE DRLD. 0
HRS. DRILLED 0 HRS. TRIPPED
HRS. OTHER 12 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. — VIS. W.L. CK. PH CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG CSG. 35
7" " CSG. 488
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
—												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
—								

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Constructed cellar
Welded on LARKIN casing head to 7" casing
Set on BOP equipment

OPERATION @ 0600 HOURS FOLLOWING DAY:
Preparing to pressure test BOP

INOPERATIVE EQUIPT, EXPLAIN

COSTS

TANGIBLES
- CASING
- VALVES
- FLANGES
- OTHER

INTANGIBLE
- LOCATION
- RIG MOVES
- RIG $ 1500
- ABATEMENT
- BITS
- DRILL EQUIP. MAIN.
- DRILL. EQUIP. RENTAL
- FUEL, WATER POWER
- MUD
- SUPERVISION & LABOR 300
- CEMENT SERVICES
- TRANSPORTATION
- LOGGING SERVICES 330 + 540
- FISHING & DIRECTIONAL
- OTHER Hagles Sup 250

DAILY TOTAL $ 2050
FORWARD $ 50940
ACCU. TOTAL $ 52,990
AFE 86-B01-4300-02

SUPERVISOR Bowden 10. 16 June

THERMAL P_WER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 8 DATE 14 June 86
TOTAL RIG DAYS 8 TIME FROM SPUD To + 10 Hrs
DEPTH @ 2400 HRS. 317 FOOTAGE DRLD. 0
HRS. DRILLED 8 HRS. TRIPPED
HRS. OTHER 9 COOLING TOWER IN USE, YES ☐ NO ☑
MUD WT. — VIS. W.L. CK. PH . CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H$_2$O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

CSG	
10 3/4 CSG.	351
7 " CSG.	488
" CSG.	
LINER	
TIE-BACK	

HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
—								

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Mixed 4 barrels of Class G cement and perlite 1:1 and filled annulus between 7" and 10 3/4" Cement level came to surface and remained there
Rigged down rotary tools
Cut off 7" casing
Pumped out pits
Digging cellar

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	8 1000
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330 + 210
FISHING & DIRECTIONAL	
OTHER	Boyles 250
DAILY TOTAL	1550
FORWARD	49390
ACCU. TOTAL	$ 50.940
AFE	86-DD1-4300-02

SUPERVISOR Brownlee 15 June

THERMAL P WER COMPANY

WELL NO. CTGH 1 AFE NO.
REPORT NO. 1 DATE 13 June 1986
TOTAL RIG DAYS 1 TIME FROM SPUD 60 + 10 HRS
DEPTH @ 2400 HRS. 517' FOOTAGE DRLD. 0
HRS. DRILLED 0 HRS. TRIPPED
HRS. OTHER 19 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. – VIS. W.L. CK. PH . CHL YP
P.V. GELS % SAND % SOLIDS % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H_2O RATIO /
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

10¾" CSG 35'
7" " CSG. 488'
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T P G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO / RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Colorado Logging completed GR log 0600 – 1300 hrs.
Ran 8 3/4" bit to 517'. CO – no fill found on btm. POH
Ran 7" casing. Stopped at 70'. POH. removed centralizer from first joint Ran 7" casing. Stopped at 488' Tried to circulated could not; no go Rigged to cement. HALLIBURTON pumped 5 bbls water ahead of cement. Slurry of 122 cu ft Class G 1:1 perlite plus 40% silica flour, 2% gel at 13.5 ppg density Tailed 32 cu ft Class G plus 40% SiO2 at 15.5 ppg. Displaced w/ 19 bbls water CIP at 0130 hrs, 14 JUNE 86 Had good cement returns. Plug bumped at 1000 psig Held OK
Ran 519' of 7" 26 lbs K-55 BT&C Csg shoe at 488', float collar at 466'.
Cement dropped in annulus

OPERATION @ 0600 HOURS FOLLOWING DAY:
Prep to do outside cement job

INOPERATIVE EQUIP'T, EXPLAIN

COSTS 1 barrel of cement = 5.61 ft³

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$2375
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	9471
TRANSPORTATION	
LOGGING SERVICES	300 + 210
FISHING & DIRECTIONAL	
OTHER	PARKES 250
DAILY TOTAL	12,696
FORWARD	$36,694
ACCU. TOTAL	$49,390
AFE	

SUPERVISOR BOWDEN DO-14 June

...POWER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 6 DATE 12 JUNE 86
TOTAL RIG DAYS 6 TIME FROM SPUD 30 1/2 hrs
DEPTH @ 2400 HRS. 517 FOOTAGE DRLD. 97
HRS. DRILLED 9.5 HRS. TRIPPED
HRS. OTHER 3.5 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.8 VIS. 70 W.L. 10 CK. 2/32 PH 7 CHL 400 YP 22
P.V. 20 GELS 12/26 % SAND 0.5 % SOLIDS 5.0 % LOST CIRC. MTL. 6-8
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. — °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: 517' 2°

16" CSG
10 3/4" CSG. 35'
" CSG.
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
2	8 3/4	STC	AV607	F-3	NONE	35	517	482	31.5	15,000	60	1 4 B 2 G W
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1	5"	6"	80	131	1000	131		

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: 8 3/4" BIT ONE 6" DC 24 4.5" DCs
TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Drilled 8 3/4" hole 420' to 517'

Spot 10 barrels of mud at 425.

2 1/2 hrs Circulating mud - condition hole at 517'

1/2 hr Survey at 517'

Dresser Atlas logging crew / truck arrived at 2100 hrs at drillsite

OPERATION @ 0600 HOURS FOLLOWING DAY:
Logging borehole from 517 to 35'
HALLIBURTON on location

INOPERATIVE EQUIP'T. EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	$1711
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	450
SUPERVISION & LABOR	BOWDEN 300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	300 + 180
FISHING & DIRECTIONAL	
OTHER	POWERS 250
DAILY TOTAL	3017
FORWARD	33,683
ACCU. TOTAL	36,694
AFE	86-401-4300-02

SUPERVISOR BOWDEN 20:13 June

THERMAL F WER COMPANY

WELL NO. CTGH-1 AFE NO.
REPORT NO. 5 DATE 6/11/86
TOTAL RIG DAYS 5 TIME FROM SPUD 41 1/2 hrs
DEPTH @ 2400 HRS. 420' FOOTAGE DRLD. 200'
HRS. DRILLED 11 1/2 HRS. TRIPPED HRS. REPAIR RIG NO.
HRS. OTHER 1/2 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 9.2 VIS. 61 W.L. 10 CK. 2 PH 7.2 CHL 400 YP 26
P.V. 18 GELS 12/21 % SAND 5 % SOLIDS 6 % LOST CIRC. MTL.
GALVONIC PROBE CORRATOR SULPHIDE OXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS: 220' = 1/2°.

10 3/4" CSG CSG. 35'
" CSG.
" CSG.
LINER
TIE-BACK

5.71

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
2	8 3/4	Smith	F-3	AV6099	Nozz	35'	—	385'	21	15-18000	65	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1	5"	6"	80	131	100	131		

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: 8 3/4" bit, 1 x 6" drill collar, 20 x 4 1/2 DC total 420'
TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

drilled 8 3/4" hole from 220' to 420'

1/2 hr other = survey

400-410' lost 50% returns ~1000 gals

410' full returns

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	45
RIG MOVES	
RIG	2993
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	190 (10 3/4" casing)
TRANSPORTATION	
LOGGING SERVICES	300 - 830 150
FISHING & DIRECTIONAL	
OTHER	
Boyles SUP.	250
DAILY TOTAL	4078
FORWARD	29605
ACCU. TOTAL	33683
AFE	

SUPERVISOR Ruthie Rowden

THERMAL P WER COMPANY

WELL NO. CTGH-1 AFE NO. 10

REPORT NO. 4 DATE 6/15/84

TOTAL RIG DAYS 4 TIME FROM SPUD 3 1/2 hrs

DEPTH @ 2400 HRS. 220' FOOTAGE DRLD. 195'

HRS. DRILLED 9 1/2 HRS. TRIPPED ____

HRS. OTHER 2 1/2 COOLING TOWER IN USE, YES ☐ NO ☐

MUD WT. 8.8 VIS. 40 W.L. ____ CK. ____ PH ____ CHL ____ YP ____

P.V. ____ GELS ____ % SAND ____ % SOLIDS ____ % LOST CIRC. MTL. ____

GALVONIC PROBE ____ CORRATOR ____ SULPHIDE ____ OXY. ____ AIR-H$_2$O RATIO 1/

FORM. DRLD. ____ FLOW LINE TEMP. ____ °F. SUCTION TEMP. ____ °F.

MAX. TEMP. ____ °F. DEVIATION SURVEYS: 160' = 1/2° ; 220' = No Data

10 3/4" CSG CSG. 35'

" CSG. ____

" CSG. ____

LINER ____

TIE-BACK ____

HRS. REPAIR ____ RIG NO. ____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
2	8 3/4	Smith	F3	AV6059	None	35'	—	195'	9 1/2	5-15000	65	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1	5"	6	80	114	100	114		

AIR COMP. NO ____ CFM ____ PSI ____ TEMP. °F ____ CHEM. ____ RATIO ____/____ RATE ____

DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: 1 x 8 3/4" bit, 1 x 6" DC, 10 x 4 1/2 DC, Total Length 220'

TOTAL STRING WT. ____ TOTAL PICKUP WT. ____ ROTARY TORQUE (HIGH AVERAGE LOW) ____

STEAM ENTRIES, DEPTH, LBS. ____

REMARKS FOR 24 HOUR PERIOD:

Drilled 8 3/4" hole from 35' to 220'

2 1/2 hrs running deviation survey problem with clock

Shut down 1900 hours

Geophysical borehole loggers called out 1700 hours

JLT

OPERATION @ 0600 HOURS FOLLOWING DAY:

INOPERATIVE EQUIP'T, EXPLAIN ____

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	3096
RIG MOVES	
RIG	
ABATEMENT	
BITS	2500 (B.H.A.)
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	200
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	300 (330 - 90 = 120)
FISHING & DIRECTIONAL	
OTHER	
Boyles Sup	250
DAILY TOTAL	6646
FORWARD	22946
ACCU. TOTAL	29605
AFE	

SUPERVISOR Buddy Bowden

THERMAL POWER COMPANY

WELL NO. CTGH-1 AFE NO. ____
REPORT NO. 3 DATE 2 JUNE 86
TOTAL RIG DAYS 3 TIME FROM SPUD 20+10HRS
DEPTH @ 2400 HRS. 35 FOOTAGE DRLD. 0
HRS. DRILLED 0 HRS. TRIPPED ____
HRS. OTHER 9 COOLING TOWER IN USE, YES ☐ NO ☒
MUD WT. 8.8 VIS. 65 W.L. — CK. ____ PH ____ CHL ____ YP ____
P.V. ____ GELS ____ % SAND ____ % SOLIDS ____ % LOST CIRC. MTL. ____
GALVONIC PROBE ____ CORRATOR ____ SULPHIDE ____ OXY. ____ AIR-H₂O RATIO 1
FORM. DRLD. ____ FLOW LINE TEMP. ____ °F. SUCTION TEMP. ____ °F.
MAX. TEMP. ____ °F. DEVIATION SURVEYS: ____

CSG 10 3/4" at 35'
" CSG. ____
" CSG. ____
" CSG. ____
LINER ____
TIE-BACK ____
HRS. REPAIR ____ RIG NO. ____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND
												T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.

AIR COMP. NO ____ CFM ____ PSI ____ TEMP. °F ____ CHEM. ____ RATIO ____ RATE ____
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: ____

TOTAL STRING WT. ____ TOTAL PICKUP WT. ____ ROTARY TORQUE (MIN AVERAGE MAX) ____
STEAM ENTRIES, DEPTH, LBS. ____

REMARKS FOR 24 HOUR PERIOD:

Hauled up rig at 9 am
Ran 12 1/4" air hammer and
C.O. to 35'. POH.
Ran one joint of 10 3/4 K-55
40.5 lb/ft conductor casing
to 35'.
Blew hole dry with air
Cemented Conductor at 35' depth
with slurry of 16 bbl Portland
Cement and 75 sax of Construction
Cement plus 3% CaCl
CIP at 1430 hrs. Shut down
rig at 1800 hrs WOC

OPERATION @ 0600 HOURS FOLLOWING DAY: Preparing to drill out with 8 3/4" bit

INOPERATIVE EQUIP'T, EXPLAIN ____

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	Pit Liner $500
RIG MOVES	
RIG	1125
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	157
SUPERVISION & LABOR	300
CEMENT SERVICES	?
TRANSPORTATION	
LOGGING SERVICES	(900) 330 490
FISHING & DIRECTIONAL	
OTHER	Boyles Sup. 250
DAILY TOTAL	3232
FORWARD	19,727
ACCU. TOTAL	22,959
AFE	86-201-4300-02

SUPERVISOR ____

THERMAL P WER COMPANY

WELL NO. CTGH-1 AFE NO. BECON
REPORT NO. 2 DATE 8 JUNE 86
TOTAL RIG DAYS 1 + 10 HRS TIME FROM SPUD
DEPTH @ 2400 HRS. 35 FOOTAGE DRLD. 35
HRS. DRILLED 3 1/2 HRS. TRIPPED
HRS. OTHER 11 COOLING TOWER IN USE, YES ☐ NO ☐
MUD WT. 8.8 PPG VIS. 54 W.L. 54 CK. 2/32 PH 6.8 CHL 400 YP 21
P.V. 17 GELS 9/12 % SAND 3 % SOLIDS 3.5 % LOST CIRC. MTL. NONE
GALVONIC PROBE CORRATOR SULPHIDE DXY. AIR-H₂O RATIO 1
FORM. DRLD. FLOW LINE TEMP. °F. SUCTION TEMP. °F.
MAX. TEMP. °F. DEVIATION SURVEYS:

CSG
" CSG.
" CSG.
" CSG.
LINER
TIE-BACK
HRS. REPAIR RIG NO.

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
2	9 7/8	SMITH		AB679	NONE	0	35	35	3 1/2	ALL	60	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1	5"	6"	54	88		88		

AIR COMP. NO CFM PSI TEMP. °F CHEM. RATIO 1 RATE
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION:

TOTAL STRING WT. TOTAL PICKUP WT. ROTARY TORQUE HIGH AVERAGE LOW
STEAM ENTRIES, DEPTH, LBS.

REMARKS FOR 24 HOUR PERIOD:

Wyoed truck sold Rotary leg 6'
Spudded second conductor hole
Drilled 8 1/4" hole in 3 1/2 hrs POH
Ran 12 1/4" bit; beamed opened hole
bit stopped at 20'. POH
Ran 17 1/4" air hammer; opened hole to 35'
POH
Ran 10 3/4" conductor; stopped at 24'
POH and ran 12 1/4" bit CO to 35' POH
Ran 10 3/4 conductor; stopped at 28'
Shut down at 2300 hrs
Filled first conductor hole w
cuttings from second hole

OPERATION @ 0600 HOURS FOLLOWING DAY:
Prep to CO again; leave straight
hole. Effect to cement 10 3/4"
Conductor

INOPERATIVE EQUIP'T, EXPLAIN

COSTS

TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	
RIG MOVES	
RIG	1325
ABATEMENT	
BITS	
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	
FISHING & DIRECTIONAL	
OTHER Boyles Rig Sup.	500
DAILY TOTAL	2175
FORWARD	17,552
ACCU. TOTAL	19,727
AFE 86-DOT-4300-02	

SUPERVISOR BOWDEN 9 June

THERMAL P WER COMPANY

WELL NO. CTG# 1 AFE NO. BELOW
REPORT NO. 1 DATE 7 JUNE 86
TOTAL RIG DAYS 0710 HRS TIME FROM SPUD 10 HRS
DEPTH @ 2400 HRS. 35 FOOTAGE DRLD. 35
HRS. DRILLED 5 HRS HRS. TRIPPED ____ HRS. REPAIR ____ RIG NO. ____
HRS. OTHER 5 HRS COOLING TOWER IN USE, YES ☐ NO ☑
MUD WT. 8.3 PPG VIS. 60 SEC W.L. — CK. — PH — CHL — YP —
P.V. ____ GELS ____ % SAND ____ % SOLIDS ____ % LOST CIRC. MTL. ____
GALVONIC PROBE ____ CORRATOR ____ SULPHIDE ____ OXY. ____ AIR-H_2O RATIO 1
FORM. DRLD. ____ FLOW LINE TEMP. ____ °F. SUCTION TEMP. ____ °F.
MAX. TEMP. ____ °F. DEVIATION SURVEYS: ____

CSG
" CSG. ____
" CSG. ____
" CSG. ____
LINER ____
TIE-BACK ____

BIT #	SIZE	MAKE	TYPE	SER. NO.	JETS	IN	OUT	FT.	HRS.	WT.	RPM	COND.
1	12¼"	REED	S136J	284376	NONE	0	35	35	5	ALL	60	T B G
												T B G
												T B G

PUMP	LINER	STROKE	SPM	GPM	PSI	TOTAL GPM	NOZZLE VEL.	ANNULUS VEL.
1	5"	6"	54	88	0	88		

AIR COMP. NO ____ CFM ____ PSI ____ TEMP. °F ____ CHEM. ____ RATIO 1 RATE ____
DRILLING ASSEMBLY, TOTAL LENGTH AND DESCRIPTION: ____

TOTAL STRING WT. ____ TOTAL PICKUP WT. ____ ROTARY TORQUE (HIGH AVERAGE LOW) ____
STEAM ENTRIES, DEPTH, LBS. ____

REMARKS FOR 24 HOUR PERIOD:

Mixed spud mud. Spudded 10:30 am 6-7-86
Drilled 12¼" hole from surface to 12' depth, stopped on boulder bed POH.
Ran 12¼" air hammer; drilled 12-35' depth "rough going." POH
Ran 12¼" bit and reamed 0-35. POH.
Ran 10¾" conductor one 35' joint; stopped at 12'. POH.
Reamed hole w 12¼" bit to 35' POH
Ran 10¾" conductor; again stopped at 12' POH and shut down

OPERATION @ 0600 HOURS FOLLOWING DAY:
REVIEWING CONDUCTOR HOLE PROBLEM

INOPERATIVE EQUIP'T, EXPLAIN ____

COSTS

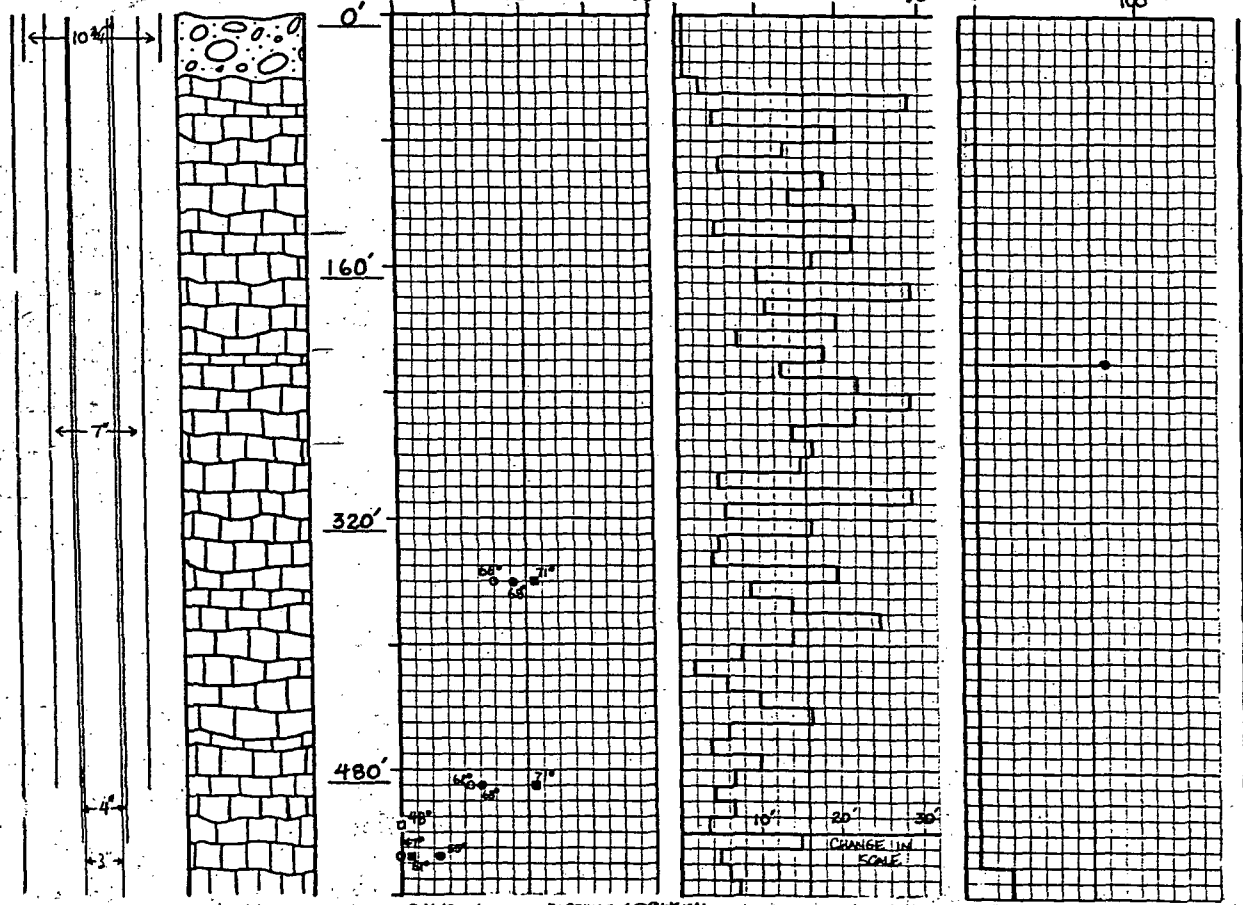
TANGIBLES	
CASING	
VALVES	
FLANGES	
OTHER	
INTANGIBLE	
LOCATION	* 7005
RIG MOVES	7000
RIG	1736
ABATEMENT	
BITS	7001 600
DRILL EQUIP. MAIN.	
DRILL. EQUIP. RENTAL	
FUEL, WATER POWER	
MUD	411
SUPERVISION & LABOR	300
CEMENT SERVICES	
TRANSPORTATION	
LOGGING SERVICES	330
FISHING & DIRECTIONAL	
OTHER WATER LINE	500
DAILY TOTAL	17,552
FORWARD	—
ACCU. TOTAL	* 17,552
AFE	86-001-4300-02A

SUPERVISOR BOWDEN RD 9 June

Diamond Shamrock
Thermal Power Company

HOLE CTGH-1 SPUD DATE 6/7/86 COMPLETION DATE _____ TOTAL DEPTH _____
FIELD CASCADE/CLACKAMAS COUNTY MARION STATE OREGON TOTAL VERTICAL DEPTH _____
LOCATION T8S, R8E, SEC. 28 ELEVATION ~3840' ☐ KB of ____ ☒ GL BOTTOM HOLE LOCATION _____
CONTRACTOR / RIG BOYLES BROS. / 882 GEOLOGIST (S) GOODWIN, McDANNEL DATE

CASING PROFILE | LITHOLOGY | DEPTH | DRILLING TEMPERATURE TYPE MRT (°F) | PENETRATION RATE | WATER LEVEL (Measured) | LOST CIRCULATION ZONES | LITHOLOGIC DESCRIPTION | COMMENTS



220' (rods in hole) Fluid level 80' after 12 hours of no activity. ~300 gal returned level to zero. 6/11. 7:30.

400' Partial loss (~10%) ~100 gpm. 1000 gal. loss LCM brought full returns. 6/11. 16:00-17:00

425' Total loss. 100 gpm. 3000 gal loss. LCM brought full returns. 6/11. ~10:00. Decrease in mud viscosity suggests small H_2O entry @ 425'.

536' Partial loss. ~50% 110 gpm = 450 gal loss 5:10 pm 6/22

540' Total loss. 82.5 gpm 6 a.m. 6/22 Static water level ~20 below surface

0'-40': Qal. Basaltic boulders and cobbles (till).

40': BASALT/BASALTIC ANDESITE LAVAS dk-med gry, minor red/brn. Aphyric to sparsely porph: phenos of plag, ol, pyx

Alteration: most of rock is fresh. Minor FeOx, clays; limonite, hematite 140'-150' tr. sulfide?

ROTARY DRILLING
0'-35' 12¼" rock bit
10¾" casing
35'-817' 8¾" button bit (Smith F3)
150' inclination survey: ½° @
220' inclination survey: ½° @
524' completed rotary drilling. began coring
517' inclination survey: 2° @ set 7" casing 0'-488' borehole geophysical survey: resistivity, temperature, density, caliper, deviation, SP

BOP inst[illegible] & tested

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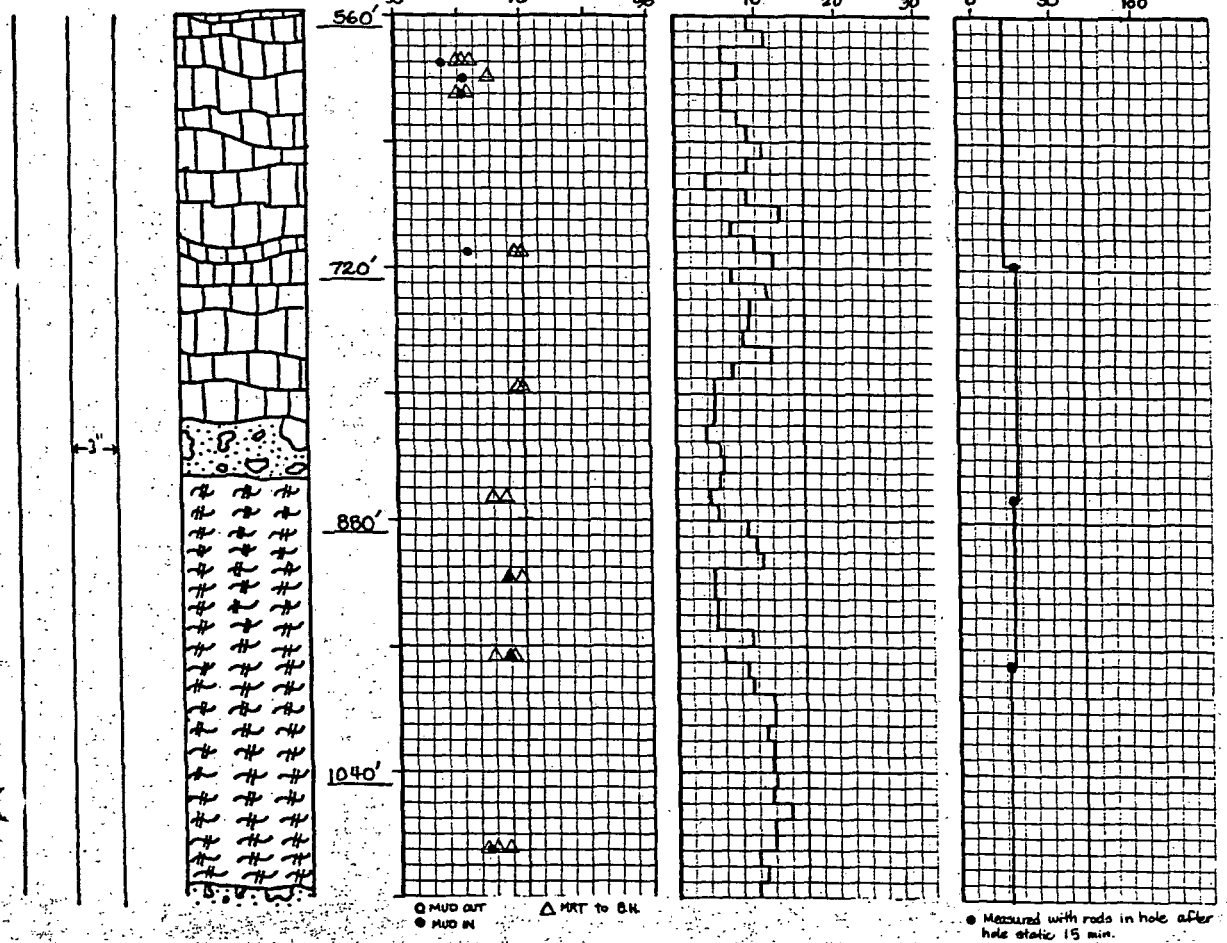
HOLE CTGH-1 SPUD DATE 6/7/86 COMPLETION DATE _____ TOTAL DEPTH _____

FIELD CASCADES/CLACKAMAS COUNTY MARION STATE OREGON TOTAL VERTICAL DEPTH _____

LOCATION T8S, R8E, SEC. 28 ELEVATION ~3840' ☐ KB of ____ ☐ GL BOTTOM HOLE LOCATION _____

CONTRACTOR / RIG BOYLES BROS./882 GEOLOGIST (S) GOODWIN/McDANNEL DATE

CASING PROFILE | LITHOLOGY | DEPTH | DRILLING TEMPERATURE TYPE | PENETRATION RATE | WATER LEVEL (Measured)



LOST CIRCULATION ZONES

Total loss continues. LCM added 549'-579' Pump rate varies: 7-15 gpm. (400-1,000 gal/hr)

730' pulled up to 540' added LCM bomb. No returns.

LITHOLOGIC DESCRIPTION

BASALT/BASALTIC ANDESITE (as above) Med lt gry-med gry finely porphyritic, 10% phenos & glomerocrysts: plag, ol, px* w/lite & pink clays coat frac. surfaces & vesicles. Zones of rubble, scoria, ash mark flow boundaries @ 579', 604', 688' 707', 771', 742'

809' VOLCANIC BRECCIA Lapilli & blocks of basaltic to silicic rock fragments supported in a yellowish brn matrix of ash, crystals & ash sz rock fragments. Silicic fragments are more common near bottom of unit & appear to be from underlying dacite, top 18 cm of unit is dk gry ash & ash sz rock fragments. Unit contains light to moderate amount of pink & brown clays, minor limonite stain.

854' DACITE Med lt gry fine gr. porphyritic. Phenos of plag, cpx, opx; groundmass of plag, px, black iron bearing mineral. Unit is intensely fractured. 15-30° vertical. Clay on fracture surfaces (pink, brn), locally heavy pyrolusite, rnd FeOx, mnr plag→ clay, tr. limonite, localized tr. chlorite.

1112' VOLCANIC BRECCIA Lapilli & blocks sz mafic & silicic (less common) rock fragments in clayey matrix of ash sz rock fragments & crystals. Thin irregular beds & laminae of ash sz & lapilli fragments.

1138' BASALT. med-med dk gry. 7-12% phenos: plag, Cpx, olivine. Lt. orange & pinkish clay coat fracture surfaces, pyrolusite, hematite, rare limonite. Locally plag→ clay.

COMMENTS

527' Bit #1. HQ core bit. Christensen grey impreg. (3937')
0-527': 4" casing hung from 7" casing
core drilling w/bentonite+ polymers
589'- Bit #2 (same specs as #1) Bridge @ 575' on RIH

733'- Directional survey 2.5° S38E

859'- Bit #3 (same specs as #1)

947'- Tripped to grease rods to alleviate rod chatter. Bridge @ ~600' on RIH. Core barrel sanded in. Tripped rods. Bridge @ ~600' on RIH.

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LOCATION Sec. 28, T8S, R8E ELEVATION 3840' ☐ KB of ____ ☒ GL BOTTOM HOLE LOCATION _____
CONTRACTOR / RIG BOYLES BROS / 882 GEOLOGIST (S) GOODWIN/McDANNEL DATE _____

CASING PROFILE

LITHOLOGY

DEPTH

DRILLING TEMPERATURE TYPE °F (50° 70° 90°)

PENETRATION RATE (feet/hr) (10' 20' 30')

WATER LEVEL (Measured) (0' 60')

1120'
1280'
1440'
1600'

3"

● MUD IN
○ MUD OUT
■ MAKE UP H_2O
△ MRT to B.H.

● Measured w/pipe in hole after hole static 15 minutes

LOST CIRCULATION ZONES

Total fluid loss continuous
Pump rate varies:
daily average 10-14gpm

LITHOLOGIC DESCRIPTION

1230' VOLCANIC BRECCIA
Red-gry-brn. Lapilli to block size rock fragments of matic lava(s) in matrix of ash (altering to clay), ash sz rock frags & crystals. Variable clast size, clast: matrix ratio & laminated intervals from 16cm-1.3m subunits. Origin of unit may be surge & airfall deposits. Numerous rubbly intervals. Pale org-pnk clay, locally heavy. Tr FeOx/MnO.

1291' ANDESITE. med brn to dk gry, 2-4% phenos: plag, opx, cpx, Hbl (≤1mm). Mnr plag → clay. Pale orange pink clay commonly coats fractures, forms seams. Tr pyrolusite, tr platy metallic min, hematite, clear to white tabular mineral (v. fine) in veinlets & on fracture surfaces. Intense fracturing, predom. vertical; more variable w/ depth: 30°, 45°

1570' VOLCANIC BRECCIA
Md dk gry & gry brn. Lapilli & block sz rock fragments of matic-intermediate, lavas in matrix of ash sz rock fragments, clay (from ash?) & crystals. Unit changes character throughout its thickness: thin, cross-bedded, laminated intervals; palagonitic intervals; intervals of basaltic andesite lapilli & blocks w/ features suggesting deposition while molten/plastic. Pyroclastic & surge origin is suggested by most of unit characteristics. Pale blue-blu gry clay on fractures, fine, clear acicular zeolite. FeOx.

1647' ANDESITE. olive gry, med gry, brn gry. ≤1% phenos: plag, Pyx. Platy frac. @ 45°. Lt brn, dk grn gry clays coat frac. Pyx → grn clay (Alt). Tr limonite, MnO (pyrolusite) on fracture surf.

1666.5' VOLCANIC BRECCIA
Lapilli-small block sz heterolithologic volcanic rock fragments, in v. dusky to clayey matrix. Unit varies based on fragment size, matrix: clast ratio; laminated cross-bedded intervals. Some matic lava fragments appear to have been deposited while molten/plastic. Pyroclastic origin suggested for unit. Fracture mineral w/variable direction. Trace fine, clear drusy zeolites on fractures.

COMMENTS

1271' - Bit #3. Same specs as bit #1. On RIH cave @ 600', 880', 920'

1620' Directional survey: ½° N39E

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Thermal Power Company

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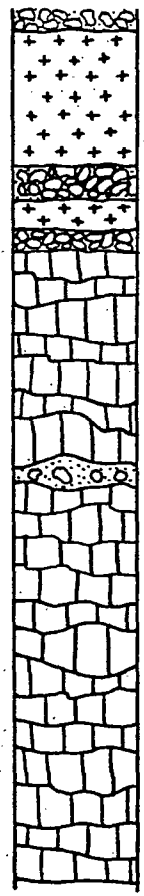
LOCATION Sec 28, T8S, R8E ELEVATION 3840' ☐ KB of ____ ☐ GL BOTTOM HOLE LOCATION _____
CONTRACTOR / RIG Boyles Bros. / 882 GEOLOGIST (S) McDannel / Goodwin DATE

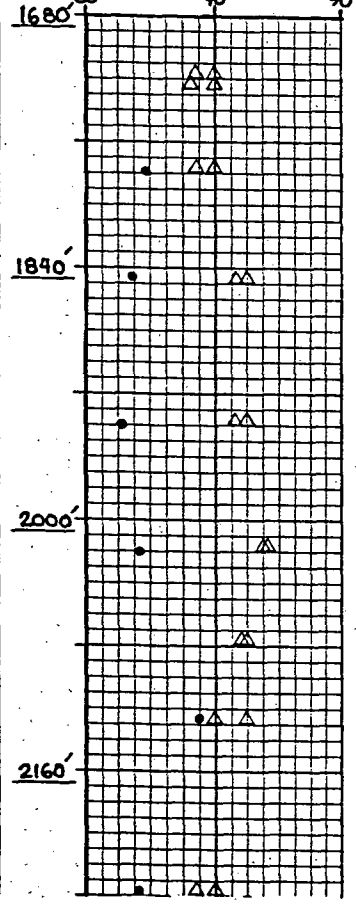
CASING PROFILE

LITHOLOGY

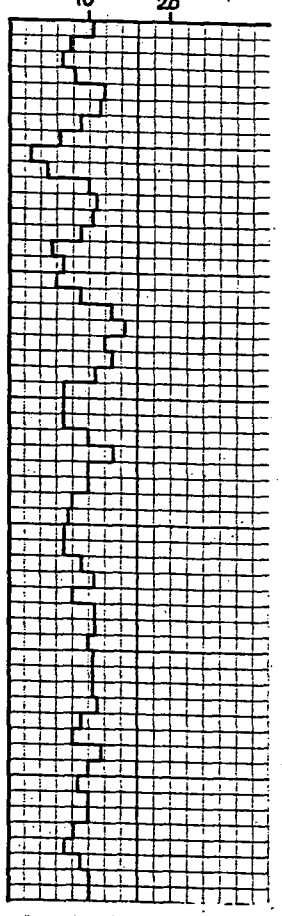


DEPTH

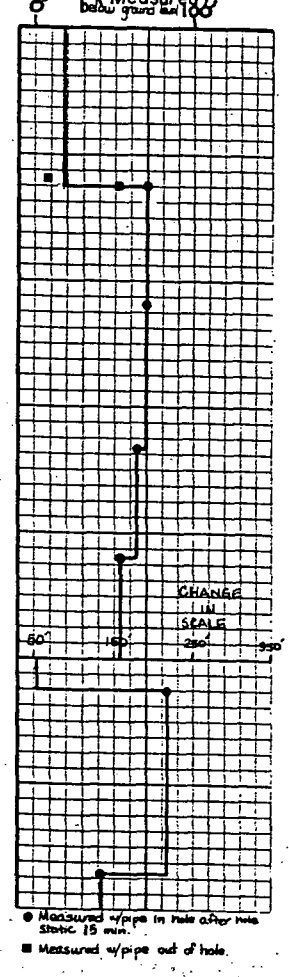
DRILLING TEMPERATURE TYPE °F



PENETRATION RATE (ft/hr)



WATER LEVEL (Measured) below ground elev.



LOST CIRCULATION ZONES

Total fluid loss continues. Pump rate varies: daily average 10-14 gpm

2111' pump pressure dropped to zero (while pumping ~13 gpm) @ vertical fracture near flow contact. Subsequent H_2O level measurements indicate an initial 170'+ drop in hole fluid column followed by a slow rise over following days.

LITHOLOGIC DESCRIPTION

1694' ANDESITE. Med to dk gry to brn gry, porphyritic 1-3% phenos' plag, pyx, lt - mod clay on fracture surfaces. Tr MnO. pyx → clay. Generally very frac. Most prominent frac. 45°.

1781.5' VOLCANIC BRECCIA
Med rd brn - md dk gry. Lapilli & blocks of scoria & andesite rock fragments in a sparse matrix of ash & clay. Pale brn, lt brn, brn red, & lt gry grn clays fill vesicles & lightly coat fractures. Clear, dusky zeolite on fractures. Unit has pyroclastic origin.

1798' ANDESITE. Brn gry to med gry. Sparsely porphyritic ≤1% plag, pyx. Plag & pyx → clay. Vesicles common. Clay (grn gry) on frac. surfaces & filling vesicles. Tr zeolite (?)

1820' VOLCANIC BRECCIA
Mod dk vel, grng brn, red brn. Coarse ash & lapilli sz heterolithologic rock fragments & minor lt gry pumice in a matrix of ash, glass fragments, & xtls. Changes in color, clast: matrix ratio, clast size gives crudely bedded appearance to unit. Plan shear on fracture surfaces. Origin of unit appears to be pyroclastic airfall.

1826' BASALTIC ANDESITE
Dk gry, finely porphyritic (2%). Phenos: plag, cpx. Mod. clays; 40°-50° prominent fracture direction. Few fractures.

1969' VOLCANIC BRECCIA
to 1971: red brn. Lapilli to coarse ash sz rock frags of intermediate to silicic composition in fine matrix of ash & less common, ash sz rock frags. Crude bedding 90° @ 1970'. 10 m.y. Basaltic andesite blocks & lapilli, often vesicular & apparently deposited while plastic, in mat matrix of red brn ash. Shear common on frac surfaces.

1979' BASALTIC ANDESITE
brn gry - gry brn, finely & sparsely porphyritic, commonly brecciated. Phenos: plag, pyx, ol. Mod. - heavy clays. Clear, dusky zeolite coats fracture surfaces. Much of unit is intensely fractured & brecciated & has greish grn to dusky grn color. Fracture angles: 15°, 40°, 80°

2086' BASALTIC ANDESITE
Grnish blk - dk grn gry - grnish brn, mnr red brn. Aphanitic to sparsely porphyritic. Fracture

COMMENTS

1775' - Bit #3. Same specs as bit #1. On RIH encountered cave @ 618', 675', 2' fill @ BH.

Lithology cont'd:
locally heavy. Predominately 45° vertical. Clays coat fracture surfaces. Zeolites in fractures & coating surfaces. Breccia common. Series of flows w/ contacts (~: 2067', 2074', 2088', 2091', 2111', 2188', 2241') marked by oxidation & vesicles.

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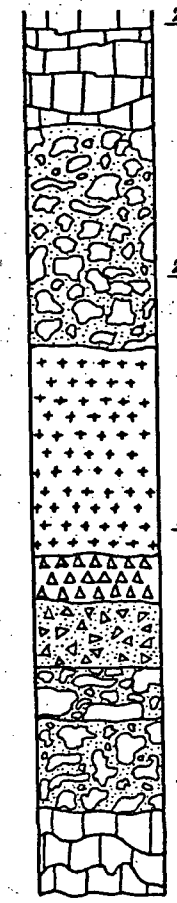
HOLE CTGH-1 | SPUD DATE 6/7/86 | COMPLETION DATE _____ | TOTAL DEPTH _____
FIELD CASCADES/CLACKAMAS | COUNTY MARION | STATE OREGON | TOTAL VERTICAL DEPTH _____
LOCATION SEC. 28, T8S, R8E | ELEVATION ~3840' | ☐ KB of ____ ☐ GL | BOTTOM HOLE LOCATION _____
CONTRACTOR / RIG BOYLES BROS / 882 | GEOLOGIST (S) GOODWIN/McDANNEL | DATE

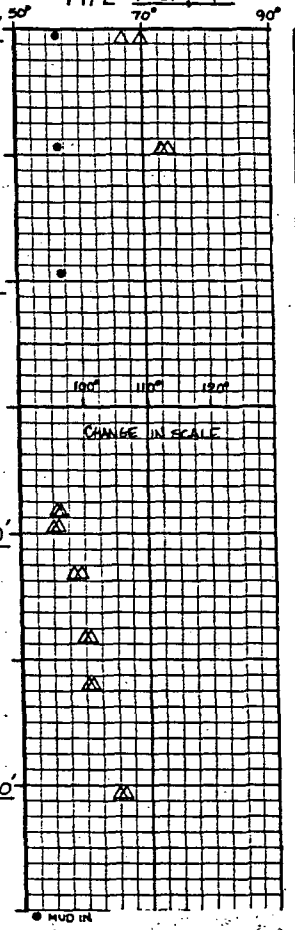
CASING PROFILE

LITHOLOGY

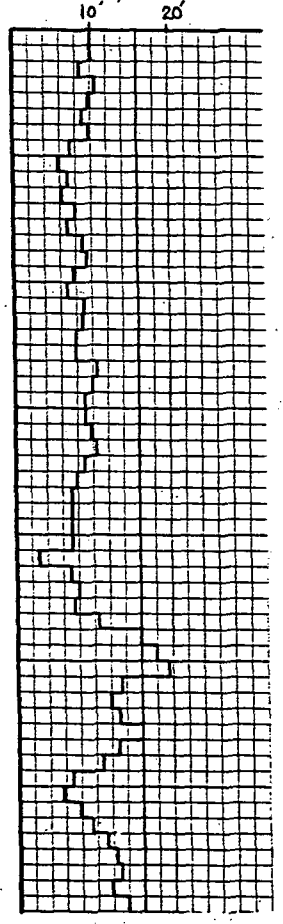


DEPTH

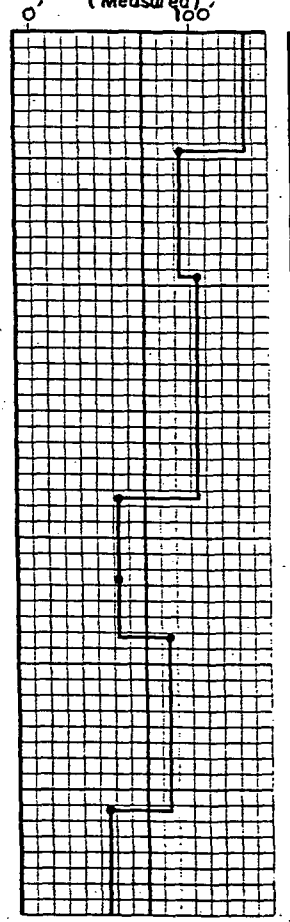
DRILLING TEMPERATURE TYPE MRT °F



PENETRATION RATE feet/hr



WATER LEVEL (Measured) Feet below ground level



LOST CIRCULATION ZONES

Total loss continues, a/z

LITHOLOGIC DESCRIPTION

2317' VOLCANIC BRECCIA
Dk grn gry, md dk gry, gry red, md red brn to brnish gry. Lt-med gry angular to subangular lapilli to block sz rock fragments of mafic to intermediate lavas in a matrix of ash sz rock fragments, ash, mnr crystals, dk grn clay. Frequent intervals of red & black flow banded lava, often with irregular, disrupted margins suggesting violent deposition. Most of unit appears to have pyroclastic origin. Mnr intervals of homogeneous aphyric basaltic andesite. Mnr clay, predominately green, on fracture surfaces. Irregular fracture, often w/waxy, sheared surfaces. Mnr. zeolites.

2453' ANDESITE
Md dk gry - v. lt. gry, porphyritic. 10% phenos: plag, cpx, opx. Phenos are altering to clays. Localized fracturing/brecciation pervasive pale blue & pale green clay.

2550' ANDESITE
Md dk gry - red brn. Sparsely & finely porphyritic. 2-3% phenos: plag, hbld, pyx. Lt clay alteration. Grn gry & wht clay veinlets. Localized, intense fracturing.

2586' CRYSTAL-LAPILLI TUFF
Lt-md gry, red brn lapilli sz rock fragments, mnr lt gry collapsed pumice? lapilli in orng brn to lt brn matrix of predom. xtls, v. coarse ash sz rock frags. Unit is not welded, but is consolidated. Origin is probably air fall. Lt shearing Dk grn & pale blue clay on fractures.

2602.5' LAPILLI TUFF
Lt gry angular to sub-rounded lapilli sz rock fragments, mean black glass collapsed pumice?, in med gry-dk gry matrix of ash sz rock frags, ash, xtls & glass shards of plag, cpx, magnetite. Mnr clay, Mnr sorting/bedding. Ash-flow origin?

2657' ANDESITE BRECCIA
Unit is a series of volcanic breccia (pyroclastic origin, in part & dense flow intervals. Breccia is consolidated but contains inter-grain voids. Mnr wht & pale grn clays, zeolites in vesicles & voids. Mnr. fracturing

2694' VOLCANIC BRECCIA
Lt-md gry black & lapilli sz rock

COMMENTS

2336' Bit #6 (same specs as bit #1). On RIH bridges @ 880 & 1140'

2486' Directional survey: ¾°, N12E

(Lithology cont'd)
fragments of mafic-intermediate lavas in a fine matrix of ash sz rock frags, mnr crystals, palagonite, clay, mnr, (altered, thin-glassy beds. Unit is predom. matrix supported. Origin is probably pyroclastic & may be in part hydroclastic or surge deposit. Intervals of lapilli & coarse ash fragments plastically deformed & w/disrupted margins suggest deposition while molten

2726' BASALTIC ANDESITE
Md dk gry - v. finely porphyritic. 7-9% phenos: plag, pyx (+ clay), ol ? Tectonically brecciated intervals w/mnr dk gry grn clay. Minor movement in brecciated intervals. Lt-mod fracturing. Pale grn & gry grn clays.

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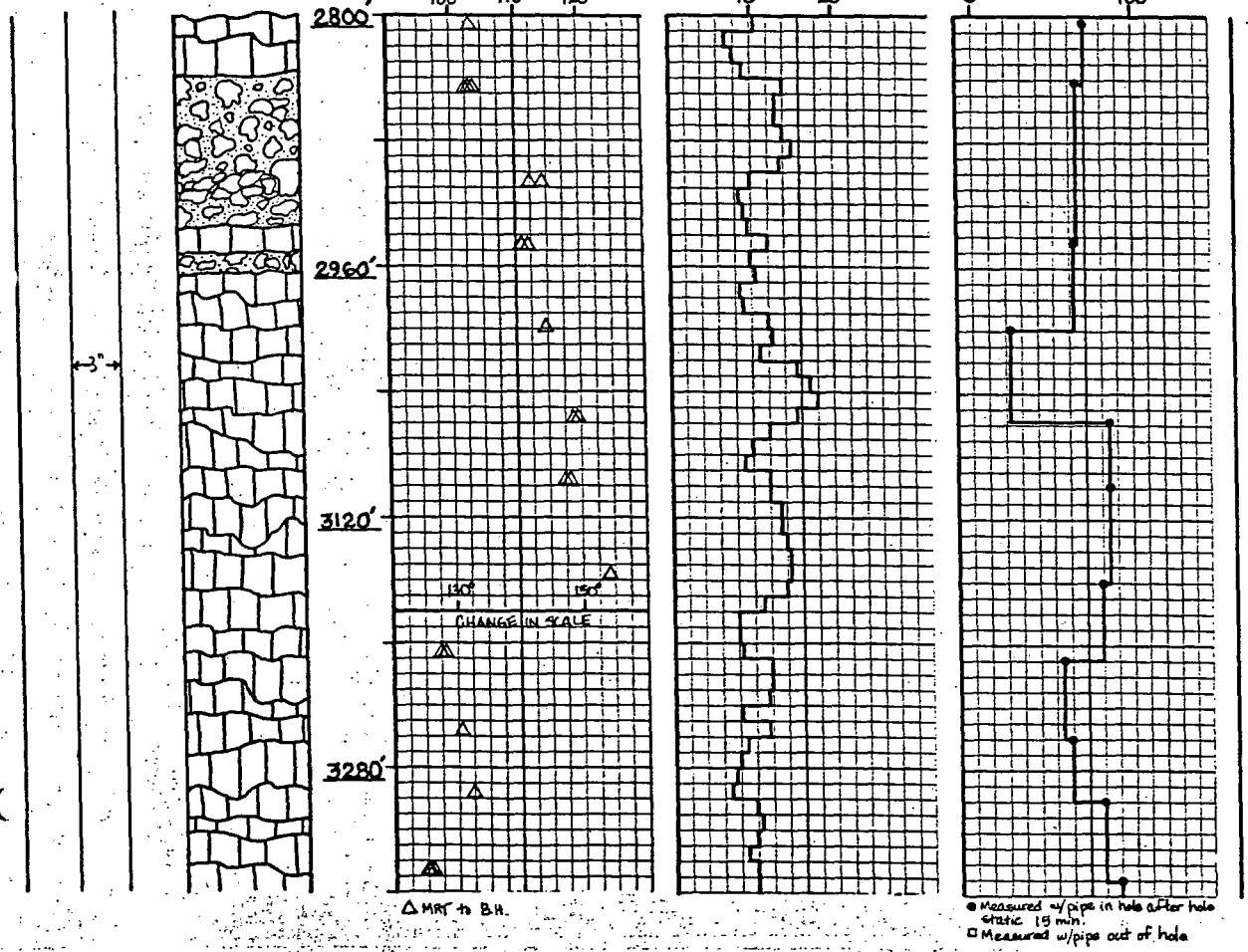
LOCATION Sec 28, T8S, R8E ELEVATION 3840' ☐ KB of ____ ☐ GL BOTTOM HOLE LOCATION _____
CONTRACTOR / RIG BOYLES BROS. / 882 GEOLOGIST (S) · GOODWIN / McDANNEL DATE

CASING PROFILE | LITHOLOGY | DEPTH | DRILLING TEMPERATURE TYPE MRT °F | PENETRATION RATE (Ft/hr) | WATER LEVEL (Measured) | LOST CIRCULATION ZONES | LITHOLOGIC DESCRIPTION | COMMENTS



Total loss continues. 7-14 gpm.

2842' VOLCANIC BRECCIA Angular to sub-rounded lapilli & mbr blocks of mafic-intermediate lavas in dk gry-brn gry-gry gd matrix of smaller rock frags, xtls, clay. Unit varies from clast to matrix supported. Intervals of basaltic andesite w/elongated, disrupted margins in oxidized, reddish brn matrix suggest deposition while molten. Mbr discontinuous grading forms bedding in matrix. Rare zeolites in fracs & minr druse coatings on surfaces. Light, variable fracture.

2935 BASALTIC ANDESITE Med dk gry-med red, finely & sparsely porphyritic, ≤ 1% phenos: plag, Pyr

2951.5 VOLCANIC BRECCIA As above in 2842, but predom. clast supported.

2965.5 BASALTIC ANDESITE Med-dk gry-brn gry, finely & sparsely porphyritic (2-5%) Phenos: plag, Pyx; both + clay. Much of unit is pyroclastic breccia, often as thick deposits: dk dry-brnish gry blocks & lapilli of basaltic andesite fragments in grey-red matrix of basaltic andesite lava. Minr agglomerate. Overall fracturing is light and is much more common in dense lavas than in breccia. Most common fracture directions vertical & 45°, rarely 30° & 60°. Waxy "claws" common: dk gry grn, gry blue grn, bluish gry, pale blue. Other less common clays: wht & gry brn, gry. Clay mds take lenticular form, particularly in voids. Zeolites common (2%), often as druse coating. Silica appears @ 3148' as veinlets & void fill. Often white & blue, & may replace "claws". Native copper as small plates & thin wire (microscopic) appears @ 3248'.

3300' Directional survey 3/4° N 16W

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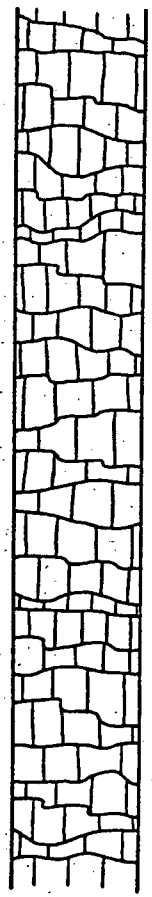
CASING PROFILE

LITHOLOGY

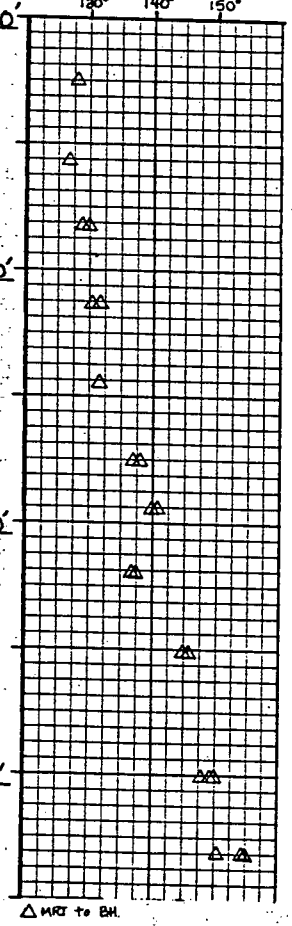


DEPTH

3360'
3520'
3680'
3840'

DRILLING TEMPERATURE

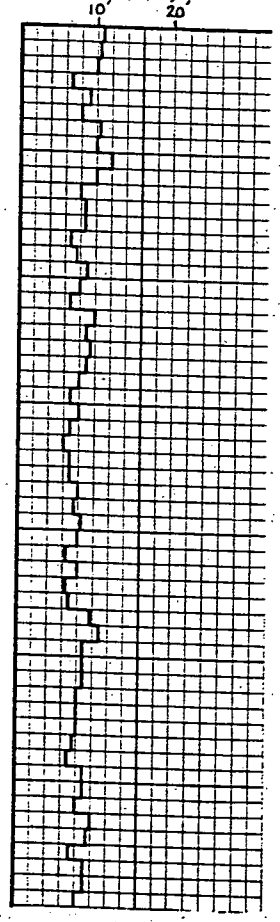
TYPE MRT °F
130° 140° 150°



△ MRT to BH.

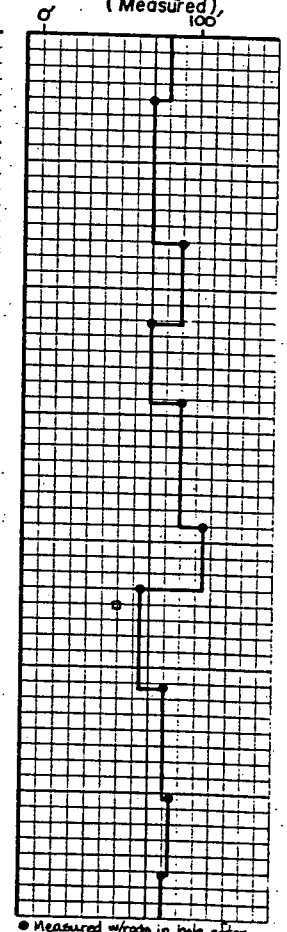
PENETRATION RATE (ft/hr)

10' 20'



WATER LEVEL feet below ground level (Measured)

0' 100'



● Measured w/rods in hole after hole static ≥ 15 minutes
□ Measured w/rods out of hole

LOST CIRCULATION ZONES

Total loss continues 7-14 gpm

LITHOLOGIC DESCRIPTION

BASALTIC ANDESITE as above @ 2965.5 cont'd: Thin (2'-10') dense flows of sparsely & finely porphyritic basaltic andesite interlayered with thicker intervals (2'-25') of basaltic andesite volcanic breccia. Fracturing is light to moderate, w/local heavy fracture zones, & is more common in flows than breccia. Fracture direction is variable, but vertical-sub-vertical direction is most common. Green & blue "clays" common, filling voids & coating fracture surfaces. Dark grn & blue grn "clays" effervesce (lightly) w/HCl. White & gry brn clays are less abundant & were deposited subsequent to grn & blue clays (Light blue clays subsequent to dk grn, gry grn, blue grn). Silica fills voids, fractures & may replace some clay. Silica more common in lava flows than breccia. Zeolites occur as very fine crystals (clear) forming drusy coatings on grn & blue clays; acicular & fibrous varieties are common in voids & may coat grn/blue clays. Silica & zeolites deposited subsequent to grn & blue clays. Microscopic native copper 3248-3700'. Minor yellow & orange Fe ox stains.

COMMENTS

3721 Bit #7 (same specs as core bit #1). Cave between 800-1,000' on RIH.

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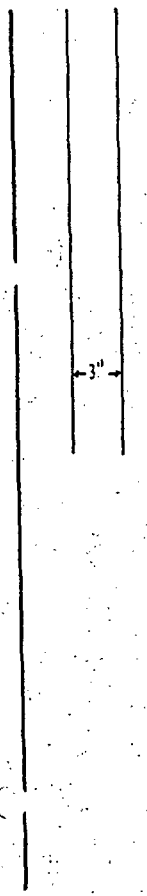
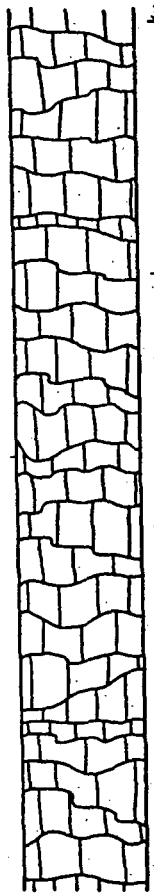
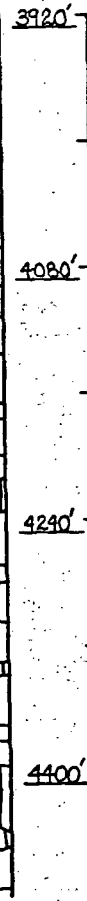
CASING PROFILE



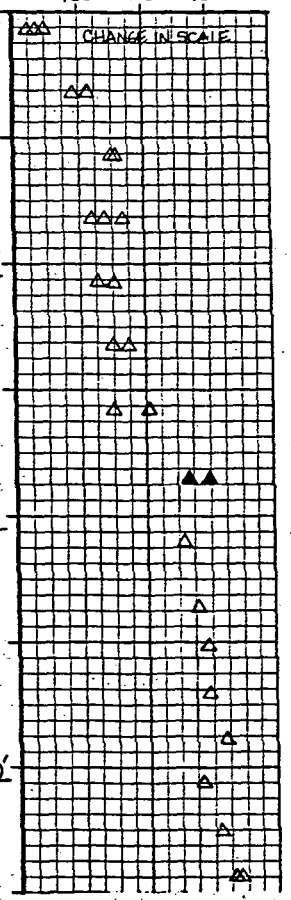
LITHOLOGY



DEPTH

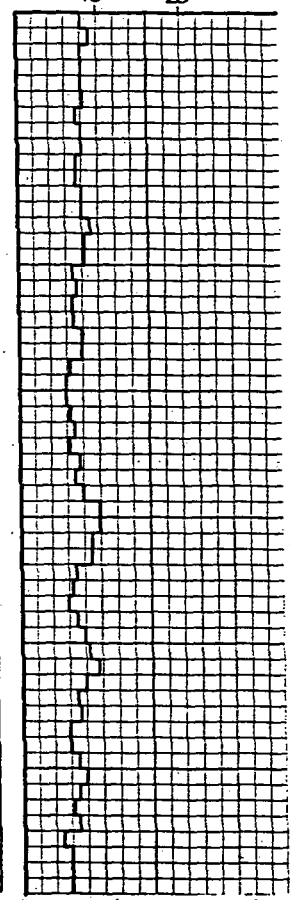


DRILLING TEMPERATURE TYPE MRT °F

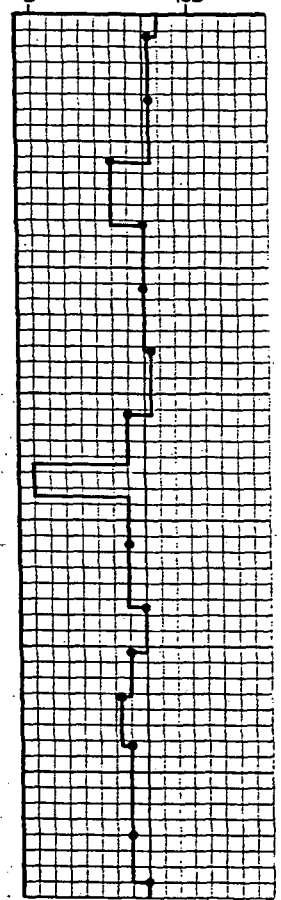


△ MRT to B.H.
▲ MRT to B.H. after 40 min.

PENETRATION RATE (ft/hr)



WATER LEVEL (Measured) being ground level



● Measured with pipe in hole after hole static 15 min.

LOST CIRCULATION ZONES

Total loss continues. 7-14 gpm

4206'-4226' full returns.

4226' Total circulation loss resumes. 7-14 gpm

LITHOLOGIC DESCRIPTION

BASALTIC ANDESITE (as above)
Dense flows of sparsely & finely porphyritic lavas of basaltic andesite interlayered with volcanic breccia of same composition. Lavas are slightly thicker (up to 14'-20') and breccias thinner (6'-8') than above. Fracturing is light to moderate, and is more common in lava flows than breccias. Fracture direction variable; it is commonly high angle (0°-20°). Green & blue "clays" common, filling voids & coating fracture surfaces. Dark grn & blue grn clays effervesce lightly w/ HCl. White & brown clays less abundant. Silica fills voids, fractures & may replace some clay. Silica most common in lavas. Zeolites are common & fill voids lined by clay. Minor yellow & orange FeOx stains follow fractures. Order of deposition of clays & secondary minerals: Dk green clay, light green & blue green clay, ± silica, ± zeolites, ± brn & wht clays.

COMMENTS

4206' Twisted off @ 823' below ground level. Entered H-rods w/NX rods to retrieve inner core barrel. Returned into H-rods w/NX rods & bit #8 (Christiansen grey impreg. 2.875"), drilled out H-bit (#7) & proceeded drilling to 4226'.

4226' Tripped out of hole. RIH w/bit #9 (same specs as #8)

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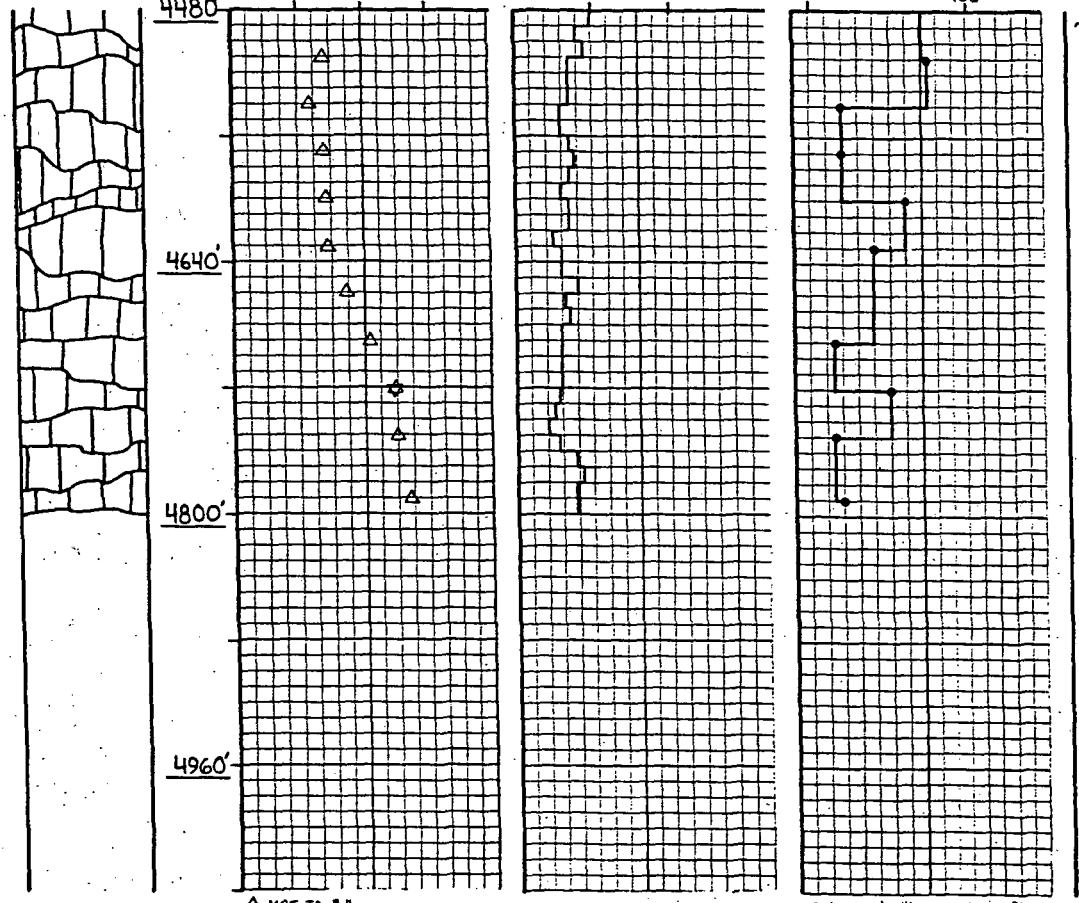
Thermal Power Company

HOLE CTGH-1 | SPUD DATE 6/7/86 | COMPLETION DATE _____ | TOTAL DEPTH _____
FIELD CASCADES/CLACKAMAS | COUNTY MARION | STATE OREGON | TOTAL VERTICAL DEPTH _____
LOCATION SEC. 28, T8S, R8E | ELEVATION ~3840' | ☐ KB of ____ ☐ GL | BOTTOM HOLE LOCATION _____
CONTRACTOR / RIG BOYLES BROS/882 | GEOLOGIST (S) _____ | DATE

CASING PROFILE | LITHOLOGY | DEPTH | DRILLING TEMPERATURE TYPE MRT °F (180° 190° 200°) | PENETRATION RATE (Feet/hour) (10' 20') | WATER LEVEL (feet below ground) (Measured) (0' 100') | LOST CIRCULATION ZONES | LITHOLOGIC DESCRIPTION | COMMENTS



△ MRT TO B.H.
✡ MRT TO B.H. AFTER HOLE STATIC 4 HRS

● Measured with pipe in hole, after hole static 15 min.

~4480' pump rate increased to 75 gpm due to high torque.

BASALTIC ANDESITE (as above)
Dense flows of sparsely & finely porphyritic to aphyric basaltic andesite interlayered with volcanic (pyroclastic) breccia. In the lower 500-400' of the unit breccias are generally thicker than flows. Flows are often as thin as 4-6'. Fracturing is generally light & concentrated in the flows. Grn & blue clays common as void fill & fracture coatings (light). Silica fills voids & fractures & is much more common in flows than breccias. Zeolites are common, particularly in breccias. Clays typically precede zeolites & silica. Silica (hydrous) may coat some zeolites. Mnr gelles & orange FeOx stains & edges along fractures; these are typically localized in their occurance. Fracture surfaces are typically sheared & may have mnr serpentine & hematite

Diamond Shamrock
Thermal Power Company

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/McDANNEL

DATE JUNE 22, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
527'-534'	1/1	7'/7.8'	112%	includes 4" slough, full circulation
534'-536'	2/1	2'/1.2'	58%	partial returns/circulation
536'-539½'	3/1&2	3½'/4.3'	124%	recovered core lost from Run #2, lose returns
539½'-539¾'	4/2	2+"/4"	≈200%	water level @ ≈ 20'
539¾'-545.5'	5/2&3	5.75'/5.75'	100%	static water level remains near top of hole. LCM added intermittently, mud visc. varied – NO RETURNS
545.5'-556'	6/3&4	10.5'/10.5'	100%	
556'-562'	7/4	6'/6'	100%	
562'-571'	8/5	9'/9'	100%	
571'-579'	9/5	8'/1½'	19%	6½ feet lost
579'-587'	10/6	8'/8'	100%	
587'-588'	11/6&7	1'/1.25'	125%	
588'-588.5'	12/7	6"/4"	67%	
588.5'-594.5'	13/7	6'/7'	117%	1 foot of slough recovered following Bit Run
594.5'-597.5'	14/7&8	3'/3'	100%	
597.5'-603'	15/8	5½'/5½'	100%	
603'-610.5'	16/8&9	7½'/2½'	33%	5 feet of rubble and ash lost
610.5'-615'	17/9	4½'/3½'	78%	1' of " " " "
615'-616'	18/9	1'/9"	75%	

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) MCDANNEL/GOODWIN

DATE JUNE 23, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
616' - 626'	19/9,10	10'/10'	100%	H_2O level remains at top of hole (rods in hole)
626' - 636'	20/10,11	10'/10'	100%	most of rock is dense, well-consolidated
636' - 646'	21/11,12	10'/10'	100%	
646' - 656'	22/12,13	10'/9'	90%	Lost 1' of rubble
656' - 663'	23/13,14	7'/6'	85%	Loss ~ 1'
663' - 670'	24/14	7'/4'	57%	Loss ~3' in rubble/cinder @ bottom of hole
670' - 675'	25/14	5'/2'	40%	Loss ~3' (in rubble...)

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JUNE 24, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
675'-683'	26/15	8'/1'	1'- 13%	7' Rubble/cinders washed away
683'-689'	27/15	6'/4½'	75%	1½' " " " " at top of interval
689'-694'	28/15,16	5'/5'	100%	
694'-696'	29/16	2'/2'	100+%	6" Cindery Slough at start of interval
696'-703'	30/16,17	7'/7'	100+%	Cinder Slough Recovered at beginning of run
703'-709'	31/17	6'/5.2'	86%	
709'-715'	32/17,18	6'/3.5'	60%	MRTS read 69°, 70°; Mud In: 61°; Air: 43°
715'-719'	33/18	4'/3.3'	80%	Cindery/scoriaceous slough 719'-723'
719'-723'	34/18	4'/1'	25%	
723'-733'	35/18	10'/2'	20%	
733'-743'	36/19	10'/10'	100%	
743'-746'	37/20	3'/3.75	125%	~3" slough
746'-756'	38/20,21	10'/10'	100%	
756'-766.5'	39/21,22	10.5'/10.5'	100%	
766.5'-774'	40/22,23	7.5'/6.5'	87%	lost ~1' ash & cinders
774'-784.5'	41/23	10.5'/5.5'	52%	lost ~5' ash & cinders and scoria

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADE/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN
DATE JUNE 25, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
784.5'-788.5'	42/23,24	4'/2½'	63%	½' slough also recovered at start of run
788.5'-792.5'	(43)/24	4'/2½'	63%	Core Returns V. Fractured/Rubbly 788.5' to
792.5'-795'	44/24	2½'/1½'	60%	
795'-799'	45/24	4'/2'	50%	
799'-806'	46/24,25	7'/7'	100%	
806'-814'	47/25,26	8'/8'	100%	
814'-815'	48/26	1'/1'	100%	v. rubbly
815'-825'	49/26,27	10'/10'	100%	
825'-835'	50/27,28	10'/7½	75%	unconsol. sandy matrix washing @ bottom hole
835'-840'	51/28,29	5'/3½'	70%	" " " " " " "
840'-844'	52/29	4'/3½'	88%	" " " "
844'-846.5'	53/29	2½'/2'	80%	" " " "
846.5'-848'	54/29	1½'/3¼'	50%	" " " "
848'-854'	55/29,30	6'/5'	83%	" " " "
854'-859'	56/30	5'/1'	20%	" " " " , mislatch-dropped
859'-864'	57/30,31	5'/5'	100%	Core during retrieval @ 859', Change Bit #2 → #3

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Form 3

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JUNE 26, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT / RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
864'-866.5'	58/31	2.5'/2.0'	80%	
866.5'-867'	59/31	0.5'/0.4'	80%	
867'-871.5'	59/31	4.5'/0.5'	11%	blocky & fractured - minor mud from above hole?
871.5'-874'	60/31	2.5'/0.25'	10%	regained (w/1½') some of lost intervals when rods tripped
874'-876.5'	61/31	2.5'/2.5'	100%	top 6" is slough from higher in hole
876.5'-878'	62/32	1.5'/1.5'	100%	
878'-880'	63/32,33	2'/2'	100%	remains very fractured, broken
880'-888'	64/33,34	8'/8'	100%	↓
888'-898.5'	65/34	10.5'/9'	86%	1½ feet lost at clayey bottom
898.5'-908.5'	66/34,35	10'/10'	100%	
908.5'-913'	67/35	4.5'/4.5'	100%	
913'-918'	68/36	5'/8'	100%	3' slough consisting of dacite & clay recovered when pulled 15' off bottom, 45 min. required to core thru slough
918'-922'	69/36,37	4'/4'	100%	
922'-932'	70/37,38	10'/10'	100%	
932'-934.5'	71/38	2.5'/2'2"	86%	
934.5'-940'	72/38,39	5.5'/5.5'	100%	

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Thermal Power Company

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN
DATE JUNE 27, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
940'-944.5'	73/39	4.5'/2'	45%	Rubbley, fractured, clayey ← washed away?
944.5'-947'	74/39	2.5'/1.9	75%	
947'-953.5'	75/39,40	6.5'/4.8'	75%	
953.5'-962.5'	76/40,41	9'/9'	100%	
962.5'-968'	77/41,42	5.5'/5'	91%+	2' slough recovered after Bit Run, Add Bit #3
968'-977½'	78/42,43	9.5'/10'	100%+	6" slough recovered
977½'-987	79/43,44	9.5'/9.5'	100%+	Mnr. slough at every interval
987- 997	80/44,45	10'/10'	100%+	
997- 1007	81/45,46	10'/10'	100%+	
1007-1017	82/46,47	10'/10'	100%+	
1017-1027	83/47,48	10'/10'	100%+	
1027-1037	84/48,49	10'/10'	100%+	
1037-1047	85/49,50	10'/10'	100%+	
1047-1057	86/50,51	10'/10'	100%+	
1057-1067	87/51,52,53	10'/10'	100%+	

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN
DATE JUNE 28, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
1067'- 1073'	88/53	6'/6'	100%	
1073'- 1083'	89/53,54,55	10'/10'	100%	
1083'-1093'	90/55,56	10'/10'	100%	
1093'- 1103'	91/56,57	10'/10'	100%	
1103'- 1113'	92/57,58	10'/10'	100%	Rock type changes from DIORITE/DACITE to Ash y Lahar @ ~ 1110'
1113'- 1123'	93/58,59	10'/10'	100%	
1123'- 1131'	94/59,60	8'/6.5'	81%	
1131'- 1141'	95/60,61	10'/10'+	100%+	
1141'- 1151'	96/61,62	10'/10'	100%	
1151'- 1161'	97/62,63	10'/10'	100%	
1161'- 1171'	98/63,64	10'/10'	100%	
1171'- 1180'	99/64,65	10/10	100%	
1180'- 1190'	100/65,66	10'/10'	100%	
1190'- 1200'	101/66,67	10'/10'	100%	
1200'- 1210'	102/67,68	10'/10'	100%	
1210'- 1220'	103/68,69	10'/10'	100%	
1220'- 1230'	104/69,70	10'/10'	100%	

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Form 3

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JUNE 29, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE FOOTAGE CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
1230'-1240.5'	105/70,71	10.5'/10.5'	100%	
1240.5'-1250.5'	106/71,72	10'/10'	100%	
1250.5'-1261'	107/72,73	10.5'/10.5'	100%	
1261'-1271'	108/74,75	10'/10'	100%	
1271'-1276'	109/75,	5'/4½',	90%	
1276'-1286'	110/75,76	10'/10½'	100+%	recovered loss of previous run
1286'-1296'	111/76,77	10'/10'	100%	
1296'-1306'	112/77,78	10'/10'	100%	
1306'-1316'	113/78,79, 80	10'/10'	100%	
1316'-1324'	114/80	8'/7'	88%	
1324'-1331'	115/80,81	7'/7+'	100%	recovered loss of previous run
1331'-1338'	116/81,82	7'/5½'	80%	clays + rubble washed away
1338'-1348'	117/82,83	10'/10'	100%	
1348'-1356'	118/83,84	8'/8'	100%	
1356'-1366'	119/84,85	10'/10'	100%	
1366'-1376'	120/85,86	10'/10'	100%	
1376'-1386'	121/86,87	10'/10'	100%	

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Form 3

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/MCDANNEL

DATE 7/1/86

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
1386'-1396'	122/87,88,89	10'/10'	100%	rock is generally very fractured w/ high clay content
1396'-1406'	123/89,90	10/10'	100%	
1406'-1414'	124/90,91	8/8'	100%	
1414'-1423'	125/91,92	9'/9'	100%	
1423'-1433'	126/92,93	10'/10'	100%	
1433'-1443'	127/93,94	10'/10'	100%	
1443'-1453'	128/94,95	10'/10'	100%	
1453'-1461'	129/95,96	8'/7½'	94%	
1461'-1471'	130/96,97	10'/10'	100%	
1471'-1481'	131/97,98	10'/10'	100%	
1481'-1491'	132/98,99	10'/10'	100%	
1491'-1501⅝'	133/99,100	10.5/10.2	~100%	
1501⅝'-1512'	134/100,101	10.5/10.2	~100%	
1512'-1522'	135/102,103	10'/10'	100%	
1522'-1532'	136/103,104	10'/10'	100%	

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) A.MCDANIEL/D.GOODWIN

DATE JULY 2, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
1532' - 1537'	137/104	5'/5'	100%	
1537' - 1547'	138/104, 105	10'/10'	100%	
1547' - 1557'	139/105, 106	10'/8'	80%	Dropped 2 feet of core from barrel
1557' - 1565'	140/106, 107	8/10'	120%	Recovered 2 feet of core dropped on previous run.
1565' - 1575'	141/107, 108, 109	10'/10'	100%	
1575' - 1585'	142/109, 110	10'/10'	100%	
1585' - 1595'	143/110, 111	10'/10'	100%	
1595' - 1605'	144/111, 112	10'/10'	100%	
1605' - 1615'	145/112, 113	10/10'	100%	
1615' - 1619'	146/113	4'/4'	100%	
1619' - 1629'	147/113, 114	10'/10'	100%	
1629' - 1639'	148/114, 115	10'/10'	100%	
1639' - 1649'	149/116, 117	10'/10'	100%	

Diamond Shamrock
Thermal Power Company

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/MCDANIEL
DATE JULY 3, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
1649' – 1659'	150/117,118	10/10'	100%	
1659' – 1669'	151/118,119	10'/10'	100%	
1669' – 1679'	152/119,120	10'/10'	100%	
1679' – 1689'	153/120,121	10'/10'	100%	
1689' – 1697'	154/121,122	8'/8'	100%	
1697' – 1698'	155/122	1'/6"	50%	Rubble w/ vertical fracture wedging core in tube
1698' – 1708'	156/122,123	10'/10'	100%	
1708' – 1711'	157/123	3'/3'	100%	
1711' – 1716'	158/124	5'/5'	100%	
1716' – 1719'	159/124	3'/3'	100%	
1719' – 1721'	160/124,	2'/2'	100%	Very fractured core causing short runs
1721 – 1725	161/125,	4'/4'	100%	
1725 – 1727	162/125,	2'/2'	100%	
1727 – 1734	163/125,126	7'/7'	100%	
1734 – 1742	164/126,127	8'/8'	100%	

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Thermal Power Company

Form 3

CORE RECOVERY LOG

HOLE CTGH #1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 4, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
1742'-1751'	165/127,128	9'/9'	100%	Rock fractured @ 45° every 1"-4" causing wedging of fragments in inner tube and short runs
1751'-1756'	166/128,129	5'/5'	100%	
1756'-1761'	167/129	5'/5'	100%	
1761'-1762'	168/129	1'/4"	33%	
1762'-1765'	169/129,130	3'/3'	100%	
1765'-1766'	170/130	1'/2"	17%	
1766'-1775'	171/130	9'/ 0' before POH 4' after POH	0%/40%	1775' Trip rods to recover core in outer barrel, core was dropped/lost because tube hadn't properly latched before start of run
1775'-1779'	172/130	4'/3.2	75%	1779' Trip rods - tube mislatched (after being pulled to recover slough material below 560', replacement tube didn't properly latch... this wasn't recognized until rods drilled to bottom and 4' of hole cored) Core recovery (75%) includes minor slough.
1779'-1788'	173/131	9'/9'	100%	
1788'-1798'	174/132	10'/10'	100%	
1798'-1808'	175/133,134	10'/10'	100%	
1808'-1818'	176/134,135	10'/10'	100%	
1818'-1828'	177/135,136	10'/8'	80%	
1828'-1836'	178/136,137	8'/10'	125%	Recovered loss of previous run
1836'-1846'	179/137,138	10'/10'	100%	
1846'-1856'	180/138,139	10'/10'	100%	
1856'-1866'	181/139,140	10'/10'	100%	

Diamond Shamrock
Thermal Power Company

Form 3

CORE RECOVERY LOG

HOLE CTGH 1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 7, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
1866'-1876'	182/140,141	10'/10'	100%	
1876'- 1886'	183/141,142	10'/10'	100%	
1886'- 1896'	184/142,143	10'/10'	100%	
1896' - 1906'	185/143,144	10'/10'	100%	
1906' - 1915'	186/144,145	9'/9'	100%	
1915' - 1917'	187/145	2'/2'	100%	Vertical fractures causing wedging of rocks in tubing
1917' - 1927'	188/145,146	10'/10'	100%	
1927' - 1929'	189/146,147	2'/2'	100%	
1929' - 1939'	190/147,148	10'/10'	100%	
1939' - 1943'	191/148	4'/3½'	88%	
1943' - 1946'	192/148	3'/3'	100%	brecciated core at 1946'
1946' - 1956'	193/149	10'/10'	100%	
1956' - 1966'	194/150,151	10'/10'	100%	
1966' - 1976'	195/151,152	10'/10'	100%	
1976' - 1981'	196/152	5'/5'	100%	
1981' - 1991'	197/152, 153	10'/10'	100%	1986'-1990'-rubbly
1991' - 1998'	198/153, 154	7'/7'	100%	50% of interval rubbly

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN
DATE JULY 8, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
1998' - 2006'	199/154,155	8'/8'	100%	1999-2001' - rubbly
2006' - 2010'	200/155	4'/4'	100%	entire interval rubbly
2010' - 2013'	201/156	3'/3'	100%	"
2013' - 2016'	202/156	3'/3'	100%	"
2016' - 2021'	203)156, 157	5'/5'	100%	"
2021' - 2025'	204/157	4'/3½	88%	"
2025' - 2030'	205/157	5'/4¾	95%	
2030' - 2037'	206/158	7'/5¼	75%	"
2037' - 2043'	207/158,159	7'/7'	100%	
2043' - 2053'	208/159,160	10'/10'	100%	
2053' - 2063'	209/160,161	10'/10'	100%	
2063' - 2073'	210/161,162	10'/10'	100%	
2073' - 2083'	211/162,163	10'/10'	100%	
2083' - 2093'	212/163,164	10'/10'	100%	17' piece of unfractured core ... Wow!
2093' - 2103'	213/164,165	10'/10'	100%	2 breaks in 10' - v. scarce frac's.
2103' - 2113'	214/165,166	10'/10'	100%	@2111' vert fracture in cindery B.A. takes drop in pump pres
2113' - 2120'	215/166,167	7'/7'	100%	
2120' - 2130'	216/167,168	10'/10'	100%	

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/MCDANNEL

DATE JULY 10, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT (CUT / RETURN)	AMOUNT RECOVERED (%)	COMMENTS
2130' - 2140'	217/168, 169	10'/10'	100%	v. few fractures ↓
2140' - 2150.5	218/169, 170	10.5'/10.5'	100%	
2150.5 - 2161'	219/170, 171	10.5'/10.5'	100%	
2161' - 2171'	220/172, 173	10'/10'	100%	
2171' - 2181'	221/173, 174	10'/10'	100%	
2181' - 2191'	222/174, 175	10'/10'	100%	
2191' - 2201.5'	223/175, 176	10½'/10½'	100%	
2201.5' - 2212'	224/176, 177	10½'/10½'	100%	
2212' - 2222½'	225/177, 178	10½'/10½'	100%	
2222½' - 2233'	226/178, 179	10½'/10½'	100%	
2233' - 2243'	227/179, 180	10'/10'	100%	
2243' - 2253'	228/180, 181	10'/10'	100%	
2253' - 2263'	229/181, 182	10'/10'	100%	
2263' - 2267'	230/182, 183	4'/4'	≤100%	v. rubbly - lost intraclast clays
2267' - 2277'	231/183, 184	10'/10'	100%	
2277' - 2286'	232/184, 185	9'/8½'	94%	
2286' - 2291'	233/185,	5'/5'	100%	

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Form 3

CORE RECOVERY LOG

HOLE CTGH1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 12, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT CUT/RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
2291' - 2296'	234/186,186	5'/5'	100%	
2296' - 2306'	235/186,187	10'/10'	100%	
2306' - 2316'	236/187,188	10'/10'	100%	
2316' - 2326	237/188,189	10'/10'	100%	
2326' - 2336'	238/189, 190	10'/10'	100%	
2336' - 2342'	239/190,191	6'/5½'	92%	
2342' - 2352'	240/191,192	10'/9½'	95%	
2352' - 2362'	241/192,193	10'/10'	100%	intermittent rubbly intervals
2362' - 2368'	242/193,194	6'/6'+	100%	
2368' - 2375'	243/194,195	7'/7'	100%	
2375' - 2385'	244/195,196	10'/10'	100%	
2385' - 2395'	245/196,197	10'/10'	100%	
2395' - 2405'	246/197,198	10'/10'	100%	
2405' - 2415	247/198,199	10'/10'	100%	
2415' - 2425'	248/199,200	10'/10'	100%	
2425' - 2434'	249/200,201	9'/9'	100%	
2434' - 2444'	250/201,202	10'/10'	100%	
2444' - 2446	251/202	2'/2'	100%	

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Form 3

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/MCDANNEL

DATE JULY 14, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT COR / RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
2446'-2456'	252/202,203	10'/10'	100%	
2456'-2466'	253/203,204	10'/10'	100%	
2466'-2476'	254/204,205	10'/10'	100%	
2476'-2486'	255/205,206	10'/10'	100%	
2486'-2495'	256/207,	9'/9'	100%	
2495'-2505'	257/208,209	10'/10'	100%	
2505'-2515'	258/209,210	10'/10'	100%	
2515'-2525'	259/210,211	10'/10'	100%	
2525'-2535'	260/211,212	10'/10'	100%	
2535'-2544'	261/212,213	9'/9'	100%	
2544'-2553'	262/213,214	9'/9'	100%	
2553'-2562'	263/214,215	9'/9+'	100%	
2562'-2570'	264/25,216	8'/8'	100%	
2570'-2574'	265/216	4'/4'	100%	
2574'-2584'	266/216,217	10'/10'	100%	
2584'-2594'	267/217,218	10'/10'	100%	
2594'-2603'	268/218,219	9'/10'+	100+%	adjusting footage to reflect accurate BH depth
2603'-2613'	269/219,220	10'/10'	100%	
2613'-2623'	270/220,221	10'/10'	100%	
2623'-2633'	271/221,222	10'/10'	100%	

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Form 3

CORE RECOVERY LOG

HOLE CTGH 1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 17, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
2633' - 2643'	272/222,223	10'/10'	100%	
2643' - 2653'	273/223,224	10'/10'	100%	
2653' - 2663'	274/224,225	10'/10'	100%	
2663' - 2673'	275/225,226	10'/10'	100%	
2673' - 2683'	276/226,227 228	10'/10'	100%	
2683' - 2693'	277/228,229	10'/10'	100%	
2693 - 2703'	278/229,230	10'/10'	100%	
2703 - 2713'	279/230,231	10'/10'	100%	
2713' - 2723'	280/231,232	10'/10'	100%	
2723' - 2733'	281/232,233	10'/10'	100%	
2733' - 2743'	282/233,234	10'/10'	100%	
2743' - 2753	283/234,235	10'/10'	100%	
2753 - 2762	284/235,236	9'/9'	100%	
2762 - 2772	285/237,236	10'/10'	100%	
2772 - 2782	286/238,237	10'/10'	100%	
2782 - 2792	287/238,239	10'/10'	100%	
2792 - 2802	288/239,240	10'/10'	100%	
2802 - 2809	289/240,241	7'/7'	100%	

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Form 3

CORE RECOVERY LOG

HOLE CTGH 1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 18, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
2809'-2816'	290/241,242	7'/7'	100%	rock has splintery fracture @ 20° (subvertical) causing wedging in the inner tube & shorter runs
2816'-2823'	291/242	7'/7'	100%	
2823'-2831'	292/243	8'/8'	100%	
2831'-2841'	293/243,244	10'/10'	100%	
2841'-2851'	294/244,245	10'/9'	90%	dropped 1' core
2851'-2860'	295/245,246	9'/10'	110%	recovered core (from above run)
2860'-2870'	296/246,	10'/10'	100%	
2870'-2880'	297/248	10'/10'	100%	
2880'-2890'	298/249,250	10'/10'	100%	
2890'-2900'	299/250,251	10'/6.5'	65%	dropped 3.5' core
2900'-2907'	300/251	7'/10+'	140+%	retrieved 10' core & moved core block 2900' to correct position
2907'-2916'	301/251,252	9'/9'	100%	
2916'-2923'	302/252,253	7'/7'	100%	
2923'-2933'	303/253,254	10'/10'	100%	
2933'-2942'	304/254,255	9'/9'	100%	
2942'-2951'	305/255,256	9'/9'	100%	
2951'-2961'	306/256,257	10'/10'	100%	
2961'-2970'	307/257,258	9'/8'	89%	dropped core - rock is fractured.

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/McDANNEL
DATE JULY 20, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
2970'- 2980'	308/258,259	10'/6.5'	65%	dropped core → may (also) be some problem grinding it up inside barrel when drilling
2980'-2988'	309/259,260	8'/10.5'	131%	← 2 wrong core blocks 2+', to correct for core recovered from last run #308
2988'-2998'	310/260,261	10'/10'	100%	
2998'-3008'	311/261,262	10'/10'	100%	
3008'-3018'	312/262,263	10'/10'	100%	
3018'-3028'	313/263,264	10'/10'	100%	
3028'-3038'	314/265,266	10'/10'	100%	
3038'-3048.5'	315/266,267	10.5'/10.5'	100%	+ 0.5 to catch up w/actual drilled depth (core barrel is 2" > 10' on each run)
3048.5'-3059'	316/267,268	10.5'/10.5'	100%	
3059'-3069'	317/268,269	10'/10'	100%	v. rubbly
3069'-3079'	318/269,270	10'/10'	100%	" towards base of interval
3079'-3089'	319/270,271	10'/10'	100%	
3089'-3099'	320/271,272	10'/10'	100%	
3099'-3109'	321/272,273	10'/10'	100%	
3109'- 3119	322/273,274	10'/10'	100%	
3119- 3129	323/274,275	10'/10'	100%	

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Form 3

CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) MCDANNEL, GOODWIN

DATE JULY 22, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
3129'- 3139'	324/275, 276	10'/10'	100%	
3139'- 3149'	325/276,277	10'/10'	100%	
3149'-3159'	326/277,278	10'/10'	100%	
3159' - 3169'	327/278,279, 280	10'/10'	100%	
3169' - 3179'	328/280,281	10'/10'	100%	
3179' - 3189'	329/281,282	10'/10'	100%	
3189' - 3199'	330/282,283	10'/10'	100%	
3199' - 3209'	331/283,284	10'/10'	100%	
3209' - 3219'	332/284,285	10'/10'	100%	
3219'- 3229'	333/285,286	10/10'	100%	
3229' - 3239'	334/286,287	10'/10'	100%	
3239'- 3249'	335/287,288	10'/10'	100%	
3249'- 3259'	336/288,289	10'/10'	100%	
3259'- 3269.5'	337/289,290	10.5'/10.5'	100%	
3269½- 3280'	338/290,291, 292	10.5'/10.5'	100%	
3280' - 3290'	339/292,293	10'/10'	100%	
3290'-3300'	340/293,294	10'/10'	100%	
3300' - 3310'	341/294,295	10'/10'	100%	
3310' - 3320'	342/295,296	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 25, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
3320' - 3330'	343/296,297	10'/10'	100%	
3330' - 3340'	344/297,298	10'/10'	100%	
3340' - 3350'	345/298,299	10'/10'	100%	
3350' - 3360'	346/299,300	10'/10'	100%	
3360' - 3370'	347/300,301	10'/10'	100%	
3370' - 3380'	348/301,302	10'/10'	100%	
3380' - 3390'	349/302,303	10'/10'	100%	
3390' - 3400'	350/303,304	10'/10'	100%	
3400' - 3410½'	351/304,305	10½'/10½'	100%	
3410½' - 3421'	352/305,306	10½'/10½'	100%	
3421' - 3431'	353/307,308	10'/10'	100%	
3431' - 3441'	354/308,309	10'/10'	100%	
3441' - 3451'	355/309,310	10'/10'	100%	
3451' - 3461'	356/310,311	10'/10'	100%	
3461' - 3471'	357/311,312	10'/10'	100%	
3471' - 3481'	358/312,313	10'/10'	100%	
3481' - 3491'	359/313,314	10'/10'	100%	
3491' - 3501½'	360/314,315	10½'/10½'	100%	
3501½ - 3512	361/315,316	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 26, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
3512'-3522'	362/316,317	10'/10'	100%	
3522'-3532'	363/317,318	10'/10'	100%	
3532'-3542'	364/318,319	10'/10'	100%	
3542'-3552'	365/319,320	10'/10'	100%	
3552'-3562'	366/320,321	10'/10'	100%	
3562'-3572'	367/321,322	10'/10'	100%	
3572'-3582'	368/322,323,324	10'/10'	100%	
3582'-3592½'	369/324,325	10½'/10½'	100%	
3592½'-3603'	370/325,326	10½'/10½'	100%	
3603'-3613'	371/326,327	10'/10'	100%	
3613'-3621'	372/327,328	10'/10'	100%	
3621'-3631'	373/328,329	10'/10'	100%	
3631'-3641'	374/329,330	10'/10'	100%	
3641'-3651'	375/330,331	10'/10'	100%	
3651'-3661'	376/331,332	10'/10'	100%	
3661'-3671'	377/332,333	10'/10'	100%	
3671'-3681'	378/333,334	10'/10'	100%	
3691'-3691'	379/334,335	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH 1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) McDANNEL/GOODWIN

DATE JULY 28, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
3691' - 3701'	380/335,336	10'/10'	100%	
3701' - 3711'	381/336,337	10'/10'	100%	
3711' - 3721'	382/337,338	10'/10'	100%	
3721' - 3723'	383/338,	2'/2'	100%	
3723' - 3733'	384/338,339	10'/10'	100%	
3733' - 3743'	385/340,341	10'/10'	100%	
3743' - 3753'	386/341,342	10'/10'	100%	
3753' - 3763'	387/342,343	10'/10'	100%	
3763' - 3773'	388/343,344	10'/10'	100%	
3773' - 3783'	389/344,345	10'/10'	100%	
3783' - 3793'	390/345,346	10'/10'	100%	
3793' - 3801'	391/346,347	8'/8'	100%	
3801' - 3811'	392/347,348	10'/10'	100%	
3811' - 3821'	393/348,349	10'/10'	100%	
3821' - 3831'	394/349,350	10'/10'	100%	
3831' - 3841'	395/350,351	10'/10'	100%	
3841' - 3851'	396/351,352	10'/10'	100%	
3851' - 3861'	397/352,353	10'/10'	100%	
3861' - 3871'	398/354	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN, McDANNEL

DATE JULY 31, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
3871'-3881'	399/355, 356	10'/10'	100%	
3881'-3891'	400/356, 357	10'/10'	100%	
3891'-3901'	401/357, 358	10'/10'	100%	
3901'-3911'	402/358, 359	10'/10'	100%	
3911'-3921'	403/359, 360	10'/10'	100%	
3921'-3931½'	404/360, 361	10½'/10½	100%	
3931½'-3942'	405/361, 362	10½/10½	100%	
3942'-3952'	406/362, 363	10'/10'	100%	
3952'-3962'	407/363, 364	10'/10'	100%	
3962'-3972	408/364, 365	10'/10'	100%	
3972'-3982'	409/365, 366	10'/10'	100%	
3982'-3992'	410/367, 368	10'/10'	100%	
3992'-4002'	411/368, 369	10'/10'	100%	
4002'-4012'	412/369, 370	10'/10'	100%	
4012'-4022'	413/370, 371	10'/10'	100%	
4022'-4032'	414/371, 372	10'/10'	100%	
4032'-4042'	415/372, 373	10'/10'	100%	
4042'-4052'	416/373, 374	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) MCDANNEL/GOODWIN

DATE AUG. 2, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
4052'- 4062'	417/374,375	10'/10'	100%	
4062' - 4072.5'	418/375,376	10.5'/10.5'	100%	
4072.5'-4083'	419/376,377	10.5'/10.5'	100%	
4083'- 4093'	420/377,378	10'/10'	100%	
4093'- 4103'	421/378,379	10'/10'	100%	
4103'- 4113'	422/379,380 381	10'/10'	100%	
4113' - 4123'	423/381,382	10'/10'	100%	
4123'- 4133'	424/382,383	10'/10'	100%	
4133' - 4143'	425/383,384	10'/10'	100%	
4143' - 4153'	426/384,385	10'/10'	100%	
4153' - 4163'	427/385,386	10'/10'	100%	
4163'- 4173'	428/386,387	10'/10'	100%	
4173'- 4183'	429/387,388	10'/10'	100%	
4183'- 4193'	430/388,389	10'/10'	100%	
4193 - 4203	431/389,390	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH 1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/MCDANIEL
DATE AUG. 4, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
4203'- 4206'	432/390,	3'/2'	66%	DROPPED CORE?
4206- 4216'	433/390,391	10'/10'	100%	DRILLING W/NXROD
4216 - 4226'	434/391,392	10'/10'	100%	
4226' - 4236'	435/392,393, 394	10'/10'	100%	
4236'- 4246'	436/394, 395	10'/10'	100%	
4246'- 4256'	437/395,396	10'/10'	100%	
4256'- 4266'	438/396,397	10'/10'	100%	
4266'- 4276'	439/397,398	10'/ 10'	100%	
4276'- 4286'	440/398,399	10'/10'	100%	
4286'- 4296'	441/399,400	10'/10'	100%	
4296'- 4303'	442/400,401	7'/10'	143%	Adjusted footage to reflect accurately T.D., all NX core markers maybe off by a systematic error of 0.3'/10' run(?) beginning @ 4206'
4303'- 4313'	443/401,402	10'/ 10'	100%	
4313' - 4323'	444/402,403	10'/10'	100%	
4323'- 4333'	445/403,404	10'/10'	100%	
4333'- 4343'	446/404,406	10'/10'	100%	
4343'- 4353'	447/405,406	10'/10'	100%	
4353' - 4363'	448/406,407	10'/10'	100%	
4363'- 4373'	449/407,408	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) MCDANNEL/GOODWIN
DATE August 13, 1986

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT CUT / RECOVERED	AMOUNT RECOVERED (%)	COMMENTS
4373'-4383'	450/408,409	10'/10' *(7')	100%	*lost 3' of core (pulled off stick left in hole)
4383'-4390'	451/409,410	7'/6½' (9½')	93%	recovered 3' lost in last run (moved core block to correct position)
4390'-4400'	452/410,411	10'/10'	100%	
4400'-4410'	453/411,412	10'/10'	100%	
4410'-4420'	454/412,413	10'/10'	100%	
4420'-4430'	455/413,414	10'/10'	100%	
4430'-4440'	456/414,415	10'/10'	100%	
4440'-4450'	457/415,416	10'/10'	100%	
4450'-4460'	458/416,417	10'/10'	100%	
4460'-4470'	459/417,418	10'/10'	100%	
4470'-4480'	460/418,419	10'/10'	100%	
4480'-4490'	461/419,420 421	10'/10'	100%	
4490'-4500'	462/421,422	10'/10'	100%	
4500'-4510'	463/422,423	10'/10'	100%	
4510'-4520'	464/423,424	10/10'	100%	
4520'-4530'	465/424,425	10'/10'	100%	
4530'-4540'	466/425,426	10'/10'	100%	
4540'-4550'	467/426,427	10'/10'	100%	
4550'-4560'	468/427,428	10'/10'	100%	

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CORE RECOVERY LOG

HOLE CTGH1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) MCDANIEL/GOODWIN

DATE 8/15/86

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
4560'-4570'	469/428,429	10'/10'	100%	
4570'-4580'	470/429,430	10'/10'	100%	
4580'-4590'	471/430,431	10'/10'	100%	
4590'-4600'	472/431,432	10'/10'	100%	
4600'-4610'	473/432,433	10'/10'	100%	
4610'-4620'	474/433,434	10'/10'	100%	
4620'-4630'	475/434,435	10'/10'	100%	
4630'-4640'	476/435,436	10'/10'	100%	
4640'-4650'	477/436,437	10'/10'	100%	
4650'-4660'	478/437,438	10'/10'	100%	
4660'-4670'	479/438,439	10'/10'	100%	
4670'-4680'	480/439,440	10'/10'	100%	
4680'-4690'	481/440,441	10'/10'	100%	
4690'-4700'	482/441,442,443	10'/10'	100%	
4700'-4710'	483/443,444	10'/10'	100%	
4710'-4720'	484/444,445	10'/10'	100%	
4720'-4730'	485/445,446	10'/10'	100%	
4730'-4746'	486/446,447	16'/16'	100%	

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CORE RECOVERY LOG

HOLE CTGH-1 FIELD CASCADES/CLACKAMAS GEOLOGIST (S) GOODWIN/MCDANNEL
DATE 8/17/86

DEPTH INTERVAL CORED (ft)	RUN/BOX NUMBER	CORE BARREL MEASUREMENT	AMOUNT RECOVERED (%)	COMMENTS
4740'-4750'	487/447,448	10'/10'	100%	
4750'-4760'	488/448,449	10'/10'	100%	
4760'-4770'	489/449,450	10'/10'	100%	
4770'-4780'	490/450,451	10'/10'	100%	
4780'-4790'	491/451,452	10'/10'	100%	
4790'-4800'	492/452,453	10'/10'	100%	
4800'				

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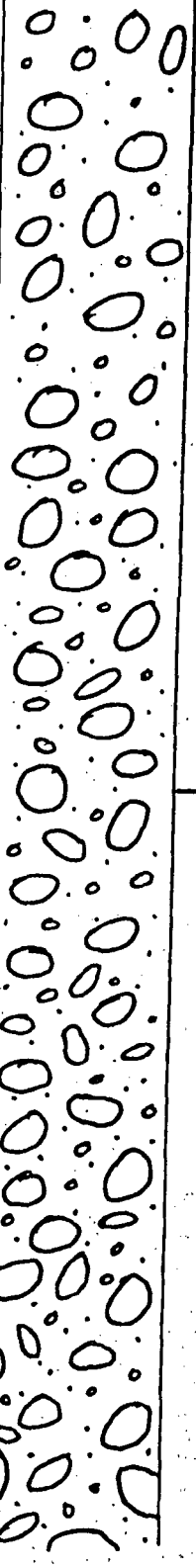
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL
FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSCOPE ID DATE 6/86

DEPTH INTERVAL	1" = 5' LITHOLOGY	LITHOLOGIC DESCRIPTION
0-20'		Qal: BOULDERS & COBBLES OF BASALT (GLACIAL TILL) MED GRY → MD. LT. GRY, MINOR REDDISH OXIDATION SPARSELY PORPHYRITIC TO APHYRIC. (PHENOS: PLAG, PYX, OL) ALTERATION: WEATHERING & SURFICIAL OXIDATION
20'-40'		As Above

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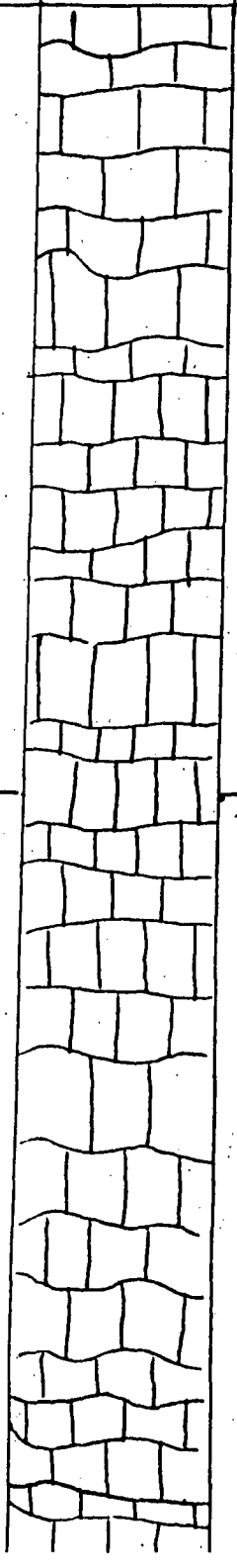
CUTTING DESCRIPTION

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5' LITHOLOGY	LITHOLOGIC DESCRIPTION
40'-60'		BASALT/BASALTIC ANDESITE: APHYRIC TO SPARSELY PORPHYRITIC MED GRY TO LT. MED. GRY, MINOR REDDISH BRN. PHENOS TYPICALLY MICROSCOPIC: PLAG, OL, CPX, {50'-60' 75% OF INTERVAL IS CINDERY (FLOW BOUNDARY?) ALTERATION: MINOR BROWN CLAY, FeOx, MINOR WHT CLAY (PLAG → CLAY)
60'-80'		BASALT/BASALTIC ANDESITE: AS ABOVE {70'-80' - 50% SMALL VESICLES ALTERATION: AS ABOVE + HEMATITE (FeOx) (COMMON)

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Form 1

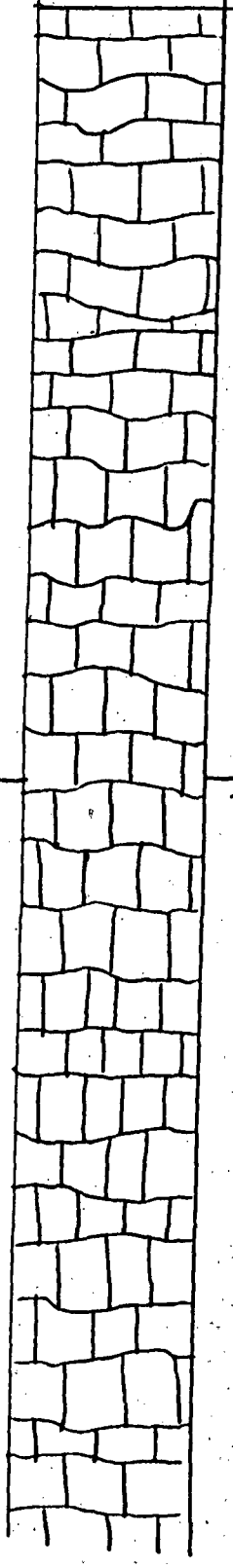
CUTTING DESCRIPTION

HOLE CTGH-1

FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL

BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5' LITHOLOGY	LITHOLOGIC DESCRIPTION
80'-100'		BASALT/BASALTIC ANDESITE: MEDIUM GREY TO LT. MED. GRY & MED. REDDISH BRN. APHYRIC TO SPARSELY PORPHYRITIC @ 80'-90': APHYRIC BASALT → BASALTIC ANDESITE, 80% WEATHERED TO BROWN CLAYS, HEMATITIC ALTERATION @ 90'-100': 30% RED, OXIDIZED (WEATHERED?), VESSICULAR BASALT/BASALTIC ANDESITE; 40% LT. MED GRY MICROPORPHYRITIC BASALT/BASALTIC ANDESITE W/RESORBED OL PHENOS; 30% BLACK, APHYRIC BASALT/BASALTIC ANDESITE ALTERATION: WEATHERING, FeOx, MNR BRN-RED CLAY
100'-120'		BASALT/BASALTIC ANDESITE: ~~SPAR~~ APHYRIC → SPARSELY PORPH. MED GREY TO DARK GREY, MINOR REDDISH GREY 100'-110': 70% LT. RED BRN + RED DUE TO WEATHERING & OXIDATION, 30% BLACK, DENSE; VESICULAR 110'-120': 60% OXIDIZED & VESICULAR, 40% DARK GREY & DENSE ALTERATION: MINOR FeOx & BROWN CLAY, MINOR WHITE CLAY IN VESICLES

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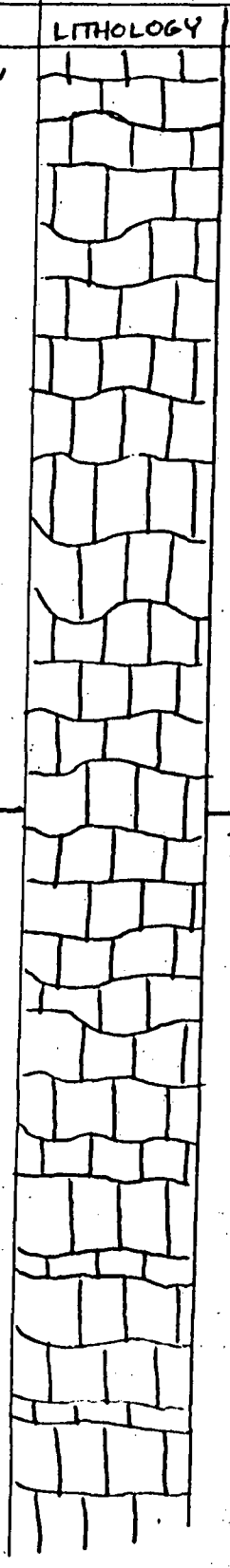
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1 GEOLOGIST (S) MCDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1"=5' LITHOLOGY	LITHOLOGIC DESCRIPTION
120'–140'		BASALT/BASALTIC ANDESITE: MED. GREY – DUSKY RED APHYRIC TO SPARSELY PORPHYRITIC (CPX) ROCK IS DENSE & UNALTERED
140'–160'		BASALT/BASALTIC ANDESITE: AS ABOVE 140'–150' W/RESORBING PLAG, OL ALTERATION: TR. HEMATITE, CLAY, 140'–150' TR. DISSEMINATED SULFIDES(?)

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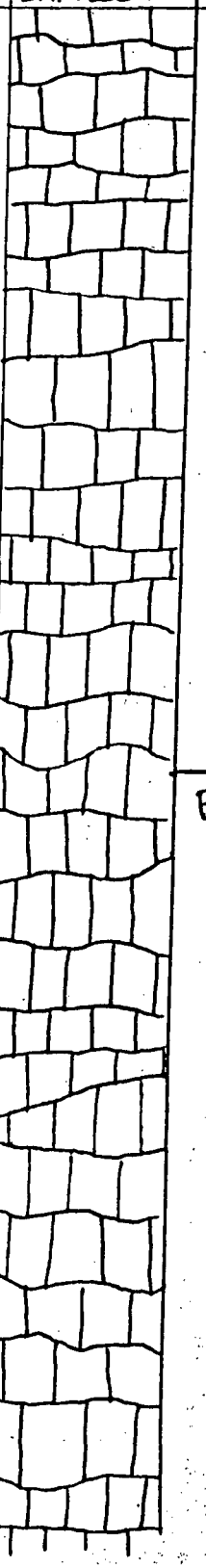
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1"=5' LITHOLOGY	LITHOLOGIC DESCRIPTION
160'-180'		BASALT/BASALTIC ANDESITE: AS ABOVE DARK GREY → REDDISH BROWN {170'-180': RARE BLACK PYX PHENOS, OL ALTERATION: (MODERATE) LIMONITE, PINKISH CLAY IN VUGS
180'-200'		BASALT/BASALTIC ANDESITE: AS ABOVE {190'-200': ≤15% FRAGMENTS OF BLACK, GLASSY ROCK = CHILLED FLOW MARGIN? ALTERATION: AS ABOVE

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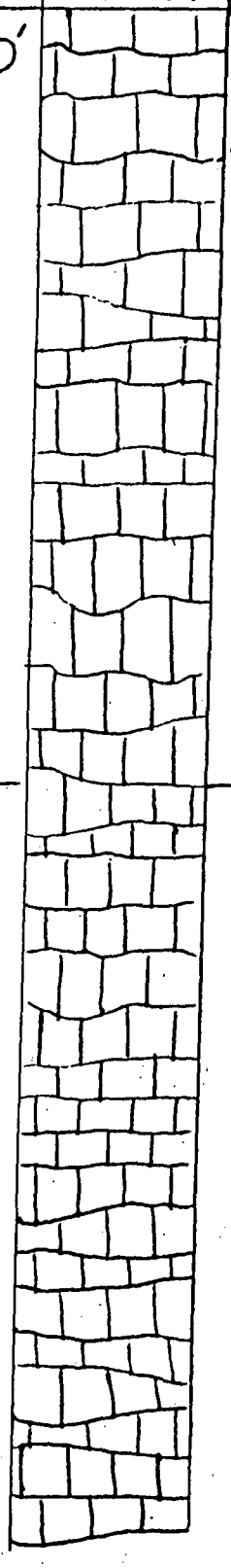
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL

FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1"=5' LITHOLOGY	LITHOLOGIC DESCRIPTION
200'-220'		BASALT/BASALTIC ANDESITE: (AS ABOVE) APHYRIC TO SPARSELY PORPHYRITIC MEDIUM DK GREY → DUSKY RED 200'-210' ≤1% RESORBING OLIVINE, ≤2% PLAG PHENOS, 210'-220' TR BROWN PYX BLACK, GLASSY FRAGMENTS = CHILLED FLOW MARGIN/TOP ALTERATION: MNR. HEMATITE MNR BROWN & WHITE CLAY IN VOIDS, (FILLING & COATING), WEATHERING
220'-240'		BASALT/BASALTIC ANDESITE: AS ABOVE ALTERATION: INCREASED FeOx (WEATHERING)

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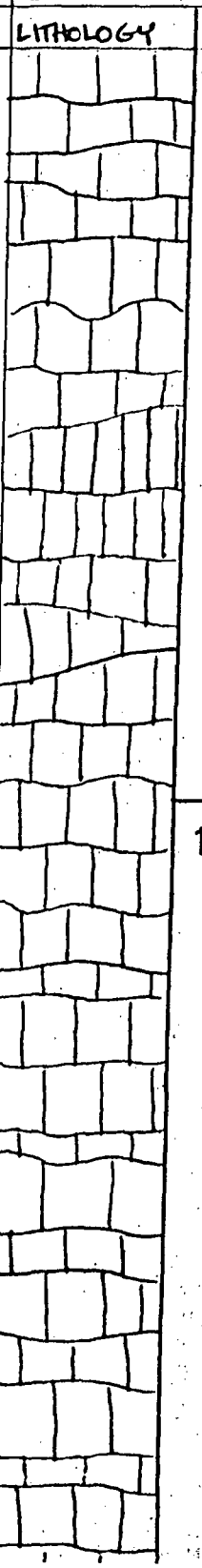
Thermal Power Company

Form 1

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	1" = 5' LITHOLOGY	LITHOLOGIC DESCRIPTION
240'-260'		BASALT/BASALTIC ANDESITE: (AS ABOVE) APHYRIC TO SPARSELY PORPHYRITIC. MED. DK GREY → MINOR RED 250'-260' - BLACK GLASSY FRAGMENTS — CHILLED MARGINS? ALTERATION: MINOR FeOx, CLAYS IN SMALL VESICLES
260'-280'		BASALT/BASALTIC ANDESITE: (AS ABOVE) (W/ONLY MINOR DUSKY RED) 260'-270' - PREDOMINATELY MICROPORPHYRITIC SAMPLE 270'-280' - FRESHER, LESS VESICULAR & LESS WEATHERED THAN PREVIOUS 20' ALTERATION: V. MINOR FeOx

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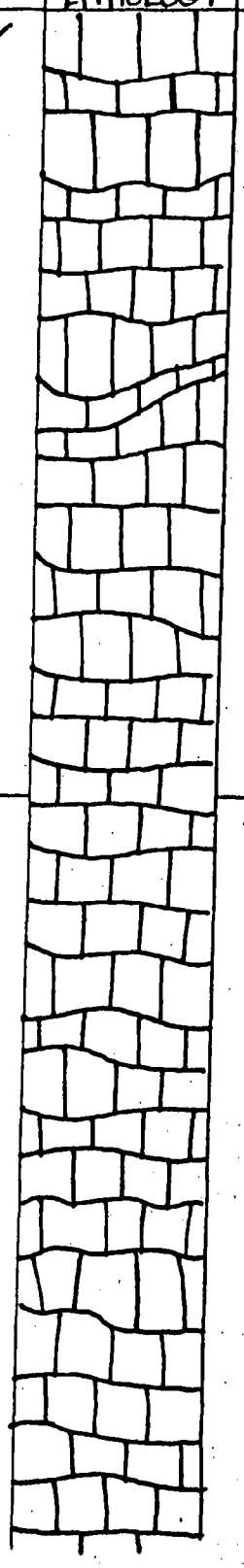
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE ID. DATE 6/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION
	LITHOLOGY
280'-300'	BASALT/BASALTIC ANDESITE: GREYISH BLACK TO BROWNISH GREY SPARSELY PORPHYRITIC - PHENOS OF PLAG & OL 290'-300' - INCREASED VESICULARITY (CONTACT?) ALTERATION: MINOR CLAY(S) IN VESICLES √RARE LIMONITE, FeOx METALLIC COATING ON WHITE CLAY (?) 280'-290'
300'-320'	BASALT/BASALTIC ANDESITE (AS ABOVE) + MINOR BLACK, GLASSY FRAGS → CHILLED CONTACT/MARGIN ALTERATION: TR → COMMON WHITE CLAY(?) IN GROUNDMASS TR LIMONITE ON GLASSY FRAGS



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Form 1

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDANNEL/GOODWIN
BASIS BIND. MICROSCOPE ID. DATE 6/86

EPTH INTERVAL	LITHOLOGIC DESCRIPTION
	LITHOLOGY
20' - 340'	BASALT/BASALTIC ANDESITE: MED. GRY → DUSKY RED APHYRIC TO SPARSELY PORPHYRITIC PHENOS OF PLAG, OL, PYX (YELLOW CPX?) GLASSY, BLACK, FRAGS = CHILLED CONTACT/MARGIN ALTERATION: CONCENTRATED IN SCORIACEOUS FRAGS & VESICULAR FRAGS. COMMON EARTHY HEMATITE, LIMONITE, FeOx. TR. WHITE CLAY(?) IN SMALL VEINLETS
340'-360'	BASALT/BASALTIC ANDESITE: (AS ABOVE) INCREASE TO 50% DUSKY RED COLOR ALTERATION: AS ABOVE, + WHITE, AMORPHOUS (CLAY?) MAT'L (COAT) IN VESICLES

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Thermal Power Company

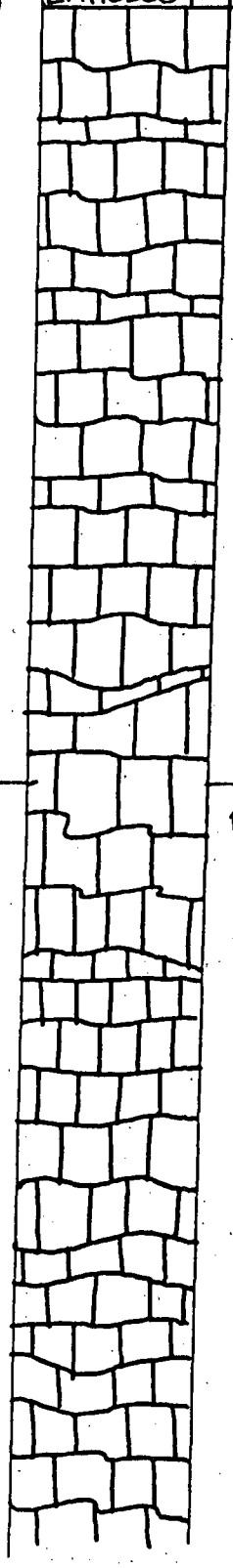
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BIN. MICROSCOPE ID. DATE 6/12/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION
360'-380'	LITHOLOGY BASALT/BASALTIC ANDESITE: PREDOM. APHYRIC, LESS COMMON SPARSELY PORPH. BRN GRY – DARK GREY, DUSKY RED (~20%) PHENOS: PLAG, OL, BLACK PYX ALTERATION: 370'-400' PERVASIVE. FeOx, SOFT, AMORPH. WHITE MAT'L (CLAY?). HEMATITE & LIMONITE COMMON TR. SULFIDE(?)
380'-400'	BASALT/BASALTIC ANDESITE: (AS ABOVE) ALTERATION: AS ABOVE



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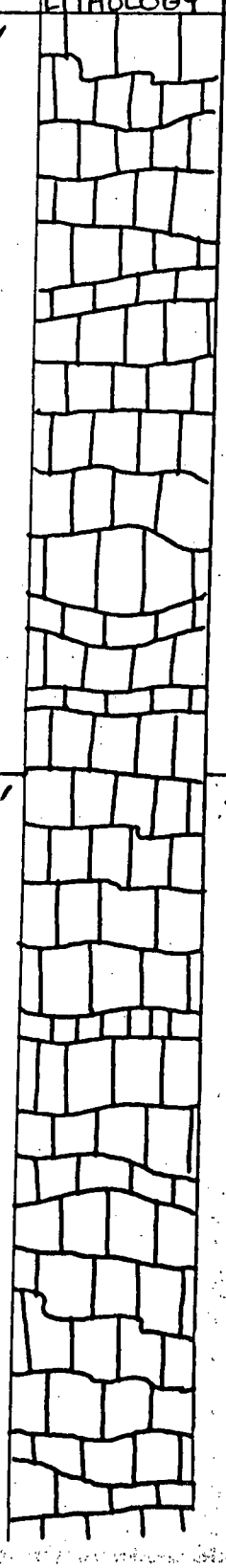
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL

FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSCOPE ID. DATE 6/12/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION
	LITHOLOGY
400'-420'	BASALT/BASALTIC ANDESITE: GRAYISH RED – APHYRIC - SPARSELY PORPHYRITIC GRAYISH BRN PHENOS OF PLAG & OL ALTERATION: PERVASNE FeOx. MINOR HEMATITE & CLAYS. TR WHITE, SOFT, AMORPHOUS MAT'L (CLAY?) IN VEINLETS.
420'-440'	BASALT/BASALTIC ANDESITE: AS ABOVE MED. DK GREY – BROWNISH GREY ALTERATION: AS ABOVE, BUT LESS PERVASIVE



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Form 1

CUTTING DESCRIPTION

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) MCDANNEL/GOODWIN
BASIS BIN. MICROSCOPE ID. DATE 6/12/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION
440'-460'	BASALT/BASALTIC ANDESITE: MED DK GREY TO BRICK RED FINELY PORPHYRITIC: PLAG & OL 450-460'- PREDOM. RED OXIDIZED GROUNDMASS INCREASE IN PHENOCRYST CONTENT. (MAY BE ILLUSION DUE TO RED GM) FLOW BOUNDARY? PHENOS MAY APPEAR AS FREE CRYSTALS (<5%) ALTERATION: PERVASIVELY Fe OXIDIZED ALTERED GROUNDMASS → MINOR CLAY, LIMONITE
460'-480'	BASALT/BASALTIC ANDESITE: MED. DK. GREY → BRICK RED 460'-470': 50% MED. DK. GREY, 50% BRICK RED APHYRIC TO → SPARSELY PORPHYRITIC PLAG, OL MORE VESICULAR & MORE OXIDATION THAN ABOVE → FLOW BOUNDARY? ALTERATION: PERVASIVE FeOx; LIMONITE, HEMATITE TR. WHT, AMORPHOUS, SOFT MATL (CLAY?)

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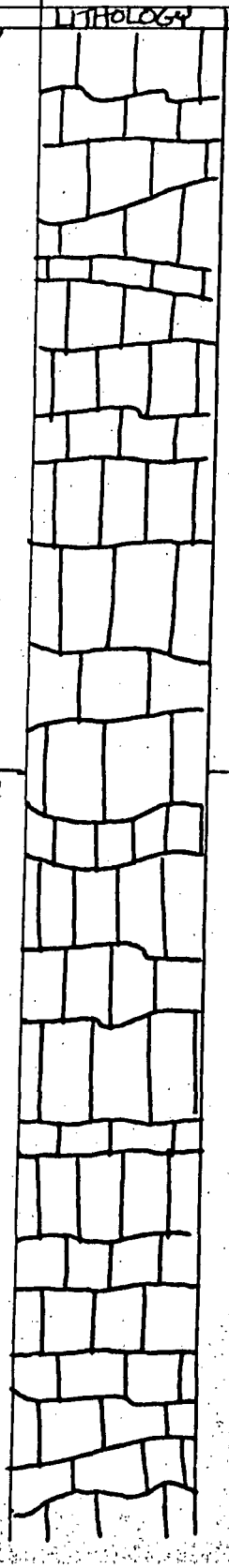
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL

FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSCOPE ID. DATE 6/12/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION
	LITHOLOGY
480'-500'	BASALT / BASALTIC ANDESITE: MED. DK GREY to BRICK RED APHYRIC TO SPARSELY PORPHYRITIC PHENOS: PLAG, OL, ± PYX {480'-490' - SLIGHTLY MORE Fe OXIDIZED THAN 490'-500' INTERVAL ALTERATION: FeOx & MINOR CLAYS (PINKISH, ORANGE, WHT) ↳ COATS VOIDS ↙
500'-520'	BASALT / BASALTIC ANDESITE: AS ABOVE {510'-517' - INCREASED FeOx ALTERATION: SAME AS ABOVE {517'-520' - CONTAMINATED SAMPLE (RUBBER, METAL, SLOUGH, LCMS)



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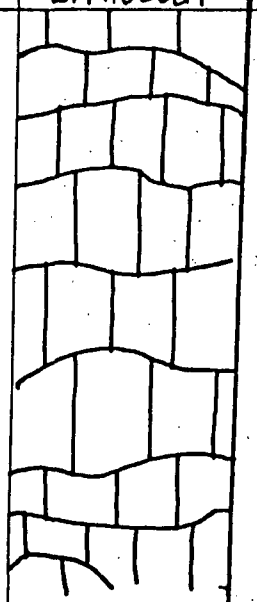
Form 1

CUTTING DESCRIPTION

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSLOPE ID. DATE 6/22/86

DEPTH INTERVAL	LITHOLOGIC DESCRIPTION
	LITHOLOGY
520'-527'	

BASALT / BASALTIC ANDESITE :

MED. DK. GRAY to BRICK RED
APHYRIC to SPARSELY PORPHYRITIC
PHENOS : PLAG., OL, ± PYX.

{ 520'-527' CONTAMINATED SAMPLE (RUBBER, CEMENT, METAL, SLOUGH, & LCMS = 75% of SAMPLE)

ALTERATION: FeOx & MINOR CLAYS COAT VOIDS (PINKISH, ORANGE, WHITE)

—— END OF CUTTING DESCRIPTION ——

HOLE DESCRIPTION CONTINUES with PAGE 1 CORE DESCRIPTION (FORM 2)

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Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

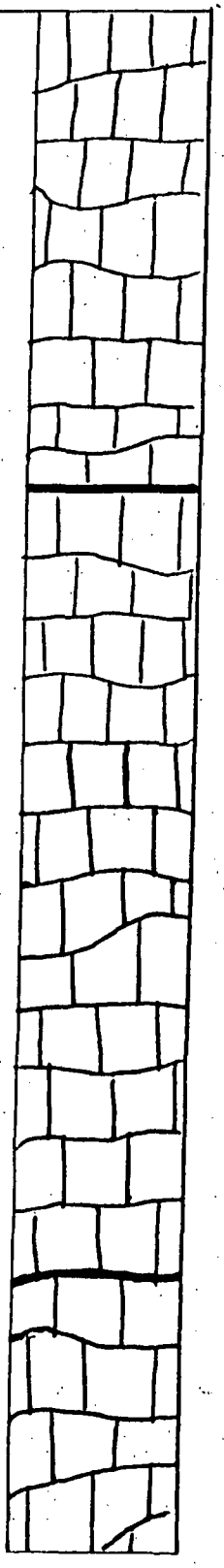
FIELD CASCADES/CLACKAMAS BASIS BIN. MICROSCOPE DATE June 22, 1986

DEPTH INTERVAL	DESCRIPTION	lithology
527'	527' BASALT/BASALTIC ANDESITE Med Lt gry to med gry, finely porphyritic ~10% phenos, all ≤ 3mm: plag, ol, cpx glomerocrysts of plag, ol, ± cpx vertical to 25° fractures common, fracture surfaces have light to moderate coating of white to yellowish and pinkish clays. @ 540'-545', 548'-542': fracturing intensifies - core pieces 1"-5".	
547'	@ 549': oxidized to reddish-gry predominately rubble, w/well consolidated intervals. Becomes vesicular. Voids up to 3 cm @ 556': clay increases (lt. yellow & dk red) @ 560': ashy intervals	
567'		

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADE/CLACKAMAS BASIS BIN. MICROSCOPE DATE 6/22/86

DEPTH INTERVAL	DESCRIPTION
567'	As above (rubbly, vesicular basalt/basaltic andesite w/clay & minor ash/scoria)
	579' - approximate flow boundary
580'	BASALT/BASALTIC ANDESITE med gry, finely porphyritic ~8% phenos, ≤ 3mm glomerocrysts of plag, ol, pyx Fractures common: vertical to 10° & approximately horizontal & coincident with stretched/smeared/elongated vesicles Small vesicles pervasive & decrease w/depth Vesicles & fractures coated w/lt. yellow & pinkish clays
587'	
	604' - approximate flow boundary vesicles pervasive and decrease with depth below oxidized, brick red horizon 1' thick marking rubbly contact
607'	



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Form 2

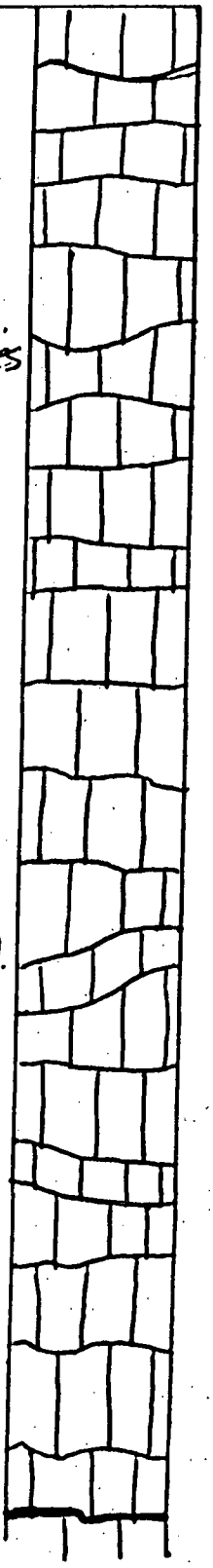
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADE/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS BIN. MICROSCOPE DATE 6/23/86

DEPTH INTERVAL	DESCRIPTION
607'	607' BASALT/BASALTIC ANDESITE med. dk gray, finely porphyritic ~8% phenocrysts, ≤ 5mm glomerocrysts of ol., plag., ± R. pyx.? rubbly, w/ minor red scoria & ash until 616'. Large vesicles 612-615. 616' - consolidated Pinkish clays fill vesicles
627'	629'-634' vesicular interval 632'-639' fractured - predominately small (3") pieces. fractures are vertical to sub-vertical (15°). 2ndary set is horizontal to sub-horizontal
647'	646.5': flow boundary? Marked by ash/cinder/scoria zone (until 648)



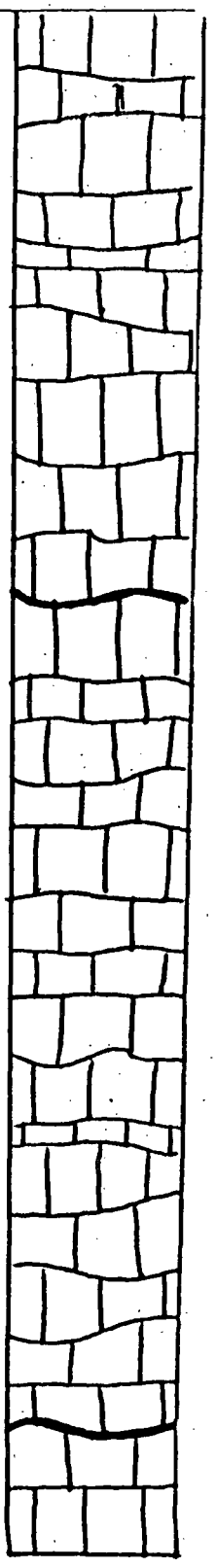
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADE/CLACKAMAS BASIS MICROSCOPE ID DATE 6/23/86

DEPTH INTERVAL	DESCRIPTION
647'	AS ABOVE (BASALT - BASALTIC ANDESITE)
	653': flow becomes denser, less vesicular fractures common — 0-25°, less commonly ~60° — producing 2"-4" pieces of rock
	660': ash & cinder zone FLOW BOUNDARY?
	663': rock becomes better consolidated, vesicular zones of rubble persist to 684'
667'	
	683-687': Well consolidated scoriaceous zone - flow breccia. Flow boundary.
687'	



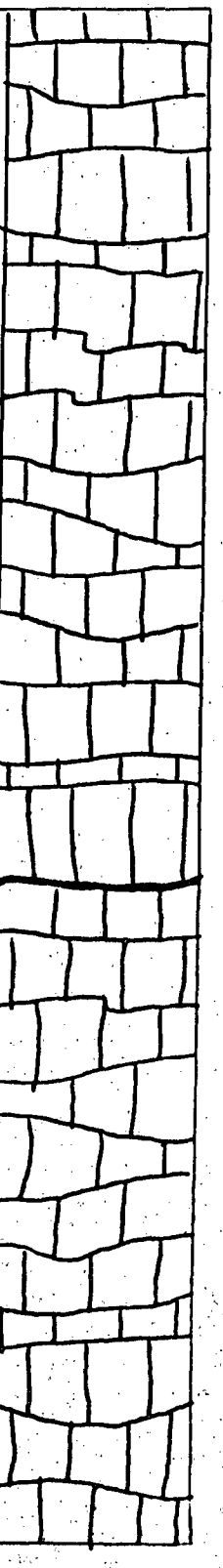
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) MCDANNEL/GOODWIN

FIELD CASCADE/CLACKAMAS BASIS MICROSCOPE ID DATE 6/24/86

DEPTH INTERVAL	DESCRIPTION
687'	687': BASALT/BASALTIC ANDESITE (A/A) MED TO MED DK GRY, PORPHYRITIC (2-5% PHENOS) PHENOS ≤ 2mm: PLAG, OL, PYX. OL→IDDINGSITE fractures 0°-30°, locally vesicular pnk, white, lt. brn. clays on fracture surfaces & filling some vesicles 693'-696': very fractured (A/A) & dense 5-10% vesicles (<1-30mm)
707'	710': brick red, scoriaceous, flow breccia. APPROX. FLOW BOUNDARY ashy & poorly consolidated
	719': BASALTIC ANDESITE med. dk grey, porphyritic (2-3%) phenos ≤ 2mm: plag, cpx, ol. subtle red tint to groundmass light coating of clays on fracture surfaces fractures 0-30°, (intense fracturing 720'-738') less common horizontal
727'	



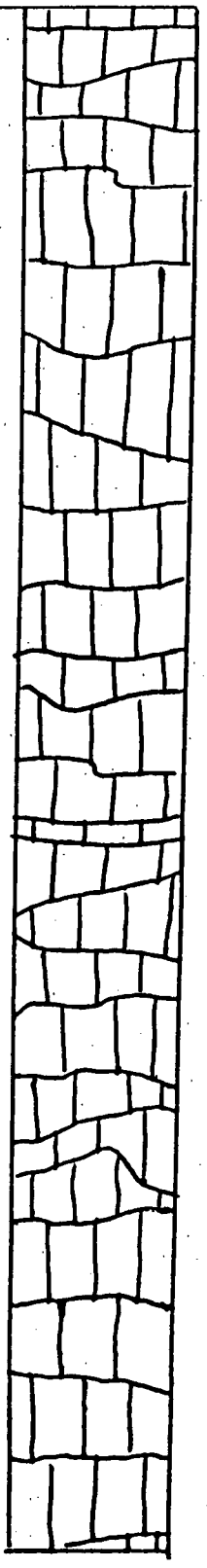
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN / McDANNEL

FIELD CASCADES/CLACKAMAS BASIS MICROSCOPE ID DATE 6/24/86

DEPTH INTERVAL	DESCRIPTION
727'	BASALTIC ANDESITE A/A
	733'-739': SLIGHTLY SCORIACEOUS/ASHY LT. RED
747'	750': BASALTIC ANDESITE lt. med. gray (unusually lt.) to med. dk. gray, dense, massive, sparsely porphyritic to aphyric, gen'ly <1% plag., ol., pyx., rarely fractured (1X/5' @ 30° ∡ to ℄) lt. brn clays coat fractures, <1% vesicles
767'	



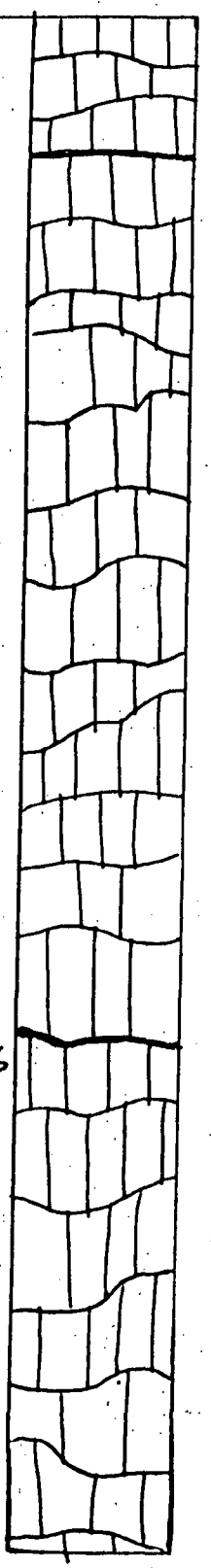
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS BIN. MICROSCOPE DATE 6/25/86

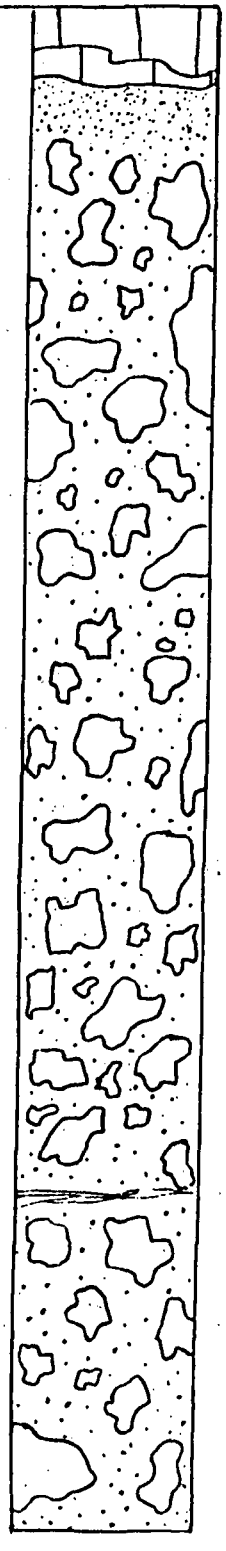
DEPTH INTERVAL	DESCRIPTION
767'	BASALTIC ANDESITE (A/A) 770'-771' increasing vesicularity 771' FLOW BOUNDARY 771'-779' rubble: brick red, vesicular, locally scoriaceous, ashy 779': BASALTIC ANDESITE med. dk. gray, sparsely porphyritic (2-4%) phenos. < 2mm; plag., ol. vesicles 5-15%, decreasing with depth 779'-781' subhorizontal stretching & concentration of vesicles in narrow bands clays: tan, wht, pink in < 20% of vesicles and ptlly. coating fractures 788.5'-792.5' Rubbly
787'	
	792.5'-795' FLOW BOUNDARY: Rubbly med. dk. gry vesicular basaltic andesite and clayey-ashy flow breccia - common med. brn clay filling inter breccia clast voids - tan & lt. brn clays fill fractures and ~10% of vesicles (i.e. 90% are void) 795'-800' Rubbly, vesicular b.a. 800' Common fractures, often @ 7% to ¢ heavier clays, thick coatings on fracture surfaces. Lt. pink clay is the predominate clay.
807'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL
FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 6/25/86

DEPTH INTERVAL	DESCRIPTION
807'	BASALTIC ANDESITE (A/A)
	809' VOLCANIC BRECCIA Sub-angular to sub-rounded lapilli & blocks of basaltic to silicic (less common) rock fragments in a yellowish brn matrix of ash, crystals & ash size rock fragments. Silicic fragments are more common near bottom of unit & appear to be same lithology as underlying unit (@ 854'). Crystals in matrix include biotite, feldspar, opx, cpx, qtz(?). Rock is matrix-supported & moderately to well indurated. Top 18 cm of unit is composed of dk grey ash & ash sz rock fragments. Unit has only minor fracturing & lw/no preferred orientation. Minor limonite stain.
827'	826.5' matrix poorly consolidated – mainly mud & rock fragments collected from core barrel
	839' - ~4 cm of fine laminations which contain v. small scale crossbeds.
911'	



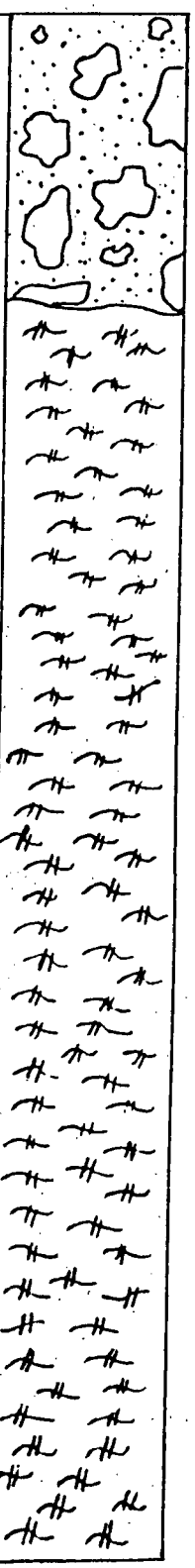
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE 6/26/86

DEPTH INTERVAL	DESCRIPTION
847'	VOLCANIC BRECCIA (A/A) 844'-854' contact w/underlying unit is marked by zone of boulders of underlying unit & less matrix than above. Transition may represent regolith & soil ?
854'	DACITE Med gry, porphyritic. 4-10% phenocrysts of plag, cpx, opx. Slightly "glassy" appearance to fractures. Much of unit is intensely fractured w/ predominate direction 75°-80°; generally closely spaced (1-10cm)- producing platy fracture. Uncommon vertical fractures. Light brn, pinkish clay on fracture surfaces; FeO or MnO? on many fracture surfaces.
867'	
887'	



Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BINOC. MICRO DATE 6/26/86

DEPTH INTERVAL	DESCRIPTION
887'	DACITE (A/A)
	894'-899' fractured & sheared. Heavy brn. clay (~10°)
	905'-906.5' - intensely fractured
907'	908'-913.5' - intensely fractured, light clays
	917.5'-918.5' - rubble, <1"ϕ fragments
	922'-923' - fractured, w/heavy brn. clay (25%)
001'	

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE 6/27/86

DEPTH INTERVAL	DESCRIPTION
927'	DACITE (A/A @ 854')
	930'-931' - intensely fractured
	934'-935.5' " "
	937'-948' - " "
	939'-939' - breccia, angular to sub-angular rock fragments (½"-6") in matrix of lt. tan (consolidated) clay, sand size rock frags, xtls
947'	
	963'-965': brecciated zone, increase in clay
	960' - slight change in rock texture. Appears less porphyritic, fewer (+smaller) plag phenos. Strongly resorbed hornblende xtls → feldspar, cpx, opx
967'	

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS _____ DATE 10/28/86

DEPTH INTERVAL	DESCRIPTION
967'	DACITE (A/A @ 854')
	967' - minute aggregates of lt grn-yel. to clr. flaky min. on frac. surfaces
	972' - clr. flaky min. a/a; minor cpx & g.mass } oxidation (reddish)
	974' - R. flaky min. & clays have decreased
987'	
	991' - fracturing intensifies, 70°-90°
	1,000' - 6"-8" heavy clay (30%) & breccia
	1,001' - 21" " " " "
1007'	

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. micro. DATE 6/28/86

DEPTH INTERVAL	DESCRIPTION
1007'	DACITE (A/A @ 854') 1010' - 8-10" fractured zone w/ heavy pinkish tan clay.
	1020'-1022' fractured interval (vertical fractures) heavy clay (pinkish) 1023' green clay on surface w/ reniform texture *groundmass darkening, suggesting changing (i.e. more mafic) composition w/depth, texture is more homogeneous & equigranular
1027'	1028'-1039' fractured interval (vertical to sub-vertical & horizontal to 70° X to ℄) w/ heavy brn clay at base of interval
	1040'-1049' Less fractured, less clay and alteration
1047'	1047' lt. coating of grn clay/flaky min.* on fracture

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTG H 1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 6/29/86

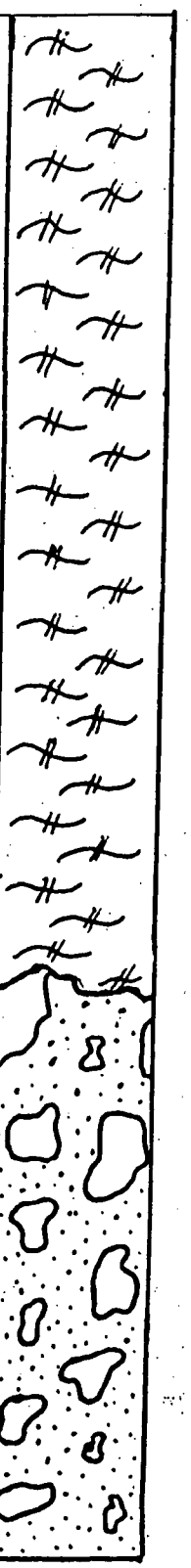
DEPTH INTERVAL	DESCRIPTION
1047'	DACITE (A/A @ 854') 1047' R specks black iron mineral (hematite?), v. fine, scattered through groundmass, rare larger hematite blebs 1049.5'-1050' intensely fractured 1052'-1053' heavy clay (med. brn color)
	1057'-1075' - splintery, high angle fracture
1067'	1066'-1081' fracturing - moderate to intense, distinctive conjugate joint set @ 15° to ℄ w/splintery fracture locally lt. limonite to 1109'
	below 1075' subtle increase in phenocryst %: @ 1076' 6-8% → 8-12% (locally) coexisting hematite (metallic) and FeOx (earthy) near fractures
1087'	1081'-1090' fractures @ 45° to ℄ ± sinuous vertical fracture >> fracture ⊥ to ℄ (90°) darker color than upper part of unit 1081'-1083' heavy clay, med.-lt. brn & grayish orange pink w/R+ pyrolusite associated

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 6/29/86

DEPTH INTERVAL	DESCRIPTION
1087'	DACITE (A/A @ 854') 1087'-1090' fractures @ 45° ∠ to ℄ ± sinuous vertical fracture, fewer ⊥ to ℄ 1101'-1103' Vertical fractures with heavy clay (lt. brn) 1105'-1109' Small miarolitic voids appearing, irregular shapes, small increase in % pyx.
1107'	1109' Intense clay alteration, 6" inclusion (dark gray) reacting w/ dacite (being digested) 1110' Contact: intense clay alteration but no signs of baking. Lt gry. Appears brecciated & gradational w/ underlying unit, w/ pebbles & boulders of dacite in clay matrix, becoming heterolithologic
1112'	VOLCANIC BRECCIA (SURGE DEPOSIT?) Angular to sub-angular lapilli & block size basalt - basaltic andesite (many from underlying unit) &, less commonly, silicic rock fragments. Clayey matrix (from ash?) of ash sz rock fragments & crystals. 1114' Small lapilli- to ash-size, rounded clay clasts are wht to tan & contain hornblende & biotite, suggestive of devitrified pumice. Discontinuous laminae & v. dark gry-brn gry, thin discontinuous beds w/ small lapilli-ash sz rock frags suggest surge origin. Oxidized slightly disrupted basaltic material near contact with
1127'	

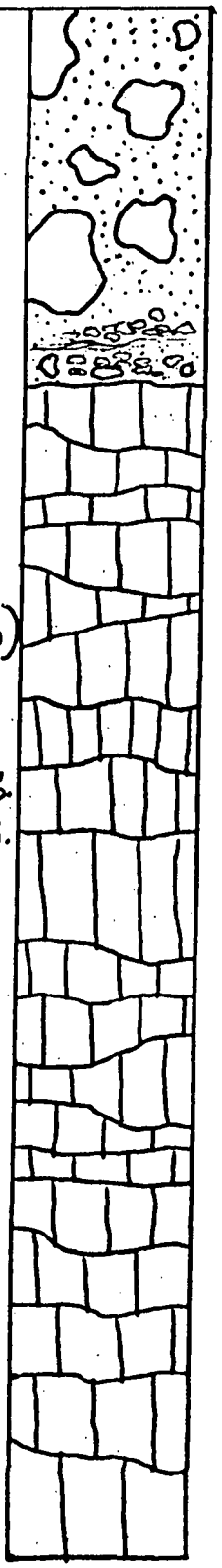


CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) GOODWIN/McDANNEL
BASIS binocular microscope DATE 6/30/86

DEPTH INTERVAL	DESCRIPTION
1127'	(cont'd) VOLCANIC BRECCIA (A/A) underlying basalt flow suggests deposition while partially molten.
	1137.5' Thin, irregular beds of ash to lapilli-sz, commonly oxidized, rock fragments w/subtle small scale cross bedding.
	1138': BASALT med-med dk gry to lt brnish gry, porphyritic (7%-12%) w/phenos of plag, cpx, ol, w/rare sieve textured mineral clots 3-15 mm diameter.
1147'	Ol → iddingsite; plag → clay, particularly near fractures. Lt orange & pinkish clay coating on most frac. surfaces. ± rare tonalite, pyrolusite, earthy hematite
	1139'-1142'- horizontal to 40° fracturing
	1143'-1144'- vertical to 15° fracturing - v. fractured. heavier pinkish brn clay.
	1149'-1152'- frac. predom 15° or less, secondary 40-60° - horizontal
1167'	



Diamond Shamrock
Thermal Power Company

Form 2

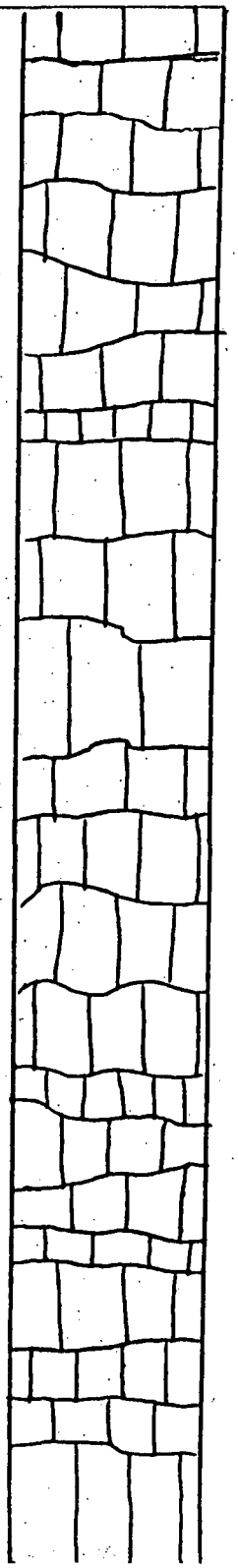
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 6/30/86

DEPTH INTERVAL	DESCRIPTION
1167'	BASALT (A/A)
	1181'-1185' - Three 5"-8" zones of heavy clay w/ brecciated rock
	1186'-1229' - color: med lt gry - lt brnish gry (to 1201')
1187'	1186'-1215' - common fractures: vertical & sinuous, ±45°
	1197'-1200' - hairline incipient fractures, partly dissolved/etched, @ 60°
1207'	

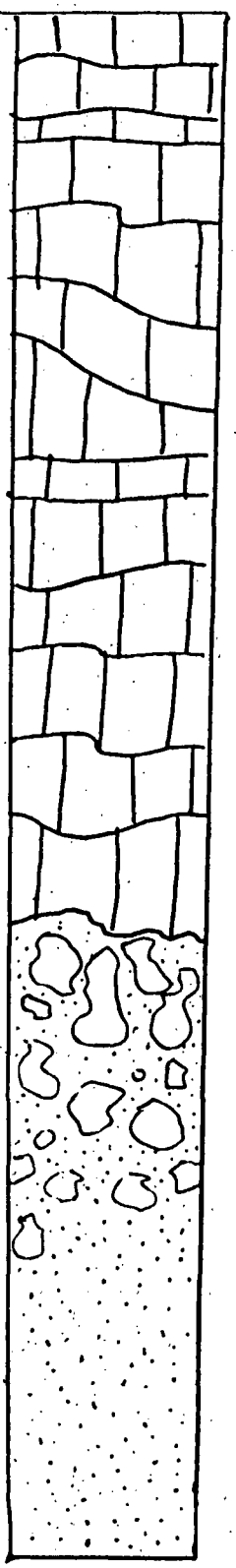


CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE 6/30/86

DEPTH INTERVAL	DESCRIPTION
1207'	BASALT (A/A)
	1215'-1229' - ~80° fracture common; continuous vertical fracture
	1223' - black, secondary mineral (MnO?)(FeO?) rimming phenos on fracture surfaces
1227'	1229' - flow becomes oxidized (brick red) & brecciated but well consolidated. Grades into red clay matrix w/clasts of basalt and cinder & plag xtls. Grades into underlying unit.
1230'	VOLCANIC BRECCIA (surge &/or fall origin?) Red-orange-brn. sub-angular to sub-rounded lapilli- & block-size rock fragments of dk. gry & red brn (oxidized) basalt & basaltic andesite. (Basaltic frags of above unit at top of volcanic breccia unit) in Matrix of ash (→ clay), ash-size rock fragments, crystals. Unit is not uniform but has sub-units (16cm-1.3m) based on variable clast size, clast to matrix ratio, laminated intervals. Contacts between these units is gradational to abrupt. Unit becomes more uniform @ 1261'. Laminations in matrix are commonly disrupted & drape around lapilli/blocks.
1247'	



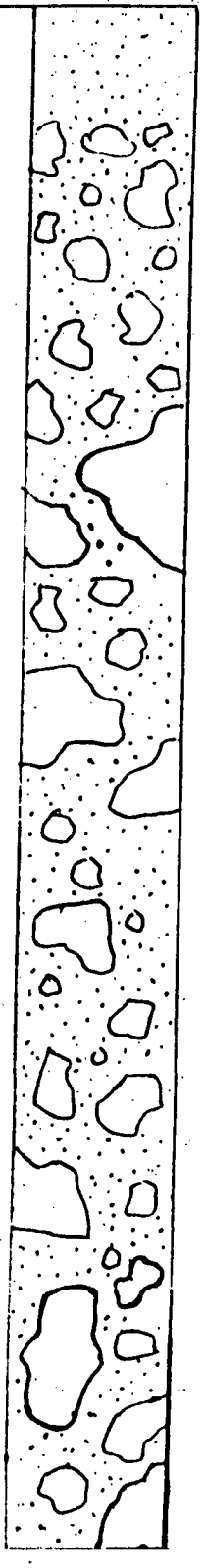
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE 6/30/86

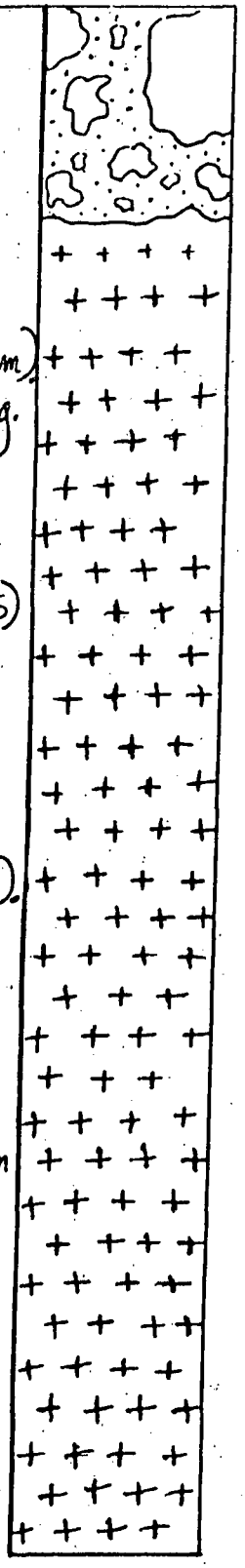
DEPTH INTERVAL	DESCRIPTION
1247'	VOLCANIC BRECCIA (A/A)
	1254.5'-1255.5': Rubbly interval
	1260'-1261' Rubbly interval. First appearance of sheared? clasts from underlying andesite unit.
1267'	
	1270'-1271 Rubbly interval
	1278'-1292' Rubbly interval
	1280'- clasts in breccia are predominately angular lapilli of underlying, sheared andesite.
1287'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS
GEOLOGIST (S) GOODWIN/MCDANNEL
BASIS BINOC. MICROSCOPE DATE 7/1/86

DEPTH INTERVAL	DESCRIPTION
1287'	VOLCANIC BRECCIA (A/A)
	1291' ANDESITE Pale mod brn (10YR 5/3) to med dk gry, sparsely porphyritic (3-5%) w/phenos of plag, opx, cpx, hblde, & common open textured crystal clots (≤4mm). Mnr plag alteration → clay; amphibole is resorbing. Common pale orange-pink clay coating & filling fractures. R MnO or FeO (black). Clear-white tabular mineral (associated w/small mafic mineral (secondary?) in thin veinlets & coating fracture surfaces) is probably zeolite. Pervasive vertical to 25° anastamosing, thin, closely spaced (≤ 0.5cm) veinlets of yellowish brn clay & zeolite (a/a) appear to be formed along shears(?). R dark, platy, metallic mineral on fracture surfaces.
1307'	Top part of flow is very broken & clayey (yel brn, a/a). ~0.3m red brn ash 1297'-1298', may indicate association of top of andesite unit w/VOLCANIC BREZCIA above. 1312-1315' - rubbly = w/clay containing rock fragments swell (≤1cm) 1318' - very fractured w/heavy, red brn clay. Fracture has no preferential orientation. Anastamosing yel brn clay veinlets/shear (a/a) not as prominent. 1325'-1335' - zones of intensely fractured rock interspersed w/consolidated zones. Fracture orientation 35°-45°.
1327'	

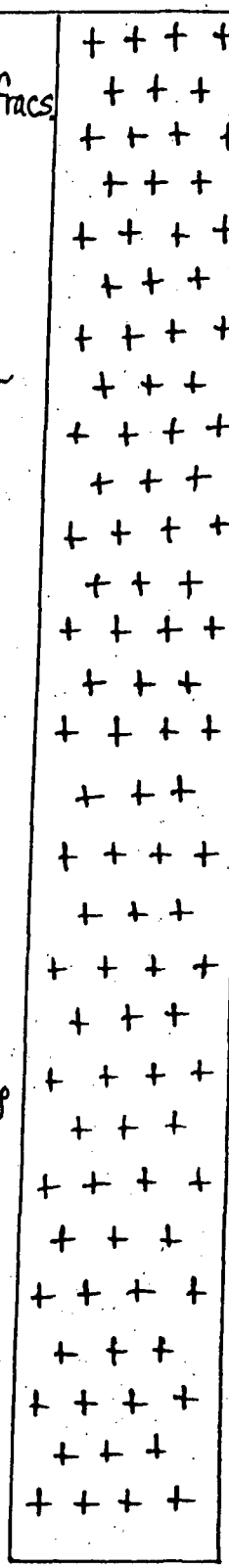


CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION
1327'	ANDESITE (A/A) med. dk. gray, sparsely porphyritic, intense pervasive vertical fracs w/ anastomosing v. thin veinlets of yellow-brn clay filling fractures
	1335' - fracturing persists but is not as intense a/a
1347'	
	1352' - 1387' - frac. orientation: predom. ~10°, also 45°-70°
1367'	



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION
1367'	ANDESITE (A/A)
	1380'-1387' Vertical fractures predominate over horizontal fractures
1387'	1387'-1402' Fractures generally ~45° to ⊥ & less commonly vertical
	1402': frac. orientation most commonly ~45°, & horizontal less commonly ⊥ vertical. Breccia & heavy clay.
1407'	1406': yellowish tint on frac. surf.

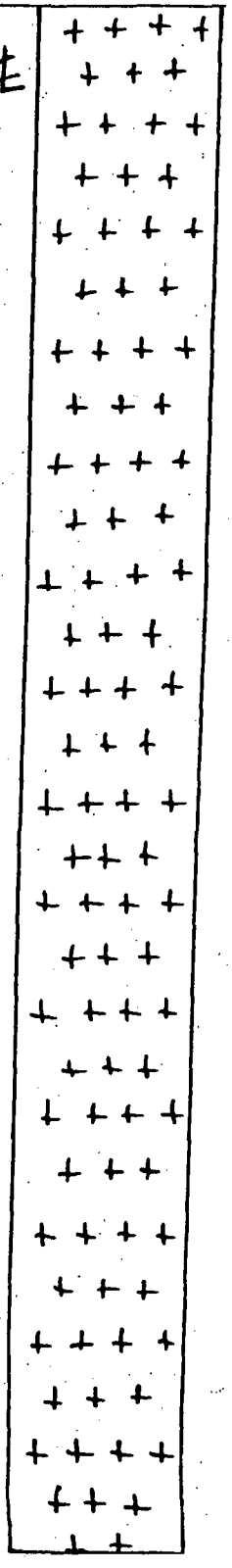
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/KLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION
1407'	ANDESITE (A/A) 1404'-1412' sinuous conjugate fracture set @ ≥45° ∡ to ℄ 1412'-1418' conjugate fracture set @ 30° ∡ to ℄, rubbly interval w/ heavy clay 1415'-1420' - breccia w/ heavy clay. Prominent yellow stain rims brecciated rock fragments, more subtle stain continues to 1445' adjacent to clay-filled fractures - no mineral observed, just staining 1421'-1438' Intermittent vertical sinuous fractures (≤ 15mm wide) filled w/ clays ± clayey breccia, locally rubbly
1427'	
	1438'-1445' Light fracturing w/ orientation @ 15° ∡ to ℄, often as conjugate joint sets
1447'	below 1445' sinuous vertical fractures w/ clay coating/coatings continue



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION
1447'	ANDESITE (A/A) med. gry, locally rubbly & intensely fractured w/ mod.–heavy clay filling fractures, R+ pyrolusite also on clays/fracture surfaces, plag → clay (wht) adjacent to fractures, seams of clays commonly v. pale orange and mod. brn; plag., pyx., and less common hbl phens a/a : 1-3% (sparse) Clear, tabular mineral abundant on frac. surfaces. +R platy dark metallic mineral 1454'-1455' Intraformational breccia zone (30+mm thick) w/ heavy clay (tectonic breccia) @1457' 10mm clay-filled fracture @ 45° to ℄ below 1450' : Subhorizontal banding on scale of 1-5mm continues as subtle mod. grn yellow stain (w/ associated v. lt. clay alteration & R+ pyrolusite) inter-banded w/ med. gry unaltered andesite. Milky to clear tabular & acicular zeolites in small voids.
1467'	1462'-1464' Fractured interval w/ heavy clay : seams ≤30mm wide 1466'-1466½' Heavy fracturing w/ lt. clay 1471'-1472' A/A w/ heavy clay
	1476½'-1485' Less fractured interval, occasional irregular break ⊥ to & along subhorizontal "incipient platy fracture" partings*, 1476'-1482' : clayey breccia seams w/ mod grn yellow alteration/stain (sim. to that above @1445') no mins. visible * i.e. rock unbroken though partings provide planes of weakness for separation
1487'	1485'- fracturing – 4"-8" lengths. Orientation variable but vertical to 11° (subhoriz) is prominent.

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES/CLACKAMAS
GEOLOGIST (S) GOODWIN/MCDANIEL
BASIS binoc. microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION
1487'	ANDESITE (A/A) w/hornblende becoming more abundant pheno phase.
	1491' - 8" vertical clay seam, ~10 mm diam. brecciated appearance: angular clay pieces in lighter clay matrix.
	1494': fracture attitude most commonly 30° & horizontal.
	1500': increase in horizontal "incipient fractures", as marked by thin clay filled joints. ≤2cm - 7cm apart
	1503' - highly fractured. Brecciated. Fracture orientations vertical to 10°, 30°, & ~horizontal. Brecciated rock frags in clay seam ~1.5 cm wide, 12 cm long.
1507'	
	1513': less fractured. Strong horizontal jointing. Thin, 1-6 cm apart. Yellow stain & clay fill emphasize joints.
	1515': Increase in amount of dark, platy, metallic mineral. Found in conjunction w/ previously described clear (to white) tabular mineral (drusy on some frac. surfaces). Yellow stain assoc. w/ this mineral on some fracture surfaces.
1527'	

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN

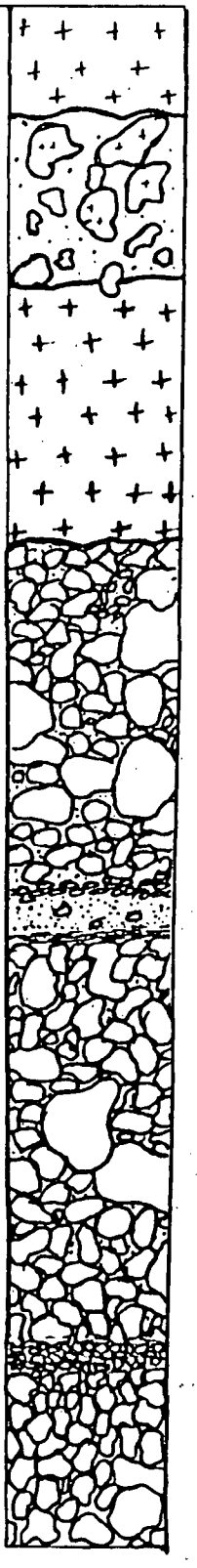
FIELD CASCADES/CLACKAMAS BASIS binoc microscope DATE 7/2/86

DEPTH INTERVAL	DESCRIPTION
1527'	ANDESITE (A/A)
	1522'-1524.5': breccia w/clay seams up to 1 cm thick
	1526'-1529': breccia w/clay, A/A
	1530': unit is slightly more porphyritic at this depth than at shallower levels -- largely due to increase in hornblende? Color is med. lt gry
	1530'-1536'- short intermittent fractured & brecciated zones w/heavy clay.
	1536'-1547'- Horizontal clay-filled joints (incipient fractures) become rare & rock is less fractured. Clay diminishes. MnO dendrites prominent.
1547'	1547'-1557'- fracturing resumes. Oriented 30°, 75°, less commonly 45°. Vertical clay seams (1546' 8mm long; 1548' 10 cm long, 4mm wide) contain brecciated rock fragments.
	1557'-1564'- intense fracturing resumes
	1561'-1564'- breccia, heavy brown clay
	1560'-1570'- Fine-scale color banding of matrix: 2-15mm bands @ 70° & to ℄, med. lt. gry & med dk. gry, long axes of phenos. also oriented in same plane @ 70° & to core length, 5cm rounded xenoliths com. @ base of interval
1567'	

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) MCDANNEL / GOODWIN
FIELD CLACKAMAS / CASCADES BASIS BINOC. MICROSCOPE DATE 7/3/86

DEPTH INTERVAL	DESCRIPTION
1567'	ANDESITE (A/A)
	1570 VOLCANIC BRECCIA Med dk gry & gry brn. sub-angular to sub-rounded lapilli and block sz rock fragments of mafic-intermediate lavas in gnysh brn matrix of ash sz rock fragments, clay (from ash?), & crystals of plag., pyx, hblde. Unit changes character throughout its thickness: thin, cross-bedded, laminated intervals of ash sz rock fragments, intervals w/palagonite common, intervals w/ disrupted/irregular margins on basaltic andesite clasts suggesting molten deposition. Pyroclastic & surge origin is suggested by much of these characteristics. Generally, unit is clast supported. Voids may occur between small lapilli. Pale blue to med bluish gry clay coats fractured surfaces. Fine, clear, acicular to prismatic (?) mineral on broken surfaces & in voids is probably zeolite. Tr pyrite → FeOx.
1587'	Upper part of unit is transitional w/ andesite unit above 1570'. 1570 - 1573.5 Volcanic breccia contains predominately lapilli & large blocks of andesite (a/a) in ashy matrix w/ minr clay. 1575' - 1583' return to dense, andesite flow a/a (may be large block in breccia?) 1590' - small lapilli interval grades into thinly bedded-laminated, lt brn interval of ash sz rock frags (~15 cm thick). 1592' - 8 cm of rhythmically thin bedded & laminated ash sz rock fragments & ash (→ clay). Top of this interval marked by erosional contact overlain by small lapilli supported by yel brn palagonitic, ashy matrix. (Suggests surge/hydroclastic possible deposit.)
1607'	



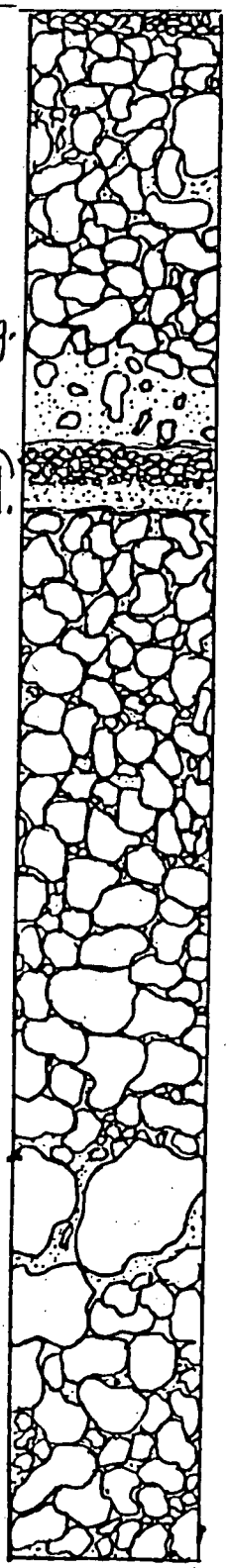
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CLACKAMAS/CASCADES BASIS BINOC. MICROSCOPE DATE 7/3/86

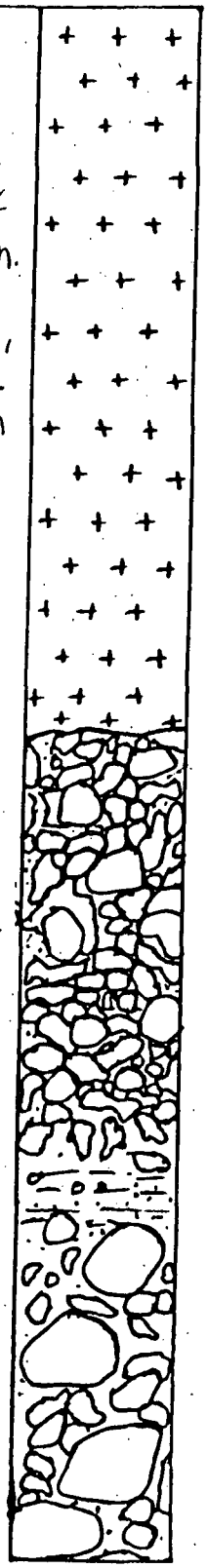
DEPTH INTERVAL	DESCRIPTION
1607'	VOLCANIC BRECCIA (A/A) 1594'- unit becomes abruptly coarser & darker gry. predom. lapilli size material (rock frags) 1597'- abrupt contact w/interval of ash-sm lapilli sz fragments in ash matrix w/palagonite 1522' Coarser & darker (gry) a/a @ 1594'. Change in ratio of clasts: matrix, clast size creates subtle bedding. 1610'-1617'- this interval is more "tuffaceous" than above intervals, as there is an increase in ash & pumice. Thin ashy (→ clay)/laminae mark end of this interval @ 1618'. Suggest larger percentage of air fall (pyroclastic) material. 1619'- clast supported interval of small lapilli to ash sz rock fragments & palagonite. Grades into, internal of ash fragments & 4 cm of small scale, cross-bedded ash → clay. 1627'-1629'- unit becomes unconsolidated
1627'	1630'-1639'- marked change in character. Dk grey, vesicular to dense blocks &, less commonly, lapilli of basaltic andesite w/irregular margins, some disrupted, suggesting deposition while molten & plastic. Clasts are 60%-50% of interval. Matrix of dk yel brn - brn gry to olive gry, fine ash w/ash size rock frags. Mnr. laminations in matrix between clasts. 1644'-1646'- Ashy matrix becomes red brn. Lapilli (no blocks) of grey-red brn - olive rock frags. 1646'-1647'- Vesicular basaltic andesite/andesite boulders w/olive & reddish clays filling vesicles. Grades into andesite unit below.
1647'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 7-3-86

DEPTH INTERVAL	DESCRIPTION
1647'	1647' - BASALTIC ANDESITE/ANDESITE lt olivegry, lt. med. gry., and brngry; sparsely porphyritic (≤ 1%) phenocrysts: plagioclase, pyroxene (?) altered to clay. Small aligned vesicles 0.5-2.0 cm apart +/- secondary clay define banding @ 60° to ⊥. Fractures are most commonly @ 45°. Clay coatings are lt. brn. dk. grngry, and mod. orange pink. Minor limonite present adjacent to fractures. R. pyrolusite, psilomelane? Moderate amt. fracturing. @1655' clear, elongate tabular secondary mineral/zeolite? forms drusy coating on fracture surface. 1658.5'-1659.5' Intense fracturing @1662' Yellow-staining (FeOx?) adjacent to clay- and pyrolusite-coated fracture Irregular, sharp basal contact
1667'	1666.5'-1694' VOLCANIC BRECCIA Mottled coloration: dk to mod. red brn, redgry, med. dk gry, olivegry, brngry, pinkgry. Angular to subrounded lapilli-sz to sm. block-sz. heterolithologic (aphyric to finely porphyritic, dense to vesicular, composition predominately mafic to intermediate but includes v. lt. gry to wht. clasts suggestive of more silicic composition) volcanic rock fragments. Some clasts may have been molten, appear plastically deformed, and have irregular, disrupted margins. Laminations of fine ashy material are typically discontinuous, disrupted, & have small-scale crossbedding. % matrix variable. Comm. fracture clay shearing. Mnr. fracturing with variable attitude. R. fine, clr. drusy zeolites on fractures. Lt. amt. 2ndary clay, limonite. @1675' R finely disseminated tabular Fe? sulfide in clay 1677'-1682.5' Reddish brn to mod. brn; angular to subrounded lapilli-sz volcanic clasts in ashy (to clayey) matrix, Crude thin bedding @ 1681' composed of sm. lapilli- & ash-sz r.f.s., waxy clays, clasts oriented @ 45° @1682.5' Increase in size & % of andesite blocks from underlying unit.
1687'	



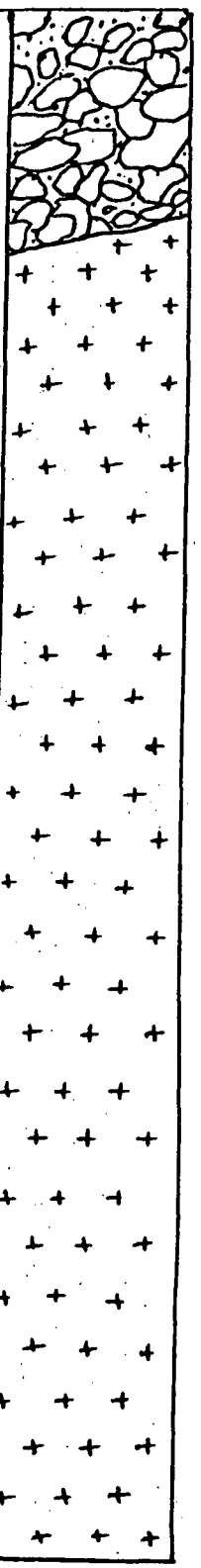
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDannel/Goodwin

FIELD CASCADES/CLACKAMAS BASIS _____ DATE _____

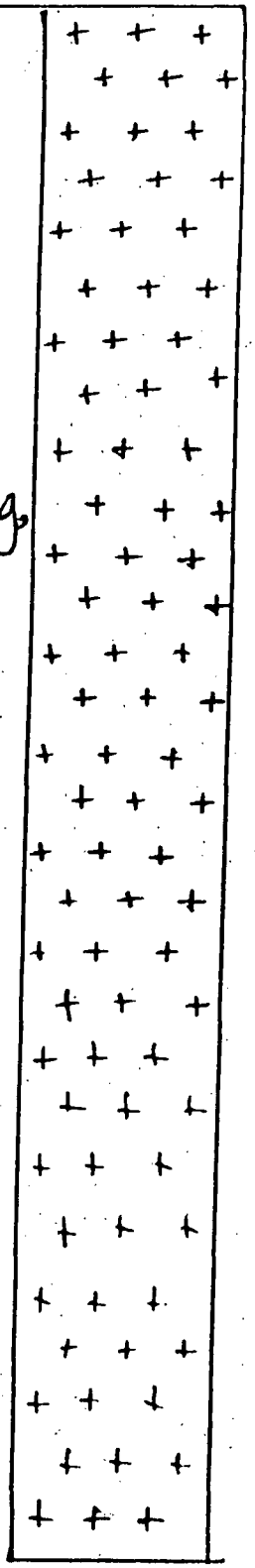
DEPTH INTERVAL	DESCRIPTION
1687'	VOLCANIC BRECCIA (A/A) 1687' soft brn clay partially filling void, sticky core
	1694' sharp 45° ↘ contact w/underlying unit
1694'	ANDESITE Med gry to dk grey to brownish gry. Porphyritic (1-3%) Phenos: plag + pyx. Pyx → clays. Secondary clay coat (lt. to mod.) fracture surfaces: lt brn, lt gru gry, pale blue, reddish brn, minr mod yel. Pyrolusite on frac. surfaces. Groundmass mafics altered to clay. Generally, unit is very fractured w/zones (~.6m) of consolidated rock. Incipient fracture marked by hairline cracks, which may be filled w/clays. Most prominent frac. direction ~45°, less prominent 70° & ~ vertical.
1707'	1694'-1702' Interval (0.5-10cm) of mud or. pnk, mod brn, lt. brn gry lams. ash → clay
	1708' abrupt color change to brnish gry. Rock is v. fractured (~1m). Dendritic MnO or FeO (black).
	1716': green clay alteration of mafics changes to reddish yellow clay.
	1721': plag phenos decrease
	1728'-1731': splintery, vertical fracture predominates, pheno content appears to decrease @ 1728'
1727'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 4th, 1986

DEPTH INTERVAL	DESCRIPTION
1727'	ANDESITE (A/A)
	1737': mafic phenos (pyx) replaced by green clay rather than reddish yellow clay a/a. Green clay alteration in groundmass, also. Platy, 45° fracturing, rare vertical fractures.
1747'	1745': dk greenish gry & minor pale blue coating on fracture surfaces is most prominent alteration. Other clays are minor.
1767'	



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

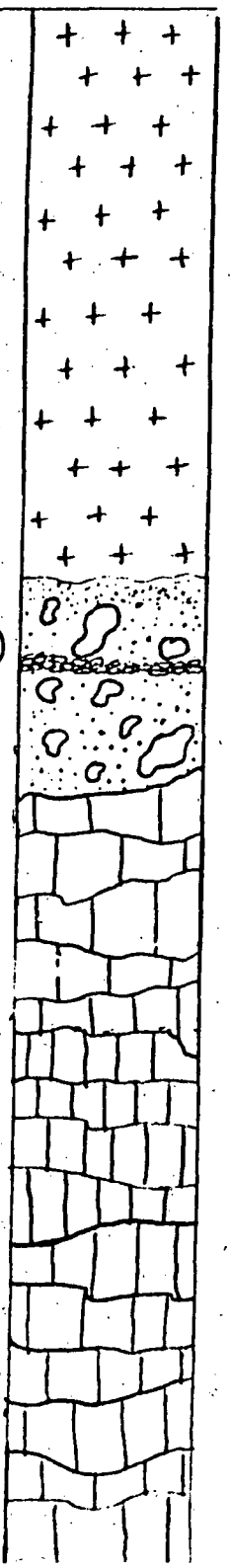
GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscopDATE July 6, 1986

DEPTH INTERVAL	DESCRIPTION
1767'	ANDESITE (A/A)
	1781½' Contact is mod. reddish brn & contains angular rock fragments
1781½'	VOLCANIC BRECCIA (predominately pyroclastic frag.) moderate reddish brn, lapilli-and block-sz andesite scoria and, less commonly, med gry andesite rock fragments in a sparse ashy to clayey matrix. Cmn. shear on fracture surfaces. Matrix ash-sz clasts includes mafics → clay & FeOx & plag. → clay. Frac. clays are ltgrngry +/- lt. to mod. FeOx. Sparse 3-15mm voids have lam's v. pale brn, lt brn, red brn clays which may drape around clasts. Clr. drusy zeolite also present on fracs. Top of unit has agglomerate appearance.
1787'	1796'-1798' color changes to med. dk gry, matrix % increases slightly. Elongated clasts are horizontal 1' above basal contact.
1798'	ANDESITE brngry to med gry, v. sparsely porphyritic (≤1%): plag & pyx → clay & FeOx (≤5mm), commonly vesicular w/ gry-grn clay filling ≤50%, 2ndary wht, lt brn, & gry-grn clays commonly coat fractures, Rclear prismatic zeolite? occurring A/A
	1803'-1806' Common irregular, elongated vesicles (1-5mm voids) with variable amygdules
1807'	

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 7/16/86

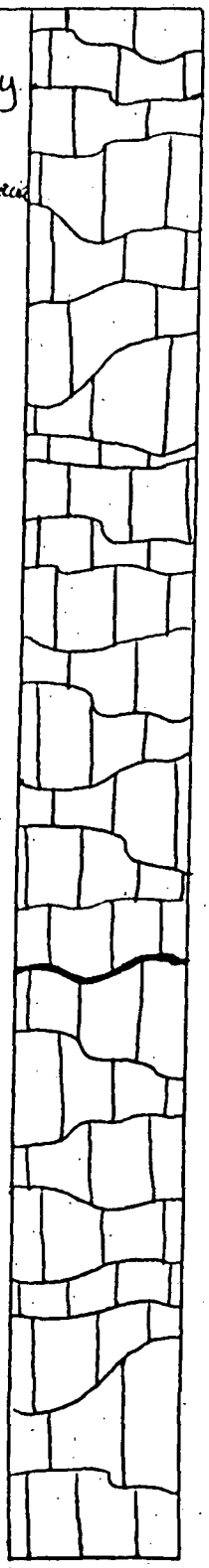
DEPTH INTERVAL	DESCRIPTION
1807'	ANDESITE (A/A) 1809-1810': ≥ 30 mm clay seam assoc. w/sinuous frac @ 30° to ℄ @ 1814': microfractures & aligned small voids (@ 0.5-1 cm interval) @ 90° ± 10° to ℄ 20% filled w/thin mod brn or grn gry clay seams 1817'-1820': heavy fracturing & clay above 4' breccia & oxidation horizon (pinkish red)
1820'	VOLCANIC BRECCIA Mod. dk yel, orng brn, red brn. Coarse ash sz & lapilli sz heterolithologic rock fragments & minor very lt. grey dense pumice (often containing hornblende, ± magnetite) commonly flattened, in a tuffaceous matrix which includes glass, hornblende, ash. Unit has slight changes every 2-6 cm -- i.e. change in color, clast: matrix ratio, clast size -- which gives a crudely bedded appearance. Minor shear visible on fracture surfaces. (Much of unit appears to be pyroclastic airfall matl.) 1826'- ~10 cm of ash & ash sz rock frags w/o clasts 1825'-1826'- reddish orng waxy matrix (from ash?)
1826'	BASALTIC ANDESITE Dk gry to grnish blk, rare microphenos of plag. Pilotaxitic texture. Brecciated (tectonically) intervals are typically consolidated. Dk grnish clay on surfaces of fractures & filling many vesicles. No predominate fracture angle/direction, generally 40°- vertical. Mnr white clay in some vesicles. 1826'-1835' volcanic "breccia" is at top of this unit composed of dk gry vesicular blocks of basaltic andesite described above, w/irregular boundaries/margins suggesting fluidal/molten deposition. Matrix (~30%) of lt olive, olive & dk yel brn ashy material.
1827'	
1847'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) GOODWIN/MCDANNEL
FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 7/7/86

DEPTH INTERVAL	DESCRIPTION
1847'	BASALTIC ANDESITE (A/A) 1836'-1845' (Tectonic) Breccia zone, well consolidated. Dk grn clay in fractures. 1851'- increase in vesicularity (1851'-1872' flow transition through pyroclastic breccia) 1853' & 1869' a/a @ 1826', (vesicular to dense blocks & lapilli of basaltic andesite, irregular margins, in mnr dk yel brn & olive gry matrix) 1869' Matrix becomes red brn w/ vesicular mafic fragments common & increase in ash component of matrix (suggests pyroclastic origin). Zeolites occur in voids between some fragments.
1867'	
1872'	BASALTIC ANDESITE Dk gry, v. finely & sparsely porphyritic (<1%). Phenos (<2mm): plag., cpx. Mod. amt. dk grnish gry to grnish black &, less common, pale blue clays on fracture surfaces. ± minor, subtle grnish clay in groundmass. Phenos show little to no alteration & rock appears fresh. Fracturing is not pervasive & varies in intensity & fracture angle; 45° & ~ vertical often predominate. 1871½'-1890': mnr platy partings @ 45° & 60° ℄, + dk grn clay coats fractures.
1887'	



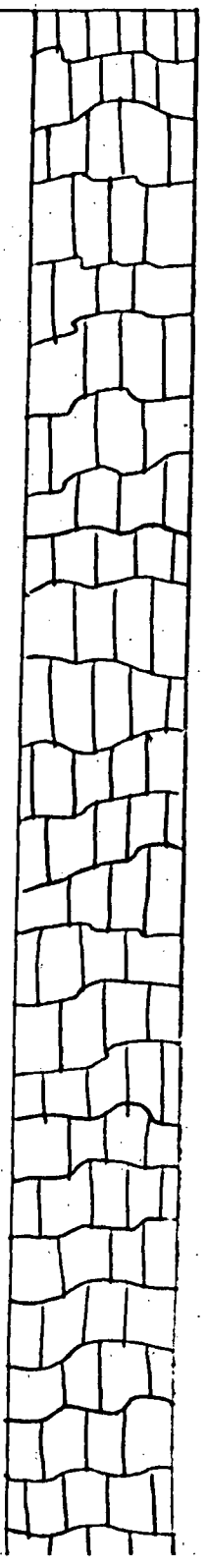
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 7, 1986

DEPTH INTERVAL	DESCRIPTION
1887'	BASALTIC ANDESITE dK gry, finely porphyritic (1%), phenos: (<2mm) plag. & cpx., mod. amt gray, green, & lt. blue clays, ± minor subtle greenish clay also in groundmass; phenos. show little to no alteration. Fracturing is light/not widespread, mainly 45°-50° to ℄ & minor subvertical & 30°- often with light coating of brn, blk, dK gry grn clay
1907'	
	1910'-1917' Common intersecting sinuous vertical fractures with brn & blk clays coating fractures
1917'	



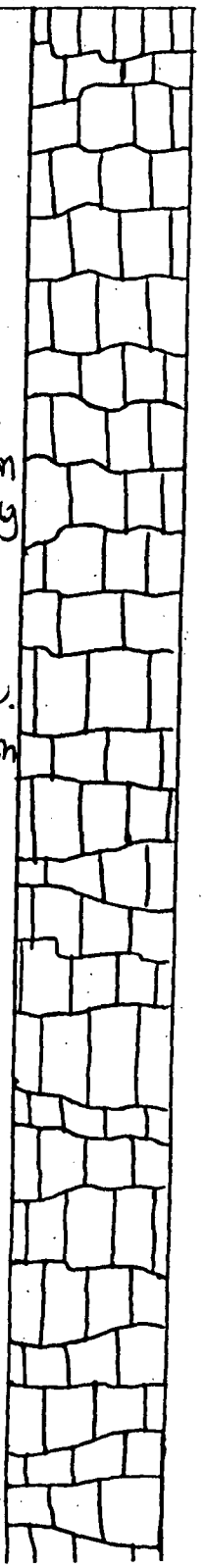
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE July 8, 1986

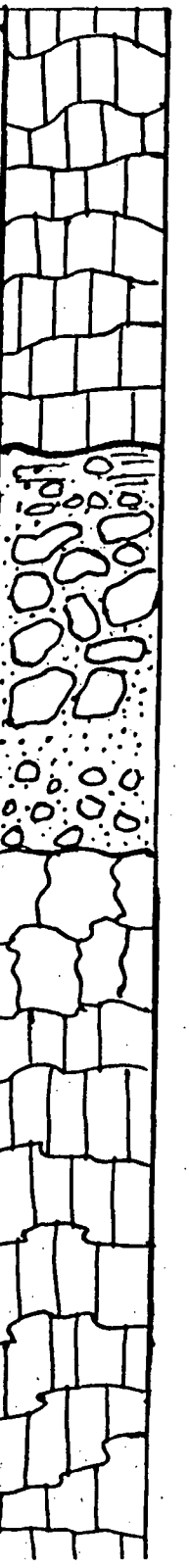
DEPTH INTERVAL	DESCRIPTION
1917'	BASALTIC ANDESITE (A/A) @ 1917' rock fracs. fairly easily along preexisting parting planes @ 30°, 45° & ± sinuous vertical 1927' 1' zone of intensely fractured/rubbly core 1928' moderately fractured. Predominate fracture direction is 45°, less commonly ~75° & vertical. Thin dk grey clay seam along vertical fracture @ 1936' 1937' - fracturing increases. Rock somewhat rubbly @ 1940'-1945'. High angle (~ vertical) & 45° predominate. 1945-1947' - angular brecciated clasts, in place w/thin clay veinlets.
1937'	
	1948': rock becomes well consolidated & has few fractures. Fracture tends to be ~horizontal.
1957	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 8, 1986

DEPTH INTERVAL	DESCRIPTION
1957	BASALTIC ANDESITE (A/A)
	1967'-1969' Contact - rock becomes brecciated and color changes to grayish black with minor reddish brown
1969'	VOLCANIC BRECCIA
	1969'-1970.5' Angular to subrounded lapilli- to coarse ash-sized rock frags. of mafic to silicic composition in a fine red brn. matrix of ash→clay (waxy) & mnr. ash-sz r.f.s. Crude bedding defined by clast size & variation in % matrix.
	1970.5'-1979' Lt. med gry to olive gry, commonly vesicular, basaltic andesite blocks (predominate) & lapilli in a sparse matrix of fire yel. brn ash. BA blocks may have dark (chilled?) or irregular (disrupted?) margins suggesting deposition in a plastic/molten state. Shear is common on fracture surfaces. Gradational basal contact.
1977	
1979'	BASALTIC ANDESITE
	brngry to gry brn, v. finely & sparsely porphyritic (<1%) to aphyric, phenos: plag, pyx→clays & limonite, ol? → clay, common lt. alteration of matrix to clay (esp. adjacent & within fractured intervals), common brecciation, mod-mod+ clays filling in many vesicles + coating all fracs. & filling all voids (mod brn, dk grngry, lt gry, pale olive, wht, orange brn...), R clear soft zeolite? occuring as drusy void coating & individual sm. xtals, vesicles to 1986'
	1979'-1984' Vesicular chilled-edged boulders w/ brn secondary? clays @ edges (MAY BE PART OF UPPER V.C. unit) = flowtop breccia
	1979' & below intermittent lt. grn clay in tiny pill-shaped grains irregularly aggregate in fractures & vesicles
	1986'-1990' intense fracturing & brecciation, 50% rubble of smaller than 1"x1" frags. fracs @ 15° to ℄ & filled with thin
1997	



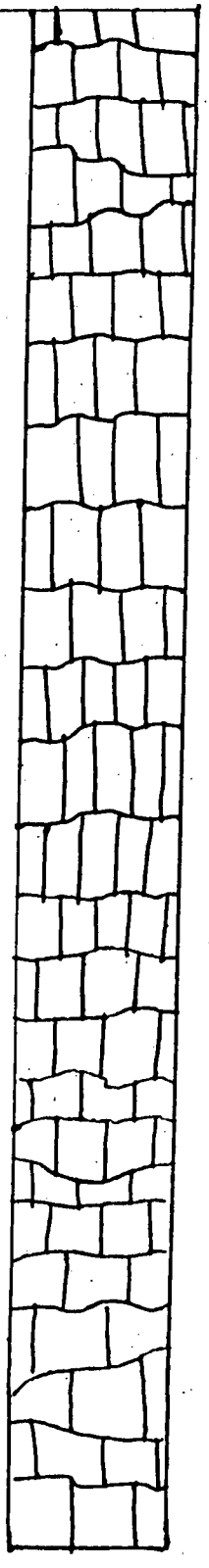
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microsco. DATE July 8, 1986

DEPTH INTERVAL	DESCRIPTION
1997'	BASALTIC ANDESITE (A/A) 1990' (cont.) dK brn, mod. brn, dK grn gry clay 1992½'-2000½' Intensely brecciated, 50% rubble, fracs @ 45° to ℄, mostly dK gry grn & brn clays as coatings/fill 2004'-2030' Intensely brecciated, fracs @ 40°, 80° rubbly, overall color is greyish green to dusky green. abundant clay.
2017'	
	2030'-2035' - color changes to dk yel brn. Rock remains rubbly.
	2035' - ~1' mod. red brn clay - CONTACT
2037'	



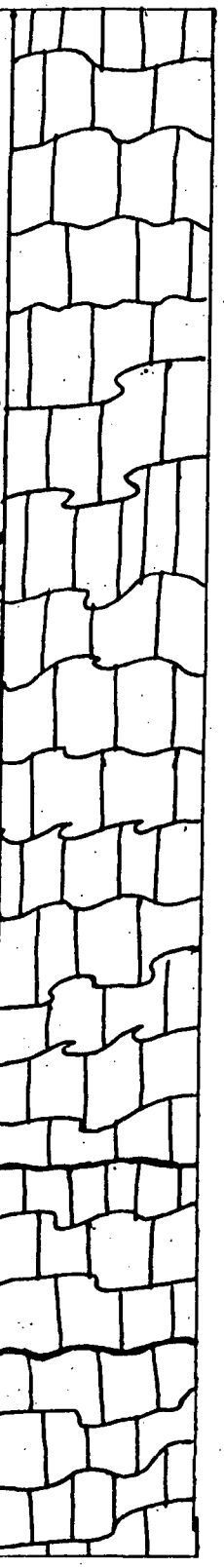
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE JULY 9, 1986

DEPTH INTERVAL	DESCRIPTION
2037'	2036' - BASALTIC ANDESITE grnish blk to dk grnish gry to gryish brn. Mnr gryish red aphyric. grn. includes plag, pyx. Pervasive dusky grn - dk grn & gryish blk clay alteration. Vesicles (up to 1.5 cm) common but not abundant, lined w/clear drusy zeolite? mineral (vapor phase?) & filled w/clay → pale blue to dk grn. Mnr. veinlets of wht clay. Minor disseminated to drusy coating of clear secondary mineral on fracture surfaces. Heavy fracturing locally, 45° predominate ∠, sinuous vertical to sub-2064' vertical less common. Brecciation common to 2040'-2057' well consolidated breccia. 2055'-2065' Pale brn - clay alteration lt. to mod. w/ clear zeolite? A/A, R earthy hematite & limonite
2057'	clay colors predominately brn & grngry; wht, redbrn, pale blue also present
	2067' Contact: 3" limonite-stained interval between dk gry vesicular basaltic andesite flows
	2072'-2074' Contact A/A with rock colors altered to mod. brn
	2076'-2079' Fracturing @ 15° is sinuous & vertical, increase in zeolite vnlets (≤3mm wide) & clay (brn), mod. brecciation lam to mm consolidation is good, color: mod brn, 40mm drusy vesicle
2077'	



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1
FIELD CASCADES/CLACKAMAS

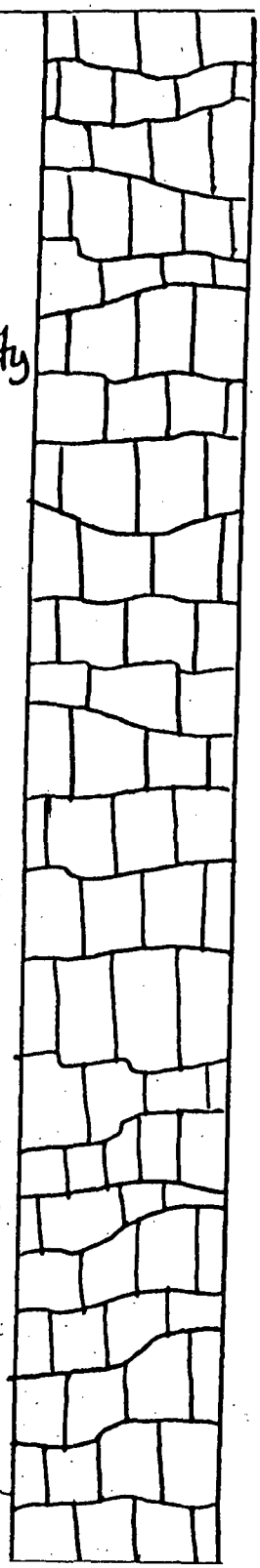
GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE July 9, 1986

DEPTH INTERVAL	DESCRIPTION
2077'	BASALTIC ANDESITE (A/A)
	2083'-2103' unfractured interval w/ fewer zeolites, particularly below 2094' where vesicles become less common, two zeolites present: clr, as drusy fill & finely dissem. xtals in fracs & voids, pale yellow (less common) at base of interval as finely dissem xtals
	2088' Contact: red-brn oxidation zone 3" wide w/ basal leached halo 3" wide
	2091' Contact A/A
	2095'-2101' intermittent coarsening of grainsize, locally w/ appearance of brecciated v. finely porphyritic gabbro in basaltic andesite matrix, sharp to diffuse-edged xenoliths (?), ~2"-10" across, mild clay alteration (5-15 mm wide) adjacent to rare fractures, intermittent fine web of wht zeolite vnlets
2091'	2103' heavy limonite, R+ clr drusy zeolite?, & lt clay on frac. @ 50° to ℄
	2107'-2111' Increase in clay alteration: rock brnish color
	2111-2116 contact? red brn, increase in vesicularity, one large sinuous vertical crack begins at contact, filled with drusy zeolites (clr), heavy clay, common hematite (earthy)
2117'	

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 10, 1986

DEPTH INTERVAL	FRACTURE DENSITY	DESCRIPTION
2117	# Fractures per 1' interval (Fractures filled w/ secondary mins)	BASALTIC ANDESITE (A/A) 2120' - seam of horizontal brn clay ~6cm thick 2122'-2124' - one 8mm wide ~0.3m vertical fracture filled w/white mineral → clay & numerous smaller veinlets 2124' - rock becomes brn gry. Increase in vesicularity up to ~15% 2126'-2126.5' - rock becomes red brn. Flattened vesicles 2126.5 - return to brn gry color 2127.5-2128 - vertical fracture filled w/white mineral → clay. Less prominent, thinner, variably oriented veinlets. 2131' - return to homogeneous dk gry color
2137		2137'-2139' - 1 continuous vertical fracture, less prominent (minor) 45° & horizontal fractures
		2148'-2159' gry sh red to mod. reddish brn, slt. increase in fracs & wht veinlets (=clay & drusy mineral), vesicles 2-15% mostly filled with wht, lt brn, or pale yel-orange clay, zeolites completely fill vesicles occasionally, common hematite, rare limonite, common clay alteration, (vesicles ≤ 20mm, vns ≤ 5mm)
	0	
	2@15°, F	
	2@subvert, F	
	0	
	0	
	1@70°	
2152	0	



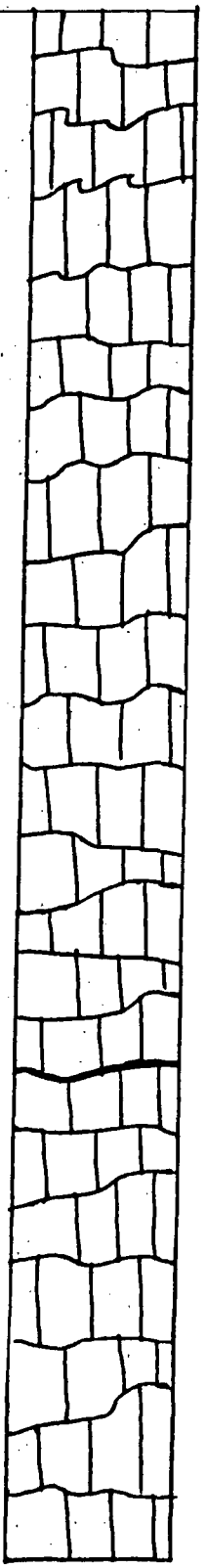
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 11, 1986

DEPTH INTERVAL	#fract/1 interval	DESCRIPTION
2151'	0	BASALTIC ANDESITE (A/A)
	2	
	1F	
	1F vert.	
	2F@15°	gryish red to mod. red brn, aphyric, 0-15% (≤20mm) vesicles w/ ± drusy clr min ± clays, mod. to lt. fracture, sparse veinlets w/
	1F vert.	zeolites & clay
	1F@15°	2159'-2164' sparse vesicles
	2F@15°	
	1F@vert.	
	1F@vert.	
	0	
	0	
	0	2171'-2181' dK grngry color, intermittent coarsening of
	0	matrix grain size to v. finely porphyritic with contact between
	0	porphyritic & aphyric sharp to diffuse, phenos: plag, ol, pyx
	0	(ol → iddingsite), few vesicles, increase in matrix alteration
	0	adjacent to fractures in coarser-grained intervals, unfractured
	2	exc. tiny veinlets A/A
	1@20°	
2177'	0	
	1@70°	
	0	
	0	
	0	
	2 F@15° 1@90°	
	0	
	0	2184'-2185' Contact: bright orange brn, normally
	0	graded volcanic seds./tuff(?): 3" fine clayey ash abruptly
	0	changes to poorly-sorted xtal poor lapilli tuff w/ 2-3% plag
	0	(euhedral & sparkling) + pyx → clay in clay (devitrified ash?)
	0	matrix w/ (sparse rounded to subangular red brn (→ clay)
	0	mafic to silicic lapilli-sz rock fragments & 1 or 2 pumice clasts → clay
	1@20°	2185'-2200' BASALTIC ANDESITE A/A, consolidated
	>5	flowtop breccia: grngry to lt brn, ±amygdular (w/
	1	zeolites ± clay), local heavy hematitic alteration @ 2192' to
	0	2195½' (minor metallic pyrite → hematite in matrix), common
	1@vert.	fractures with brown clay & fairly coarse-grained drusy zeo-
	3	lites, v. sparse matrix material → lt brn clay ± hematite
	3@45°	
2197'	1	



Diamond Shamrock
Thermal Power Company

Form 2

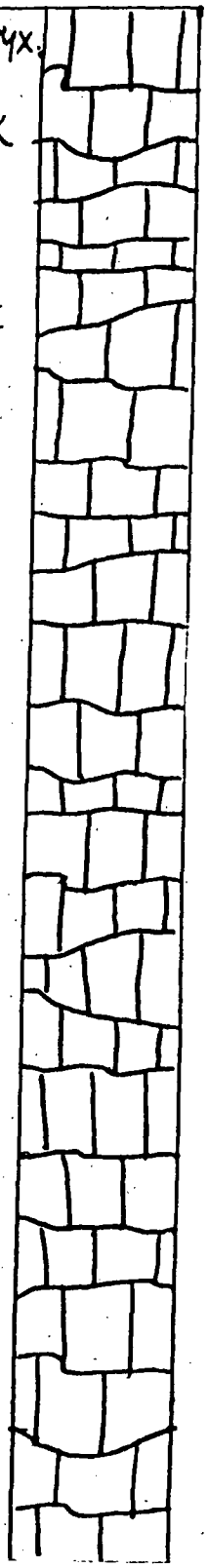
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE July 11, 1986

DEPTH INTERVAL	# Fract/Linear	DESCRIPTION
2197'	0	BASALTIC ANDESITE, aphyric w/g.m. ol → iddingsite, plag, pyx. dk gmgry, 2200'-2224' local brecciation but rock well consolidated, fine grygrn clay ± clr zeolite veinlets, unfractured core w/irreg. break
		2205½' 3cm drusy-lined irreg. cavity & v. lt. wht clay
		2208' fine, wht, acicular zeolite in fractures fracturing remains minor, predom. along 45°-55° ∠
2217'	Lt.	2224'-2230' red brn. Mnr flow? breccia (12cm) passes into vesicular rock (Basaltic Andesite as described above), vesicles filled w/ clays & wht zeolites(?) White zeolites fill fracture (vein) @ ~20°. Probable Contact
		2230' - rock becomes greenish grey with same appearance as described at top of page.
2237'		



Diamond Shamrock
Thermal Power Company

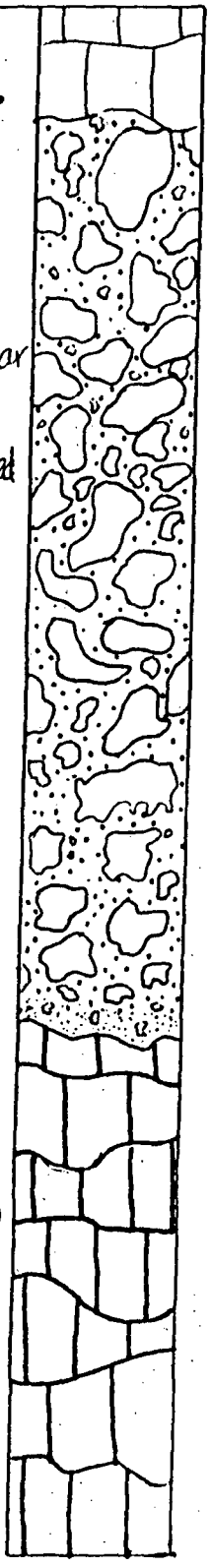
Form 2

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN / McDANNEL

FIELD CASCADES / CLACKAMAS BASIS BINOC. SCOPE DATE JULY 11, 1986

DEPTH INTERVAL	Fracturing intensity ↓ (L: light, M: moderate, H: heavy, I: intense, A: absent)	DESCRIPTION
2237'	L	**BASALTIC ANDESITE (A/A)**
	↓ M	2237' rock is brecciated (tectonically) but well consolidated.
	H	V. minor matrix of dk grn clay.
	M	2238' increase in vesicles. Clay & wht. zeolite fill vesicles
	L	2239'-2241' very fractured. Waxy shear surfaces.
		2240'- **VOLCANIC BRECCIA** (pyroclastic origin) Lapilli & blocks, rounded to irregularly shaped, dense to vesicular basaltic andesite in a minor matrix of mod brn clay, ash sz rock fragments & crystals (predom. plag.). Numerals small voids & vesicles filled w/ white zeolite & clays (pale blue & dk grn). Sheared waxy fracture surfaces. Predom. fracture direction 20°-35°.
	H	2253' matrix increases; fracturing increases & rock becomes V.
	↓ M	broken & rubbly. Shear on surfaces. Larger clasts in breccia
	↓ H	have yel brn oxidized rims; other clasts have rims darker
		than remainder of clasts (chilling?). Fracture remains intense
2257'		until 2259.'
	↓ M	2259' angular to sub-rounded lapilli sz rock fragments
	↓ H	of med-dk grey mafic lavas in red brn to gry brn matrix
	↓ M	of clay (from ash?), ash sz rock fragments, xtls. Some of frag-
	↓ H	ments have convoluted, disrupted margins — suggesting
	↓ M	deposition while in a molten/plastic state.
	↓	2263' - 7 cm mod rd brn clay w/ predom. ash sz rock frags. (AIRFALL?)
	↓ H	
	↓ I	2264' **BASALTIC ANDESITE**
	↓ M	Dk grn gry - mod red brn, aphyric. (tectonically) Brecciated but
	↓ H	consolidated w/ lt-dk grn gry matrix. Vesicles common
	↓ L	clear drusy zeolite ± white, pale blue clays; un-
	↓ M	common veinlets of same. Short intervals of red
	↓ L	brn (oxidized) volcanic breccia of basaltic andesite
		lapilli — some indicate deposition while molten/plastic.
	↓ A	Pyroclastic origin appears most likely. Rare, finely disseminated
	↓ M	pyrite → limonite/hematite. Intermittent
		shear on fracture surfaces.
2277'		



Diamond Shamrock
Thermal Power Company

Form 2

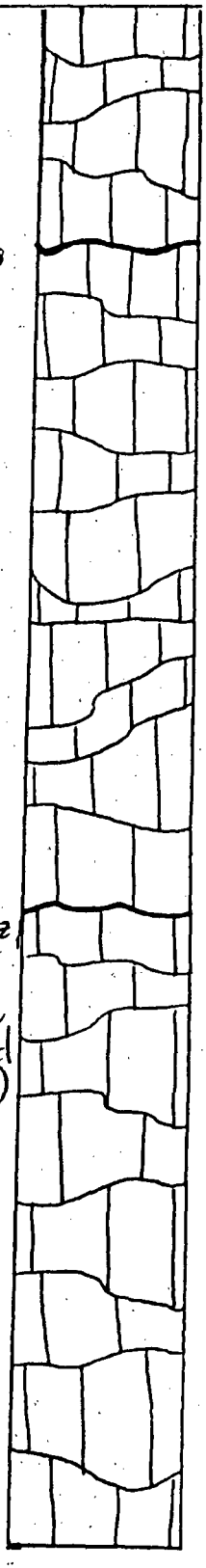
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) MCDANNEL / GOODWIN

FIELD CASCADES / CLACKAMAS BASIS BINOC. SCOPE DATE 7/12/86

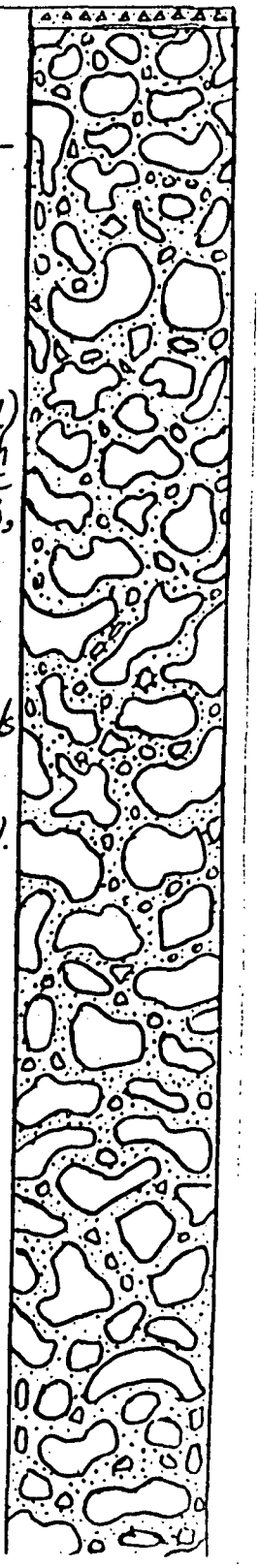
DEPTH INTERVAL	DESCRIPTION
2277'	BASALTIC ANDESITE (A/A)
	2277-2280' - hvy brn clay + tr limonite associated w/dk gry vesicular volcanic blocks (flow edge?)
	2284'-2286' - gry brn - red brn vd. breccia: lapilli sz rock frags in ashy matrix (flow boundary?). Much of matrix is clay. Mnr shearing on fracture surfaces. Zeolites on fractures in trace amnts.
	2286'-2288' - no brecciation of rock a/a (began @ 2264'). Rock is blue grn color.
	2288' - 7 cm red brn clay seam w/rock frags, offset ~4cm in shear zone. (description similar to 2284' above)
	2294-2295' - vertical fracture w/heavy waxy (clay) shear + seam of soft clay w/rock frags.
2297'	2298'-2300' - mod brn, brecciated, w/ fractures @ 30-45°. Clay along fractures, mod. shearing, pervasive clay alteration,
	2301'-2305' volcanic breccia: mod red brn to mod brn: lapilli sz, often vesicular, basaltic andesite(?) clasts in matrix of clay (fine ash), ash sz rock frags, x tls. Lt shear, tr. zeolites. Pyroclastic origin. Contact?
	2305'-2317.5' - Interval above grades into basaltic andesite as described @ 2264'. Color is blue green. Rock is brecciated (tectonically) but consolidated.
2317'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) MCDANIEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binocular microscope DATE JULY 13, 1986

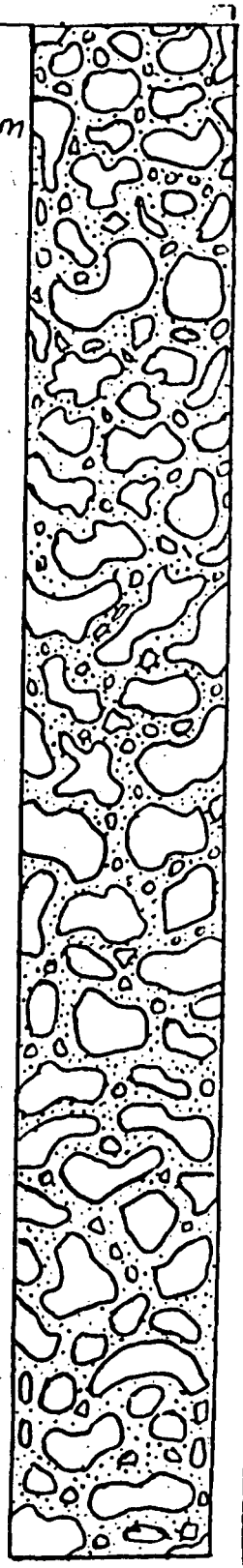
DEPTH INTERVAL	fracturing A=abund L=light M=moderate H=heavy I=intense	DESCRIPTION
2317'	L	2317' Minor red brn oxidation marks flow boundary
	M	
	M	2317.5' LAPILLI TUFF
	H	16 cm thick interval: pale yel org to mod yel brn. <1mm -
	H	5mm elongated clay clasts (appear to have been pumice
	M	lapilli, collapsed) & ≤ 5 cm (angular lt. gry rock fragments
	H	of intermediate composition. (Some frags are irregularly shaped
	I	& have oxidized rims). In minor mod yel-dk yel brn clay
	M	matrix w/xtls of plag & pyx. Percentage of rock fragments in
	M	unit increases w/depth, grading into unit below:
	M	2318' VOLCANIC BRECCIA (well consolidated)
	M	Dk grn gry, med dk gry, grayish red, mod red brn to brnish
	H	gry. Lt-med gry angular to subangular lapilli to block-size rock
		frags of mafic to intermediate composition in matrix of ash,
	M	smaller (to ≤ 1mm) rock fragments (l/a), sparse xtls, & dk
		grn clay. Frequent, intermittent intervals of mod red brn
		& blk flow banded (+ stringers & blebs) lava → clay ± minor
		vesicular/rarely scoriaceous, rounded blk to brn to red brn
	H	lapilli-sz fragments. (Flow banding, stringers & blebs
	M	suggest material was molten at deposition). Also, intervals
2337'	L	of brnish gry basaltic andesite (typically, aphyric) w/
	H	more homogeneous texture & occasional subtle breccia.
	L	(Breccia as described above ~~may be~~ probably of explosive origin).
	M	Minor clay, concentrated on fractured & often waxy,
	H	sheared surfaces of dk grn gry breccia. V. minor
	M	white veinlets & fracture coating of zeolites. (Clays
	H	are predom. dk grn, w/less pale blue & red brn). Fractures @
	L	~45°.
		2319.5' - rare laminations
		2318' - 2325' - intermittent lt yel brn zones (~15cm - 1m)
		w/lighter colored (intermed - silicic) lapilli-sz volcanic
		fragments (i.e. rock fragments) + more tuffaceous matrix
		than most of unit.
	L	2349 - 2351 - breccia has dk grn gry color.
2357'		



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE July 14, 1986

DEPTH INTERVAL	Fracturing L=light M=moderate H=heavy A=absent I=intense	DESCRIPTION
2357'	L↓MHIMHI	VOLCANIC BRECCIA (A/A) 2359'-2372' - red brn → blk, brn gry. Flow banding common @ angles of 30°-45°. FeOx (limonite), rare clear zeolite. Much of interval is rubbly. 2372'-2379' - grn gry breccia (consolidated), less matrix.
2377'	LAMIHLIHIHLA	2379'-2385' - red brn, med-dk gry. Flow banding 45°-80°. locally rubbly. 2385'-2387' - grn gry breccia (a/a) 2387'-2391' grayish red, rounded, ± vesicles, basaltic and. blebs, minor bands. Sheared frac. surfaces. 2391-2401 brn gry (+mnr red gry). Texture is subtle: med gry to dk red grey rounded frags. in red gry lava matrix
2401'		



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 14, 1986

DEPTH INTERVAL	Fracture	DESCRIPTION
2397'	A L A L H H ↓ M L M L M I L ↓ M	VOLCANIC BRECCIA (A/A) 2401'-2412' - grn grey breccia, as described above, often w/ little matrix between rock fragments. 2412' dk red brn matrix, w/ blk, rounded, vesicular rock fragments & irregularly shaped blebs. Zeolites in vesicles. 2416' red color intensifies & flow banding prominent.
2417'	H M ↓ H A M @45° ↓ H ↓ M	2419' grades into red gry & becomes more homogenous lava by 2422 2425' grn grey breccia, a/a. Pale blue clay & gry grn clay on wavy, sheared, fracture surfaces. 2434'-2438' Brn, blk & red brn breccia "dike" threads its way through lt. gry breccia w/ angular blocks & lapilli separated by thin clay seams suggesting little movement relative to "dike" (attitude 15° to // to ¢). Dike may have been fluid and is composed of ash-sized volcanic fragments with disrupted margins.
2437'	↓	

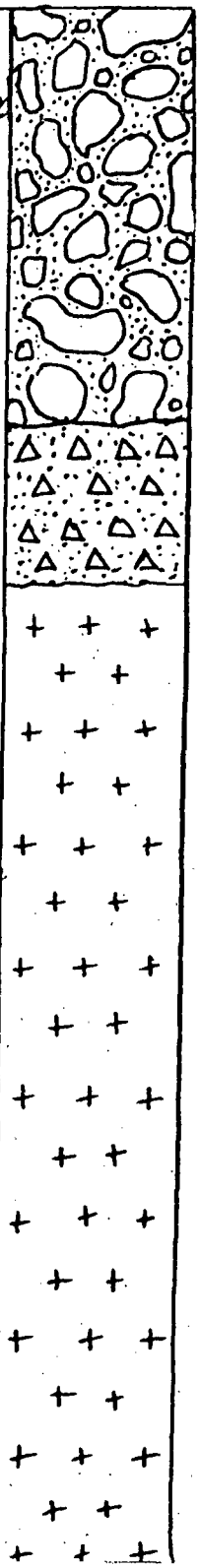
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CLACKAMAS (CASCADES) BASIS binoc. microscope DATE 7-15-86

DEPTH INTERVAL	DESCRIPTION
2437'	VOLCANIC BRECCIA (A/A) 2440'-2441' red brn & dk gry breccia, w/ streaked & convolute bands (~ flow banding). Red ashy matrix. 2441'-2448' increase in matrix (dk grn gry), angular to rounded lapilli & small block sz basaltic andesite w/ intermittent intervals (up to 15 cm thick) of red brn & blk banding a/a, w/ sparse lapilli-sz rock. Dk grn waxy shear surfaces (2444'-2448': increase in pale blue clay on fractures) 2448'-2453' CRYSTAL TUFF? (very ash matrix has altered to clay) Dk yel brn, waxy, sheared clay w/ abundant xtls of plag & pyx → clay. Minor coarse ash-lapilli sz rock fragments (of intermed. composition) & porphyritic clast. Unit becomes slightly less waxy & altered w/ depth (~2453') & is marked by disrupted black bands of basaltic material. 2453' ANDESITE med dk gry to v. lt. gry, porphyritic andesite ~10% phenos of plag, cpx & opx → All show clay alteration. 2457' 2453'-2469' bomb- & lapilli-sz gry blk - dk gry porph. andesite commonly flattened/elongated, in dk org brn clayey matrix of coarse ash-sz rock fragments & xtls of plag & pyx. (Flow breccia) 2469'-2476.5' above grades into med dk gry porphyritic andesite @ 2469'. Phenos replaced by wht clay w/ minor pale blue cores. 2476.5 color changes to lt gry - v. lt. gry. Cpx phenos repl. by dk grn clay. Pale blue & pale grn clay pervasive throughout rock. 2477'



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL
FIELD CASCADES/CLACKAMAS BASIS _____ DATE 7-15-86

DEPTH INTERVAL	DESCRIPTION
2477'	ANDESITE (A/A)
	2485'-2489' rock takes on subtle pinkish cast which becomes pronounced by 2488', Pheno sites have rims of oxidized red brn-mod red iron w/ light blue clay (rather than dk grn clay) repl. phenos.
	2487' ~12 cm zone intense fracturing, increased yel brn clay
	2490' pervasive lt grn gry clay, mnr lt gry brn clay. Veinlets of wht clay (may be zeolite?).
2497'	2495' rock becomes tectonically brecciated w/ minor dk grn gry matrix of finer rock frags & clay. Rock remains well consolidated. Mnr zeolite veinlets. (Brecciation is 2ndary feature)
	2504'-2512' brecciation intensifies. Zeolite veinlets 5°-15° ℄ (acicular zeolite – natrolite?)
	2512'-2516' Light fracturing. Rock color is lt. brn gray adjacent to fractures, otherwise lt gry. Light grn clay coats fractures.
	2515' 8 cm drusy cavity with several different zeolites successively coating light grn clay cavity wall (resinous tightly fitting stumpy columns → radiating blades → very fine acicular xtals, all ~clear in color)
2517'	

ANDESITE (A/A) LAVA FLOW

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION
40 FOOT INTERVAL

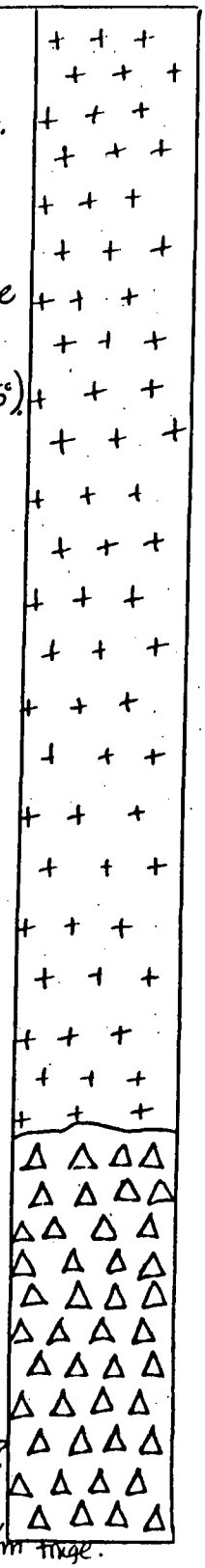
HOLE CTGH1 GEOLOGIST (S) MCDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 16, 1986

DEPTH INTERVAL	Fracturing	DESCRIPTION
2517'	A L A	ANDESITE (A/A)
	L M L A	2526'-2532½' (2ndary) Brecciation increases. Minor dk grn gray clay vnlets ± clear zeolites coat fractures. Fracture attitude variable, 30°-45° to ℄ most common. Rock remains well consolidated.
		2532½'-2539' Base of flow marked by a change in color: rock is mainly brn gry, w/ pink brn & med. gray-related to incomplete mixing with the lower unit and chilling, respectively.
2537'	L A M A L A L A L	2539'-2552½' Volcanic breccia – (agglomeratic by 2543') Red brn & gray lapilli & blocks of andesite in an orange brn matrix of clay/ash & common free plag. & pyx. xtals. From 2543' to 2545' lapilli are flattened horizontally. Local fracture @ 15° to ℄ w/ lt. clay shearing. Minor zeolites in vesicles ± clay (± quartz (?) @ 2548'). (Pyroclastic breccia between flows)
		@ 2550' matrix changes color to moderate brn. Amphibole appears. Suggests contact w/ unit below @ 2259'.
		@ 2552½' ½ cm brn clay seam on fracture @ 45° ℄ to ℄ marks contact with breccia of different character
2557'		2552½'-2559' Indistinctly banded, brecciated but consolidated andesite; wispy bands of pale yellowish brn, moderate yellow & red brn xtal-rich matrix (clay, + amphibole ≤5mm), pyx → red brn clay,

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTBH-1 GEOLOGIST (S) MCDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 7/16/86

DEPTH INTERVAL	DESCRIPTION
2557'	ANDESITE (A/A) (continued from p. 51) & plag) w/med dk gry unaltered blocks. Banding may be a primary flow feature or related to alteration & fracturing.
	2259' ANDESITE (see 2550') finely porphyritic; 2-3% phenos of amphibole, pyx, plag. Med dk gry. Fractures most common @ 20°. R white clay on fracture. Light clay alteration of matrix.
	2566'-2569' - intense shearing, vertical to high angle (15°). Forms rubble.
	2573'-2575' - intense shearing & rubble. Vertical & 45° Waxy shear surfaces.
2577'	2579' - hairline fractures (w/v. lt. clay) @ 45°.
	2580-2586' - volcanic breccia — basal breccia. Lapilli & small blocks of andesite in ashy matrix. Groundmass minerals altering to clays, pyx → hematite (FeOx) & clay. Common gry grn & white clay veinlets.
	2586' CRYSTAL-LAPILLI TUFF (airfall?) Overall color is lt. gry. Lt gry, med gry & red brn fine gr. intermediate to mafic lapilli of volcanic rock fragments in a matrix of ash sz rock fragments, abundant crystals (plag, pyx, amphibole?). Minor flattened pumice → clay. Ash is sparse. Subtle bedding defined by size variations in matrix & lapilli.
	2586'-2589' - orange brn, ashy matrix. Oxidized by overlying andesite flow?
	2594'-2595' - poorly consolidated. Dk green & pale blue secondary clays common.
2597'	2591' - drn clay seam along 30° fracture; below this point is lt. gry/grn rock color to base of unit



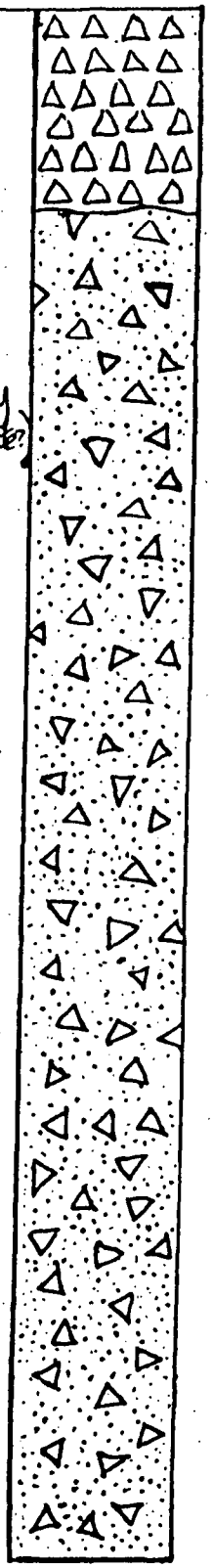
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 17, 1986

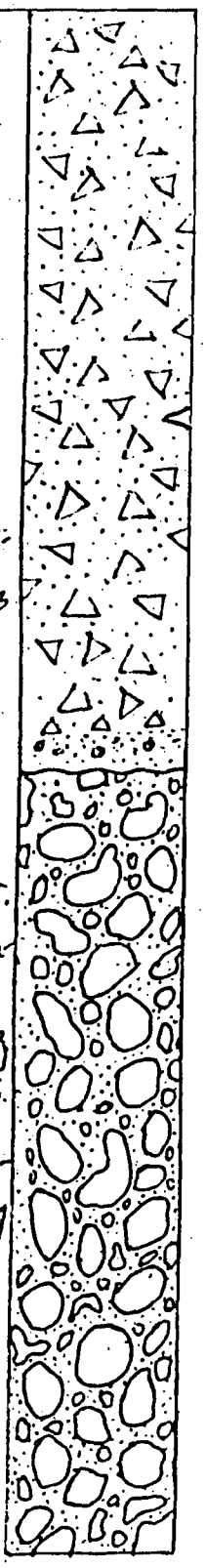
DEPTH INTERVAL	DESCRIPTION
2597'	Crystal-Lapilli Tuff (A/A)
	2602.5 Lapilli Tuff (Ash-Flow origin?)
	Lt gry angular to sub-rounded lapilli sz rock fragments & black glass (FRESH) in med gry to dk med gry matrix of ash sz rock fragments, xtls & glomeroxts of plag, opx & magnetite, glass fragments, minr clay. Rock fragments are predominately porphyritic andesite but include rare gabbroic samples (cumulate?) Elongated, black, fine-textured features are common & are reminiscent of collapsed pumice, but may be depositional feature. Unit is mod. well-consolidated & predominately massive. Bedding & sorting are present but uncommon → suggests possible surge deposition, in part.
	2604 ~0.3 m well sorted thin beds of coarse to fine ash sz material.
2617'	2605 rare blocks & larger lapilli in uppermost part of flow disappear by this interval. Small lapilli only are now present.
	2612' - decrease in lapilli sz rock fragments to ~ ≤3% throughout remainder of unit
	2624' - lapilli sz frags almost absent
	2630.5' - 2642' unit is poorly consolidated/friable in much of this interval
2637'	TALLAILA / IALA / LAHMLL / HLI / MALAL



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 17, 1986

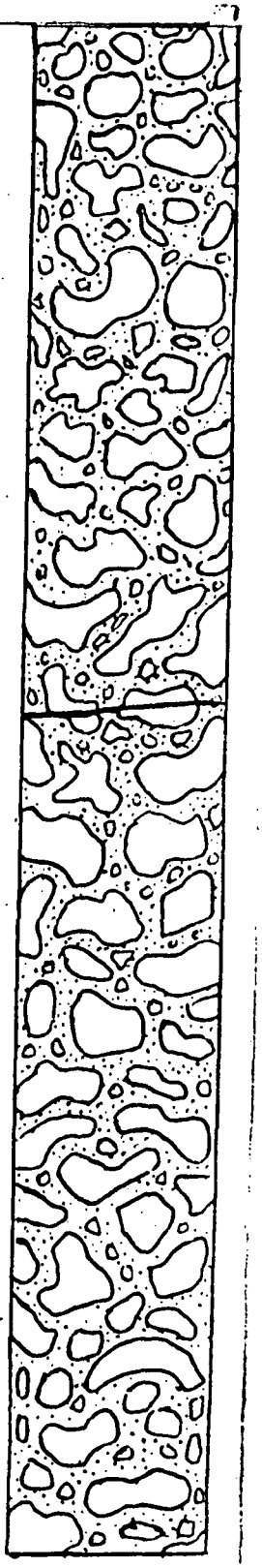
DEPTH INTERVAL	Footing	DESCRIPTION
2637'	L	LAPILLI TUFF (A/A)
	H	
	M	
	A	
	L	
	I	
	L	
		2654½' unit becomes lt.grey & horizontally-flattened lapilli (v.lt.grey, = fiamme?) increase
		2656½' A 6cm thick well-sorted layer of lt.gray coarse ash- to sm. lapilli-sized rock fragments with common wht & grn clay alteration followed by a 14cm thick bed of lt.gry consolidated ash size fragments w/ sparse vesicular andesite lapilli.
	A	
2657'		2657' ANDESITE BRECCIA
		med to med dk gry angular to subrounded lapilli & blocks (≤4') of porphyritic andesite (pyx → dk grn gry clay, ± plag. : 2-4%), in lt. yel brn to lt. olive brn to lt. red brn matrix of ash-size 17% mnr. xtals w/ common voids. Unit is a series of intervals of primary breccia (i.e. vol. breccia) tion (with vesicular lapilli & matrix) interspersed w/ blocks (v. thin flows? unvesiculated andesite w/ mnr. secondary/tectonic² fracturing (and may represent a margin sample of thin flows) Mnr wht clay in vesicles.
	M	
	I	
	M	
	L	
	A	
		2657'-2675' Zeolites commonly form drusy linings on intergranular voids & vesicles, cementing the rock together & suggesting laterally extensive interconnected fractures.
		2657'-2659' Rapid decrease in matrix fraction. Below top 2' breccia is clast-supported.
		below 2675' Decrease in matrix voids & zeolites (clr/wht)
2677'		



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTG-H1
FIELD CASCADES/CLACKAMAS
GEOLOGIST (S) McDANIEL/GOODWIN
BASIS binoc. microscope DATE July 18, 1986

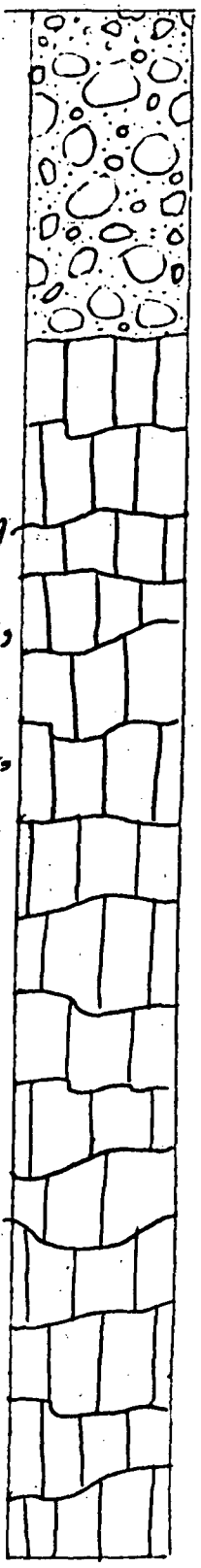
DEPTH INTERVAL	Fractures	DESCRIPTION
2677'		ANDESITE BRECCIA (A/A)
		2690'-2694' Notable increase in vesicularity & vesicle size (≤4cm) in scoriaceous blocks. Light amt. drusy zeolites and +/- pale grn gry/wht clay in voids. Contact marked by 23cm of brn grey coarse ash-size red brn, med gry, & dk. gry rock fragments, xtals & mnr. asl(?). (overall) Interval is normally graded & crudely bedded/laminated @ 70°.
2677'		2694' VOLCANIC BRECCIA
		Lt. olive gry to dk yellowish brn, lt. to med. gry blocks & lapilli-sz r.f.s. of mafic to intermediate composition in a matrix of ash-sz r.f.s., xtals (mnr.), dusky yellow to dk yellow palagonite, & v. fine asl(?). Minor localized crude bedding (thin beds) in matrix. Matrix --> clay
		@ 2694' contact marked by ~23 cm of ash sz rock fragments, lt's & minor ash. Interval is normally graded & crudely bedded & laminated, ~70° angle. (BLAST DEPOSIT?)
		2710' Percentage of rock fragments in unit decreases
		2712'-2718½' Small lapilli-to coarse ash-sz dk gry to dk. gry brn rock fragments in matrix of dk. yellow orange palagonite and mnr. xtals. R f.s often appear elongated & disrupted, as if deposited in a partially molten state. Subtle bedding based on clast size & matrix % variations. Blast deposit origin? Palagonite tuff?
2717		



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. macro-scope DATE July 15, 1986

DEPTH INTERVAL	DESCRIPTION
2717'	VOLCANIC BRECCIA (A/A) 2718' 12cm of dusky yellow to lt. olive brn v. fine ash-sz. f.s and Xtals. Palagonitic? Rare lapilli-sz. clasts. 2718.5' - Volcanic Breccia A/A @ 2694' with slight increase in clasts, mainly from b.a. unit beginning @ 2726'. Matrix color changes from dusky yellow to med. dk gry by 2719'. Rare clr. zeolite veins.
2726'	BASALTIC ANDESITE MED DK GRY, V. Finely porphyritic (7-8%). PHENOS: PLAG, PYX → CLAY, OL? LIGHT-MOD fracturing. Long (0.3m+) vertical to 20° fractures coated w/ pale grn & gry-ish grn, waxy clay. fracture surfaces show minor shearing. 2726'-2736.5' - flow top breccia: dk gry - gry brn - red brn porphyritic basaltic andesite (25cm - 1cm) fragments, often elongated/banded & disrupted, in mod red brn clayey matrix w/xtls, subtle banding. 2736.5'-2748' rock becomes pale red brn, less breccia, mnr cavities w/ drusy zeolite. Zeolites also fill hairline fractures. 2748' - rock becomes med dk gry as described above.
2737'	
2757'	



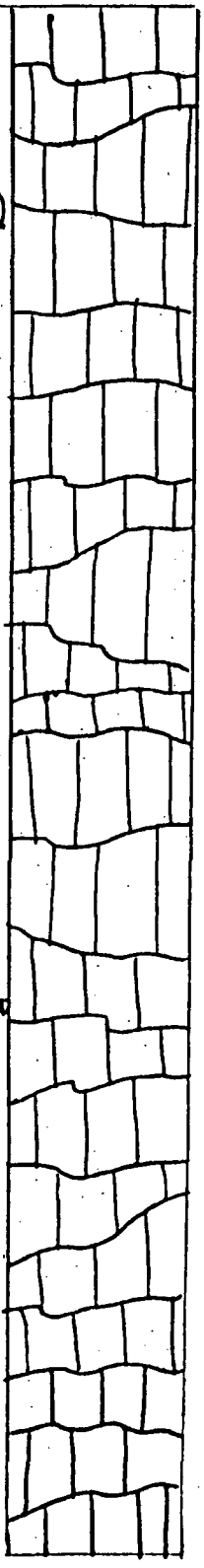
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOSSWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE JULY 18, 1986

DEPTH INTERVAL	DESCRIPTION
2757'	BASALTIC ANDESITE (A/A) (MED DK GRY, FINELY PORPHYRITIC: PHENOS OF PLAG, PYX, OL? FRACTURING LIGHT TO MODERATE, 20° TO VERTICAL. PALE GRN & DK GRYISH GRN CLAYS ON FRACTURE SURFACES, TYPICALLY SHOWING MNR SHEAR)
2777'	2782'-2786' ROCK BECOMES BRECCIATED (TECTONIC), BUT IS WELL CONSOLIDATED. BRECCIA FRAGMENTS ARE ANGULAR, CLOSELY SPACED, & SLIGHTLY ELONGATE (DUE TO FRACTURE DIRECTION) ALONG VERTICAL-SUBVERTICAL AXIS. NOT MUCH MOVEMENT ALONG FRACTURES. MNR CAVITIES W/ ZEOLITE. MNR MATRIX BETWEEN FRAGS OF DK GRYISH GRN CLAY, & LESS COMMONLY, WHT ZEOLITE. FORMING ≤ ½ CM SEAMS ON 30° TO 45° JOINTS WITH WAXY SHEAR (MINOR) TOWARDS BASE OF INTERVAL.
2797'	



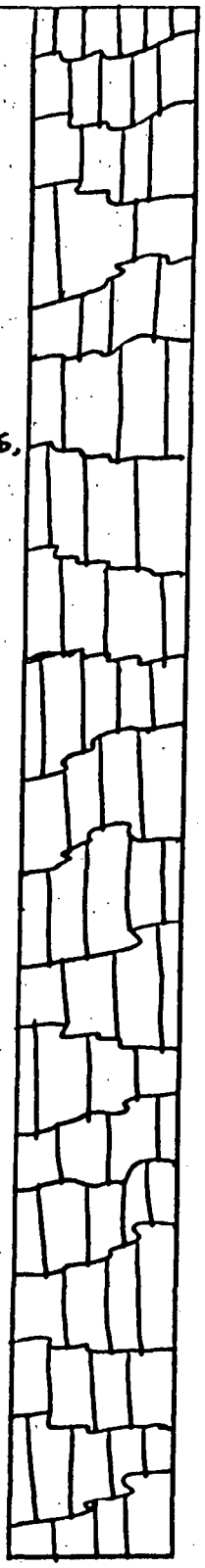
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES / CLACKAMAS

GEOLOGIST (S) McDANNEL / GOODWIN
BASIS Binoc. Microscope DATE JULY 19, 1986

DEPTH INTERVAL		DESCRIPTION
2797'	A ↓ L ↓ M ↓ A L H I ↓ H L M ↓ H M	BASALTIC ANDESITE (A/A) (med dk gry, finely porphyritic, phenos: pyx, plag, & ol.? light to moderate fracturing, most commonly 20° to 45° to ℄ with local sinuous vertical fracture. Pale grn & wht clays on fracture surfaces (often slightly waxy), typically showing minor shearing. V. short intermittent brecciated but consolidated intervals w/ clay vnlets ± rare zeolites (clr). 2806'-2810' Intensely fractured @ 30° ℄ to ℄ to vertical, splintery rock fragments <1"-6" long, heavy waxy shear ± clear zeolite ± pale grn/wht clay on sinuous to planar fracs.
2817'	H A L A M ↓ L A M A ↓ L H M L A M L	
2837'	M	



CORE DESCRIPTION

40 FOOT INTERVAL

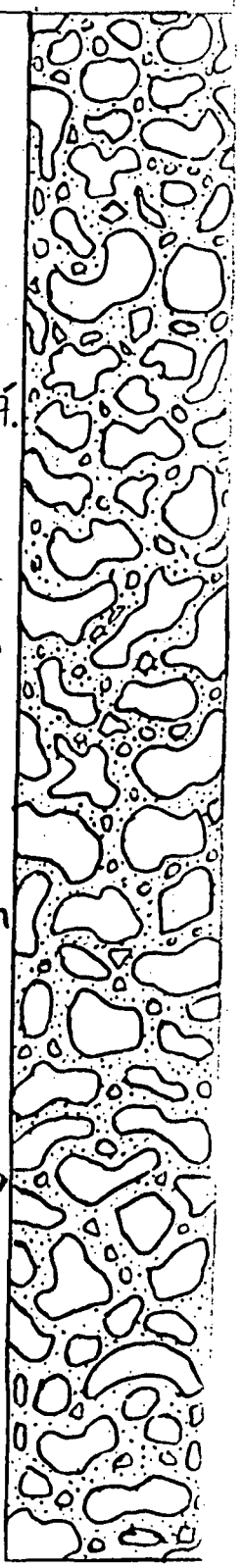
HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 19, 1986

DEPTH INTERVAL	DESCRIPTION
2837'	LAVA FLOW MARGIN **BASALTIC ANDESITE(A/A)** 2838' flow becomes oxidized & grayish red. Flow breccia appears by 2840.5. Decrease in fracturing & clays 2841.25'-2844': very fractured/broken. Vertical to sub-vertical fracture angle predominate. Drusy zeolites.
2842'	**VOLCANIC BRECCIA** (explosive origin) Rock changes character often over short intervals, but is predominately composed of angular to sub-rounded lapilli ±, less commonly, blocks, of md gry to dk gry mafic-intermediate lavas in a dk gry-brn gry to gry red matrix of smaller rock fragments a/a v. fine material → clay, ± xtls. Clasts are typically heterolithologic. Unit varies from clast to matrix supported. Intervals of dk gry basaltic andesite(?) showing evidence of deposition while still in a plastic, partially molten state (incandescent) (i.e. disrupted margins, flattening, stringers, rnr banding) in oxidized (primary) reddish brn matrix. Near top of unit there is crude, subtle, discontinuous bedding in matrix. Rare zeolites filling hairline fractures/cracks, rnr drusy coatings on frac. surfaces. Fracture variable, but most often at high angle or ~45°. gen. light.
2857'	2860.75'-2863' dk gry porph basaltic andesite, predom lapilli sz, showing plastic deformation (see above descrip) in fine pale brn matrix → clay + smaller basaltic andesite frags. 2863.5' - heterolithologic clasts predom mafic to interm composition but include altered (gray, silicic?) porphyritic lt grnish gray & fine(ly) banded (recrystal?). Some
2877'	

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CT611-1 GEOLOGIST (S) GOODWIN/MCDANIEL
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 19, '86

DEPTH INTERVAL	Fracturing	DESCRIPTION
2877'	I L A L H M L I H M I A L M I M H I L A	VOLCANIC BRECCIA (A/A) 2869.5' cont'd: Clasts show plastic deformation. Oxidized reddish matrix shows minr banding (as if deposited in molten state) 2876' - sheared & broken. Sheared, waxy surfaces. Variable shear/fracture angles. 2877.5'-2879' small lapilli sz gry & dk red brn rock frags (heterolithologic) in minor matrix of dusky yel-dk yel org clay (palagonitic?). Thin bedding, laminations @ 2876-2877. 2878'-2880' unit v. sheared & broken, predominately along short high angle fractures. waxy, sheared surfaces 2880'-2897' dk yel brn to dk yel orange matrix, interval characterized by two interbedded units grading into one another repeatedly: (1) a lapilli-rich interval w/ 2-25 mm rounded lapilli, mainly dk. yel. brn & altered to clay & (2) larger more angular lapilli of mafic & intermed. comp. in a matrix of v. fine ± palagonitized rfs & clay (wht) w/ minr xtals pyx, plag., FeOx (blk min). Rare frac @ 30° to ℄ w/ lt. shearing of clays & v. rare zeolites
2897'		2896'-2903' Sinuous subvertical fracture & poorly developed 30° conjugate fracture set (locally), lower ½ is rubbly, common shearing on fractures, v. lt. wht & grn gry clay Below 2897'-2955': matrix color dusky yellow grn, change in Fe oxidation state? 2906'-2907' thin interval with characteristics of hot deposition: blk & reddish gry matrix w/ v.f. palagonitized rfs & smaller lapilli among larger basaltic andesite lapilli/blocks 2909'-2916½' Several rubble zones (≤2' thick) in interval, matrix color: dirty brn, rock has v. irreg. break & is sometimes friable, probably shear-related condition; lt. clays & zeolites in fracs (v. rough conj. frac set @ 35°)
2917'		



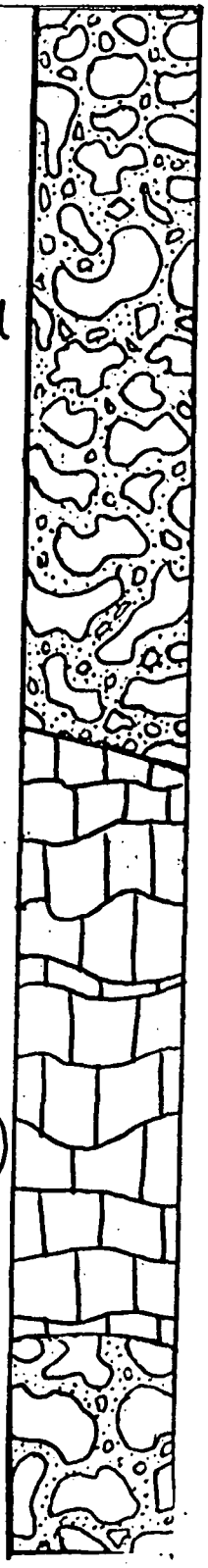
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc microscope DATE July 20, 1986

DEPTH INTERVAL	fracturing	DESCRIPTION
2917'	LALLAMHMHMHLAMHIHMLILALAIAALAMI	VOLCANIC BRECCIA (A/A) 2916½' matrix color varying from dusky yel. grn to dk yel. brn w/ both matrix & clast-supported intervals 2925' matrix color: dk yel. brn, matrix appears to flow around larger constituents in matrix-supported interval; hot & fluid deposition suggested 2930'-2933' Vertical fracture present w/ rubble at base of interval 2935' reverse graded base of breccia unit: ash-sized & lapilli n.f.s, lightly sheared @ 45° to ¢ w/ brn clay vn along shear (= fault contact?), crudely bedded @ 90° to ¢ 2934'-3935' laminae & thin beds of predominately ash sized rock fragments. Bedding is horizontal to ~45° to ¢.
2937'		2935' BASALTIC ANDESITE Md gry to dk md gry, finely & sparsely porphyritic (≤1%), phenos: plag, pyx. Rock has mottled grey appearance. Grades into oxidized mod red & red gry: flattened, elongated, irregular disrupted margins of med dk gry basaltic andesite in oxidized basaltic andesite. (Pyroclastic mat.) (@2937')
		2951.5' VOLCANIC BRECCIA (see following page)
2957'		



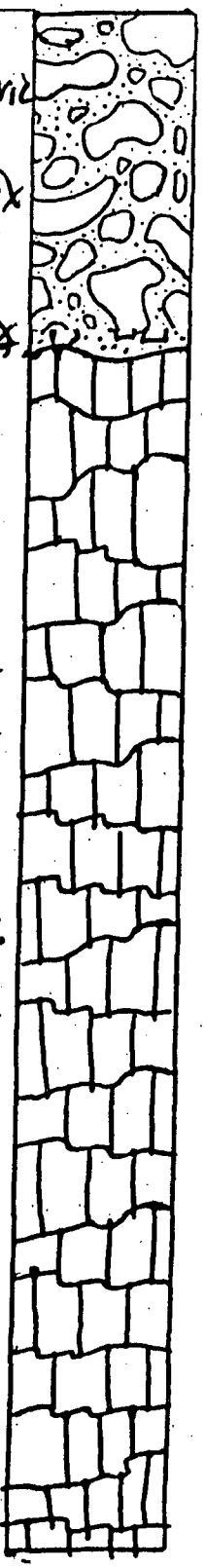
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. MICROSCOPE DATE July 20, 1986

DEPTH INTERVAL	(fracturing)	DESCRIPTION
2957'	I	VOLCANIC BRECCIA (A/A) Angular to sub-angular lapilli sz clasts of porphyritic-aphyric mafic to intermediate lavas & less commonly, ltgry to v.lt. gry clasts (some nowclay) which may be more silicic. Matrix is greenish blk coarse to fine ash sz rock frags. a/a. Unit is predominately clast supported. Graded bedding at 2954' & 2956'. Unit is v. fractured, usually along subvertical to 30°& Polished, sheared surfaces. Minor pale grn & pale blue clays on frac. surfaces.
	M	
	H	
	I	
2965.5'		BASALTIC ANDESITE med gry to dk gry to brngry, finely & commonly sparsely porphyritic (2-5%), phenos: plag pth wht clay, pyx → grn clay, common mottled appearance, due to brecciated but consolidated rock: dk gry to brnish gry sm. blocks & lapilli-sized B.A. frags. (w/generally disaggregating boundaries) blend (orange brn to reddish brn) into matrix of ash sz B.A. frags, xtals plag & pyx, & bright orange, wht, & red brn clays. Mottling is more subtle and matrix is sparse above 2979'. Below 2979' matrix increases to 20%-50% and fine fracturing of lapilli w/ sm. valets wht clay is common. Pervasive mod. matrix clay alteration. Fractured intervals w/ shear surfaces, typically 30°-45°&. V. Minr gry grn clay on surfaces. 2979½'-2984' intermittent rubble, 30°-45° fracs most common w/ irreg breaks ⊥ to &
	L	
2977'	M	
	H	
	I	
	M	
	L	
		2994'-2998½' basaltic andesite interval, unbrecciated- w/ soft lt. gry clay in vertical fracture at 2994', mod. clr drusy (& coating) zeolite on fractures
2997'		



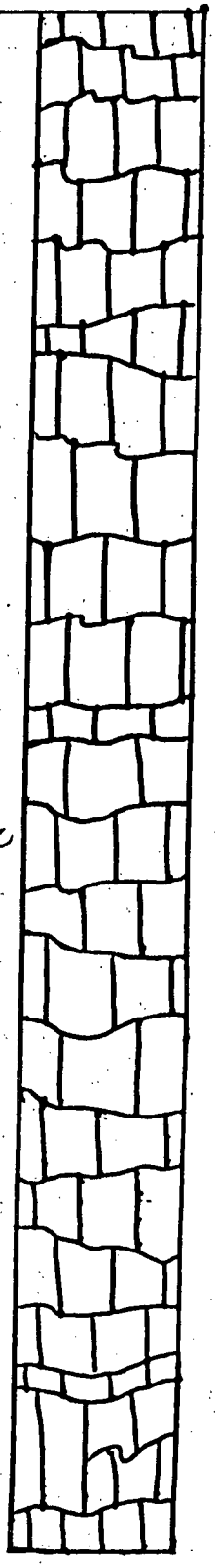
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE July 20, '86

DEPTH INTERVAL	Fracturing	DESCRIPTION
2991'	L	**BASALTIC ANDESITE (A/A)**
	M	below 2998½' mottled appearance, brn gry & dk gry B.A. lapilli sized frags. in orange brn to red brn matrix a/a, sparsely porphyritic (fewer pyx.) (This feature ends ~3001', when flow becomes med. dk grey.) (Pyroclastic breccia)
	L	3003' rock appears more open textured. Increase in vesicles. Clays (grn gry, white, pale blue, gry grn) fill vesicles & intergranular voids.
	M	
	L	
	A	
	L	
	H	
	M	3014' - began to find yellowish grn - gry grn inclusions (2-4 cm) composed of pyroxene & minor plagioclase + clay (green).
	H	
3017'	L	3016½' rock becomes slightly scoriaceous & becomes increasingly scoriaceous by 3018', showing red brn oxidation. Rock is slightly less consolidated & breaks easily. (Pyroclastic breccia interval)
	M	
	L	
	M	
	L	
	M	
	H	
3037'	H	



Diamond Shamrock
Thermal Power Company

Form 2

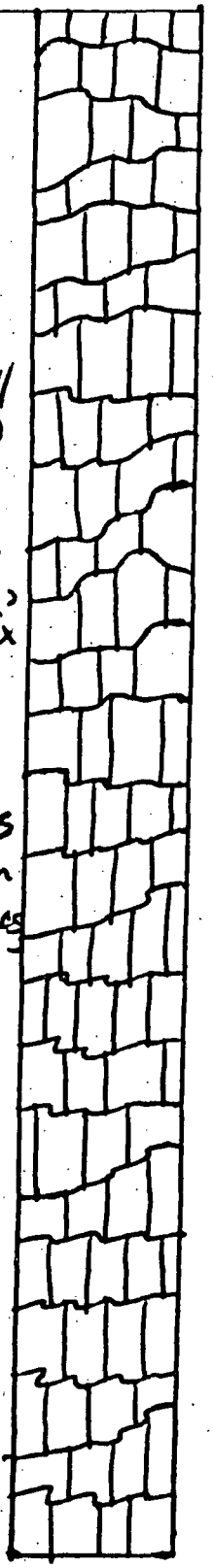
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANIEL

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE JULY 21, 1986

DEPTH INTERVAL	(fracturing)	DESCRIPTION
3037'	ML ↓ ML	**BASALTIC ANDESITE (A/A)** rock fragments commonly porous & scoriaceous, fractures easily, brecciated but consolidated, most common frac. @ 45° w/ no shearing, v. lt. pale blue & dk grygrn clay in frac's., common unfilled vesicles (≤ 1.5cm) overall v. little alteration exc. lt. clay alteration of matrix & pyx → clay
		3047½'-3048½' Rubbly interval, several vertical fracs. w/ one continuing to 3051', mod. brn clay (easily washed away)
	I ↓ MLA ↓ LLH	3054'-3069' Scoriaceous rock absent through interval, @ 3054' rock becomes matrix-supported w/ increase matrix
3057'	I ↓ H ↓ I	3057'-3067' unbrecciated med. gry basaltic andesite, commonly rubbly w/ sinuous vertical-subvertical fractures & frac @ 40°, light clay (pale blue, dk grygrn) on fracs which often have irreg. break, v. light drusy zeolite in voids/fracs pervasive light matrix clay alteration (grygrn)
	I ↓ HML ↓ AM ↓ AL	@ 3067' return to brecciated but consolidated blocks & lapilli-sz b.a. in red brn matrix (A/A), commonly scoriaceous, little alteration exc. light clay alteration of matrix, frac @ subvertical & 45° w/ no or v. light pale blue & grygrn clay 3068½'-3072½' 8" intensely oxidized red brn scoria followed by brn gry → med gry unbrecciated b.a. A/A (contact?)
3077'	I ↓	



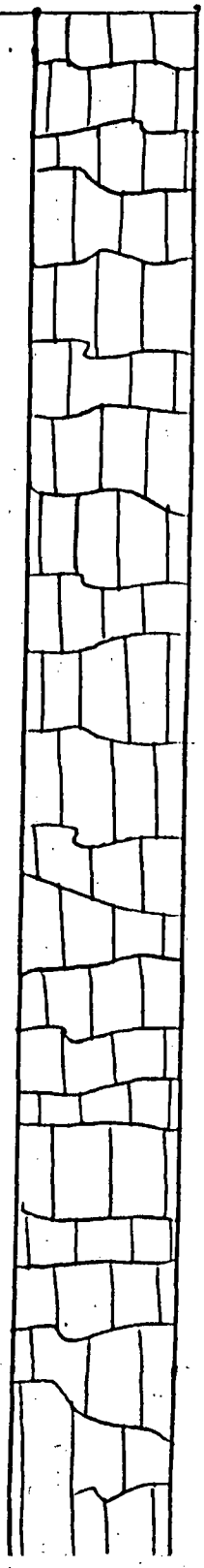
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL / GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE JULY 22, 1986

DEPTH INTERVAL	Fracturing	DESCRIPTION
3077'	I L A L L I L I L I L A L A A L A L I M A L H L H L M L M H	**BASALTIC ANDESITE (A/A)** brecciated but consolidated ba. blocks (much less common) & lapilli-sz r.f.s in med brn to red brn matrix a/a, generally light fracturing (often irregular), light pale blue & dk gry grn clays in vesicles and coating fractures, common scoriaceous texture, locally rubbly & light clr zeolite in vesicles, pervasive lt. matrix clay alteration 3076'-3079' rubbly, vertical frac intersecting irreg break ⊥ to ¢ in fragile/scoriaceous interval, slt. increase brn clay 3087'-3088' rubbly
3097'		3107' - ROCK BECOMES LT-MED GRY, DENSE — i.e. NO LONGER SCORIACEOUS. FRACTURING PREDOMINATELY VERTICAL, LESS COMMONLY 45°
3117'		3114' - FRACTURING INTENSIFIES. GRAYISH GREEN CLAY V. COMMON ON FRACTURE SURFACES & IN CRACKS & SMALL VOIDS. FRACTURING PREDOMINATELY VERTICAL TO SUB-VERTICAL, LESS COMMONLY 45°.



Diamond Shamrock
Thermal Power Company

Form 2

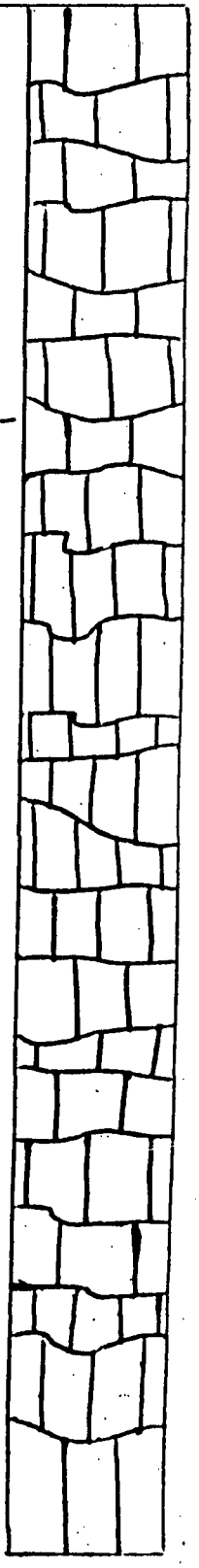
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANIEL

FIELD CASCADES/CLACKAMAS BASIS BINOCULAR SCOPE DATE JULY 22nd, '86

DEPTH INTERVAL	DESCRIPTION
3117'	BASALTIC ANDESITE (A/A)
	3122'- FRACTURING & CLAY DECREASE
	3126'- VOLCANIC BRECCIA ROCK RESUMES PREVIOUS COLOR (MED DK GRY-DK GRY) & BECOMES SCORIACEOUS AGAIN - MNR RD BRN SCORIA IN BASALTIC ANDESITE LAVA. MNR PALE BLUE CLAY.
3137'	
	3140'- ROCK BECOMES LT-MED GRY, DENSE; INTENSIFIED FRACTURING W/GRYISH GRN & GREENISH GRY CLAYS (AS ABOVE @ 3114-3126).
	3146'- AS ABOVE @ 3126'
	3148'- COATING OF BOTRYOIDAL SILICA ON FRACTURE/VOID WITH WHT CLAY INTERLAM'S PTLLY FILLING VOID
	@ 3154' conjugate fracture set @ 15° to ℄ & sinuous vertical fracture, slt. increase clay, consolidated v. poorly
3157'	



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. scope DATE JULY 23, '86

DEPTH INTERVAL	*Fracturing	DESCRIPTION
3157'	LMI↓HML↓ALA↓LMLA↓LMI↓ALA↓LM↓H	**BASALTIC ANDESITE (A/A)** 3157'-3161.5' med dk gry, unbrecciated, dense, sparsely porphyritic (plag & pyx phenos.), pilotaxitic g.m., often intensely frac'd., common lt. coating pale blue gry (dry) & wht (& dk gry grn (wet)) clay on fracs & coating vesicles, rare vnlets clay + quartz, clay commonly botryoidal, most common fracs @ 30° & ~vertical 3161.5'-3173' brecciated & consolidated lapilli- & blk-sz ± scoriaceous b.a. in or- to red-brn matrix a/a, clast-supported except at boundaries of interval where matrix% exceeds 50%, decrease in fracturing & clays 3173'-3177' dense & unbrecciated, frothy top w/ decrease in vesicles w/ depth, lt. frac. w/ predom. fracs @ 30° & 60°, lt. clays a/a (@ 3157'), 2cm breccia seam in middle of unit, rare plag-pyx clots (≤0.5cm) Unit may represent a single thin flow.
3177'		3177'-3181.5' brecciated but consolidated (same as 3161.5') finely scoriaceous lt fs 3181.5'-3184.5' dense basaltic andesite, fracs @ 15°-45° near basal rubbly zone 3184.5'-3189.5' brecciated but consolidated, no scoria, botryoidal pale blue clay in voids (light), rare vertical veinlets w/ clr zeolites, increase in gry grn matrix clay in basal ½ of unit, lt. shearing of 1-45° frac 3189.5'-3197' dense, generally unbrecciated, local alignment of sm pits filled w/ clay @ 45° = incipient platy parting?, fracs variable: sinuous subvertical most common w/ lt. amt. wht/pale blue clay (botryoidal), large (≤2") angular voids basal 1½' of unit, partially filled w/ wht botryoidal silica (= clay + silica), minr silica vnlets
3197'		*Fracturing: A=absent L=light M=moderate H=heavy I=intense

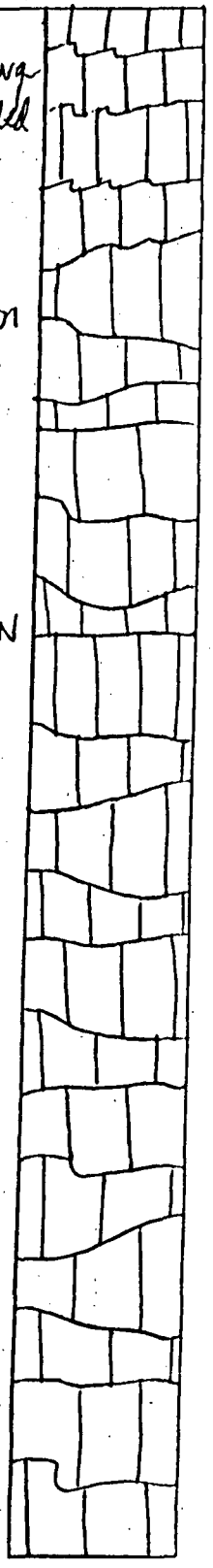
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) MCDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 7/23/86

DEPTH INTERVAL	fracturing	DESCRIPTION
3197'	H M A ↓ L A M L ↓ M L M L	BASALTIC ANDESITE (A/A) a series of thin (3'-15') layers of massive med gry porphyritic lava & brecciated but consolidated intervals of commonly med gry subrounded lapilli-sz r.f.s of b.a. in a red brn to med brn matrix of ash sz rfs & Xtals of plag & pyx. 3197' subtly brecciated but cons. b.a. a/a, common scoriaceous rfs, v. lt. amt. pale blue/wht (dry) clay on fracs & in voids, common lt. matrix clay alt., frac. & most common = vertical (sinuous & irreg. break)
		3205.5' ZEOLITES COMMON AS DRUSY COATING OVER/ON BLUISH GRAY CLAY ON FRACTURE SURFACES & IN VOIDS
3217'		
		3214'-3240' VOIDS UP TO 5 CM COMMONLY THIN CLAY COATINGS, ± ZEOLITES.
3237'	L A M	



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 7/23/86

DEPTH INTERVAL	DESCRIPTION
3237'	BASALTIC ANDESITE (A/A)
	3244' - 1 vein opalescent pale blue qtz in frac previously coated w/ clay s/a
	3246'-3248.5' ~VERTICAL TO 45° FRACTURE
	3248' - TR DISSEMINATED V. FINE, THIN, SOFT, GOLD-COLORED MINERAL ON FRACTURE W/ ZEOLITE & BLUISH GRY CLAY
	3252.5'-3257.5' irregular sub-vertical & 30° fractures w/ tetryoidal ltgry to ltbluegry to pale grn clay (± v.lt. zeolite - less common), ruddly @ 3254'-3255' (in dense lava unit)
3257'	3257.5'-3263' : consolidated breccia w/ finely scoriaceous r.f.s. (≤ 1.5cm voids) w/ v. light amt. clay (exc. pervasive matrix clay alteration - mod. amt.)
	3263'-3267' dense lava, common fracturing w/ increased amt. clays (but still v. light): wht & pale grn & pale blue (± pale grn/ clear zeolite) coating fractures, R opalescent quartz in vn @ 3265', vesicles & pits intermittently ptly to completely filled w/ clay s/a
	3274'-3279' dense lava, commonly frac'd @ 30°-45°, very light amt. clay for dense lava interval; no intense fracturing
3277'	

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Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 7/24/86

DEPTH INTERVAL	DESCRIPTION
3277'	**BASALTIC ANDESITE (A/A)**

A series of thin (3'-15') layers of massive dense porphyritic lava and consolidated breccia intervals (breccia (pyroclastic) intervals commonly consist of med gry subrounded lapilli sz lava rock fragments in a red brn to mod. brn matrix of ash sz r.f.s and xtals of pyx & plag). Brecciated intervals are commonly thicker, less fractured, & often have less secondary mineral deposition in available voids. The breccia is commonly porous but pervasive lt. to mod. matrix clay alteration may result in less permeability than the dense lava which has less porosity (though it is commonly vesicular at borders) but is usually lightly to moderately fractured. Apparently the interconnection of these fractures is fairly good. Light amounts of clay (a/a) & zeolites & rare quartz veins are found in the unbrecciated but fractured dense lava intervals.

3279'-3289' breccia a/a, unfrac'd w/common scoriaceous r.f.s, lt-mod. lt. gry to mod brn clay, intermittent ptl to complete filling of vesicles by clay.

3289'-3293' dense lava w/lt. amt lt. gry to lt. blue gray clay ± v. lt. amt lt. grn/clr botryoidal zeolite on clay

3293'-3302' same as 3279'-3289' - volcanic breccia

3302'-3308' dense lava, platy frac. @ 75° to ℄ and less common vertical fracture with lt. amt. lt. blue gry & gry grn clays

3308'-3334½' Volcanic Breccia

3297'

3317'

Diamond Shamrock
Thermal Power Company

Form 2

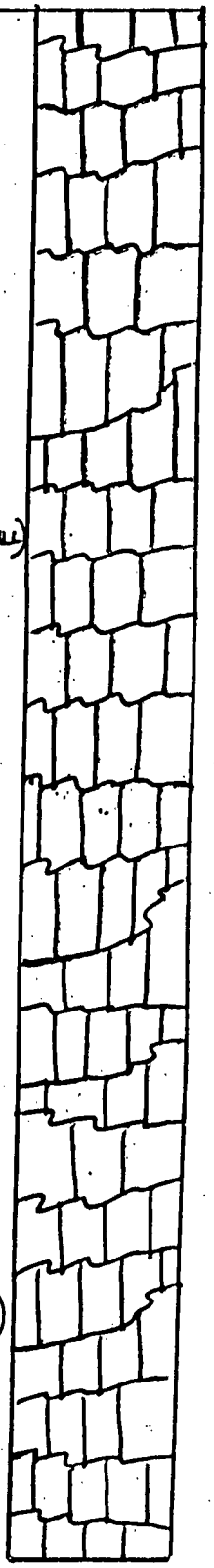
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. scope DATE 7/24/86

DEPTH INTERVAL	DESCRIPTION
3317'	BASALTIC ANDESITE (A/A)
	3319' microscopic, thin, malleable plates of copper-colored metallic mineral
	3324' R botryoidal silica in void w/ lgrn gry clay, vertical fracture at this interval w/ coating of botryoidal dusky yellowish grn clay overlain(?) by dusky grn clay w/ drusy coating of soft, clr, microxtalline (zeolite?) mineral. common pale blue clay. R. v. fine disseminated phyllosilicate - dk. grn to dk grey ... chlorite?? (SUPERFICIAL MATERIAL WASHED INTO DRILL HOLE, ACCOMPANIED BY FINE SAND.)
	3329' R copper-colored mineral occurring as @ 3319', lt. shear ofracs @ 15°-30° w/ lt. to mod. amt ltgry to lt. bluegry clay
3331'	3335'-3337.5' dense lava, @ 3335' (≤ 2cm voids) w/ clr. silica ptlly filling voids on top of botryoidal gry-grn clay (+ zeolite?)
	3337.5'-3339' brecciated a/a, no unusual mineralization
	3339'-3352' dense lava w/ pilotaxitic g.m texture, plag & pyx phenos., unit v. frac'd to 3347' w/ fracs @ subvert. to 75°, lt. blk to gry-grn clay (w/ shear) on fracs, orange & yellow oxides form films on fracs. and (≤ 6") halos in unfrac'd rock below 3345'
	3350' microscopic, thin, irregular golden flecks (tarnished w/ lt. grn) - unidentified metallic min. occurring as v. finely disseminated grains on fracture surface w/ clays. (NATIVE COPPER)
3357'	



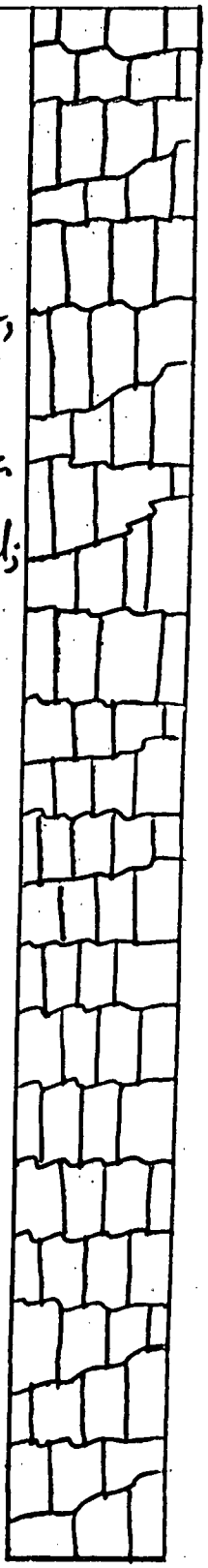
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. scope DATE 7/24/86

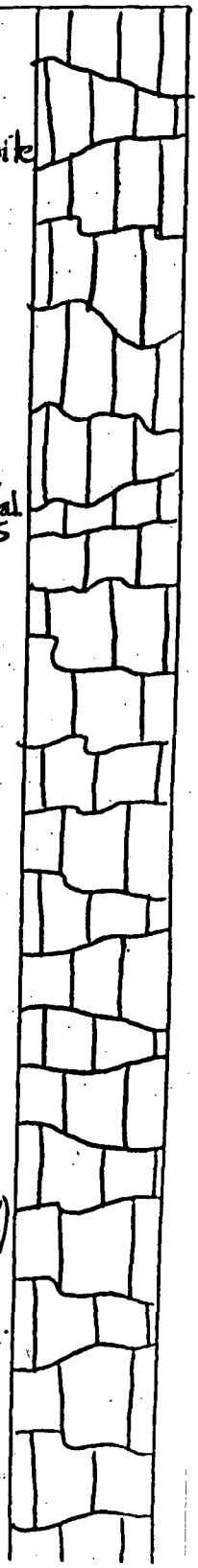
DEPTH INTERVAL		DESCRIPTION
3357'	L ↓ M H L A	BASALTIC ANDESITE (A/A) 3356.5'-3360' dense flow w/ local platey parting, vesicular top, frac. variable, most common subvert. & irreg., lt. amt botryoidal pale blue gry to v. lt. gry zeolite? and clay on fracs. (v. soft coating) 3360'-3373' brecciated but consolidated, common sconaceous r.f.s, v. lt. amt clay-zeolite botryoidal frac./vesicle coating a/a, v.f. clr drusy zeolite coating frac. @ 3373', vesicles commonly filled ptly w/ mod. brn to gry grn clays 3373'-3379.5 gry-grn clay coating fracs., rarely sheared, frac attitude commonly subvert to 75°, local yellow and orange oxide forms films adjacent to fracs & on fracs. in this dense flow interval; @ 3379.5' silica vn in assoc. w/ pale blue gry to wht clay in subvertical fracture
	M ↓	
3377'	H L L M L ↓	
	A M L ↓ M ↓	3383'-3395' dense lava, rare v.f. disseminated copper-colored metallic flakes on botryoidal frac. coating of (zeolite?) + pale blue clay. Grayish blue grn, waxy clay & v. pale blue clay coat fracture surfaces, fill fractures & small voids. Mnr, dusky yel grn clay, Also. Mnr dusky yel ("glauconitic") & red/brn oxidation stains follow hairline fractures. Microscopic, irridescent spots on fracture surface appear to be metallic, but are soft & break easily into small, thin plates of yel/org color. Vertical-sub-vertical &, less commonly, 60-70° fractures pervasive.
	M ↓ H M	
3391'		



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANIEL
FIELD CLACKAMAS/CASCADES BASIS BINOCSCOPE DATE JULY 25, '86

DEPTH INTERVAL	fracturing	DESCRIPTION
3397'	L A L A L A L A L A L M A L M M L A	**BASALTIC ANDESITE (A/A)** (pyroclastic) 3395'-3421'- Return to volcanic breccia- lapilli & blocks of scoriaceous/vesicular/dense basaltic andesite in basaltic andesite matrix. Vertical to sub-vertical fracture persists, w/lesser 60°-70°, but is not as intense as above. Common pale blue to v. pale blue clays on fracture surfaces & loose intergran voids. Less common grayish blue grn clay (a/a), & gry blu grn & gry grn. Clays(?) often have fine botryoidal form & may or may not be coated by v. fine, drusy coating of soft clear mineral (zeolite?). Also, clear botryoidal mineral on frac. surfaces. Mnr silica. Sequence of clays loose voids: lt blue, green, clear mineral (a/a). Mnr copper mineral 3399.5'- very soft, clear foliated mineral in small voids on cut surface of core = gypsum? Trace amounts. (zeolite)
3417'		3421'-3434.6'- return to dense, med gry, b.a. lava. Plag, pyx, ol? Most of mafic minerals → clay. Mnr flow banding produces fracture ~ 75°-80°. Silica veinlets ~ horizontal. Silica appears to be increasing on fracture surfaces, in voids & ≤1cm veins, often in botryoidal-mammillary form. Lt. blue & gry blue grn on fracs & in vessicles, voids. Less common gry grn clay. Trace copper colored mineral as described above (3383'-3395') occurs as thin, malleable flakes & as flat wire-like form.
3437'		



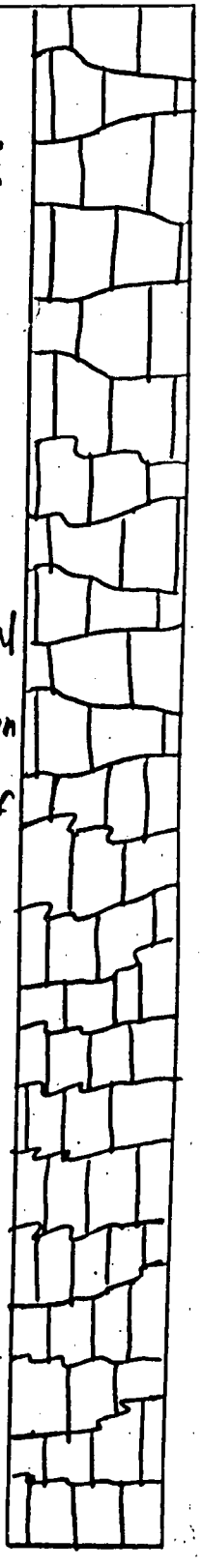
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CLACKAMAS/CASCADES BASIS BINOC SCOPE DATE 7/25/86

DEPTH INTERVAL	DESCRIPTION
3437'	**BASALTIC ANDESITE (A/A)**
	3434'-3443' Return to volcanic breccia a/a, common pale yellow gry and very pale grn clay ptlly to completely filling 50-70% of sm. vesicles, larger vesicles (3-15mm) often contain clr zeolites as drusy coatings on lt. blue gry to lt gry botryoidal clay, opalescent silica is less common except in the largest cavities (≤2½cm) where it is selectively deposited, often in close association w/ wht clay eg. 3438' & 3441' bg. At 3438' silica fills a 1½cm cavity and 6" away a 2½cm cavity contains only botryoidal clay & the clr drusy zeolite.
	3443'-3451' Return to dense med gry b.a. lower frac. commonly @ ~75° & subvertical (& sinuous), clays occur a/a, silica restricted to 1 vein @ 3448' (2mm x 40mm, sinuous & subhorizontal), rare microscopic copper-colored metallic min. occurs as v.f. disseminated flakes on clays in fractures. Limonite minr @ 3451'.
3457'	3451'-3455' volcanic breccia w/ clays a/a, @ base of interval silica occurs in fracture above a 1mm layer of grn gry clay & below a 3mm layer of wht clay. Silica is 1mm layer & all are horizontal in partially-filled void.
	3455'-3459' dense lava; platy partings @ 60° in middle of interval, lt. clay on fractures a/a, rare v.f. finely disseminated microscopic copper-colored min. occurring a/a; blue gry to milky silica as short veins (≤1½cm x ≤2mm) & filling vesicles & associated w/ lt. blue gry and grn gry clays on fractures. Common botryoidal clr zeolite on dk gry grn clay in other vesicles. Clays >> silica > zeolite. Silica assted w/ subvertical fracture through this thin unit.
	3459'-3480½ Return to breccia; mod brn & gry grn clays in vesicles a/a, to 3471' intermittent v.lt. blue botryoidal silica assoc. w/ wht clay on frac & in larger (≤2cm) vesicles on top of gry grn clay, milky & pale blue varieties are commonly horizontally banded (1-5mm bands) in ptlly filled cavities, many voids remain v. lightly mineralized w/ gry-grn clays & drusy clr zeolite w/o silica, below 3469' subtle increase in clay content of matrix (gry grn) & in zeolites
3477'	



Diamond Shamrock
Thermal Power Company

Form 2

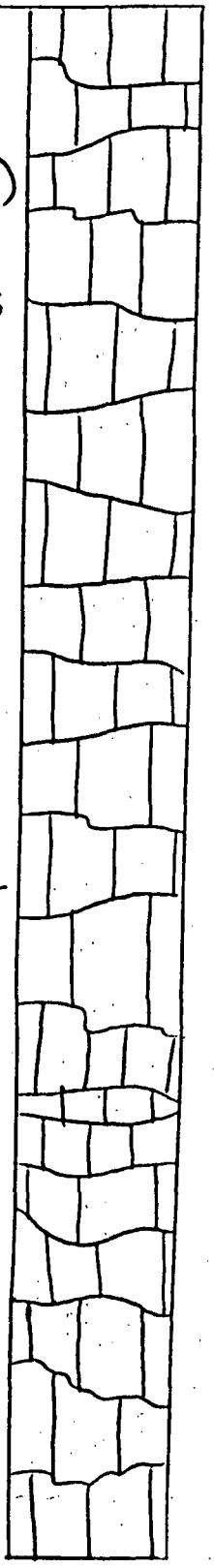
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) GOODWIN/McDANNEL

FIELD CLACKAMAS/CASCADES BASIS binoc. 'scope DATE 7/26/86

DEPTH INTERVAL		DESCRIPTION
3477'	A ↓ M ↓ H	BASALTIC ANDESITE (A/A) 3480½' - 3492' Return to dense lava (finely porphyritic b.a. w/ 5% plag & pyx → gry grn clay, pilotaxitic g.m.) increasing silica (pale blue & milky) in voids and as (≤ 5mm thick x ≤ 30cm) vns filling common sinuous subvertical fractures, some of pale blue silica has botryoidal/mammillary texture and is hydrated/opalescent. Clay adjacent to silica in large (≤ 3-5 mm) vesicles is silicified (ptly). @ 3481' clr zeolite forms microstalactites in void above silica pooled at base of narrow 5" fracture, both form on top of grn clay
	L	3492' - 3517' Return to VOLCANIC BRECCIA 3488' ROCK BECOMES VESICULAR & PASSES INTO VOLCANIC BRECCIA ~ 3492. (VOLCANIC BRECCIA COMPOSED OF LAPILLI & BLOCKS OF BASALTIC ANDESITE, COMMONLY SCORIACEOUS OR VESICULAR & MAY SHOW SUBTLE RED BRN OXIDATION, IN MATRIX OF BASALTIC ANDESITE), VESICLES FILLED W/ GRY BLUE GRN CLAY & PALE BLUE CLAY*, MNR WHITE CLAY. BLUE & GRN CLAYS MAY BE BOTRYOIDAL (NOT AS COMMON IN THIS INTERVAL AS ABOVE) & COATED W/ CLEAR, FINE, ZEOLITE*? (PALE BLUE CLAY OFTEN COATS GRY BLUE GRY). MNR SILICA IN VOIDS & SUB-VERTICAL VEINLETS. TR. V. SOFT FOLIATED MINERAL. TR COPPER. CLAYS IN THIS INTERVAL APPEAR TO BE LESS THAN INTERVALS ABOVE (i.e. ~3385')
	M A L L A	
3497'		
	M ↓ A L	
3517'		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL

FIELD CLACKAMAS/CASCADES BASIS BINOC SCOPE (20x MAX) DATE 7/26/86

DEPTH INTERVAL	Fracturing	DESCRIPTION
3517'	A L H L ↓ A M L M ↓ H ↓ M L A ↓ L A ↓ L	**BASALTIC ANDESITE** 3517'-3532' RETURN TO DENSE BASALTIC ANDESITE LAVA: FINELY & SPARSELY PORPHYRITIC. PHENOS OF PLAG, PYX, OL? (IDENTICAL TO PREVIOUS LAVAS-SINCE 29656). INCREASE IN FRACTURING & CLAY OVER PREVIOUS INTERVAL (3438-3517'). FRACTURING FREQM. SUB-VERTICAL & LESS COMMONLY, 46°. FRACTURE SURFACES HAVE LIGHT CLAY COATING: GRY BLU GRN, GRY GRN, PALE BLUE, WHT. PALE BLUE USUALLY COATS UNDERLYING GRY BLU GRN & MAY IN TURN HAVE A DRUSY COATING OF FINE ZEOLITES. CLAYS MAY EXHIBIT BOTRYOIDAL FORM. SiO_2 FORMS SHORT VEINLETS & OCCURS AS/ BLUE GRN IN VOIDS. V. RARE COPPER. MINOR SHEAR ON FRAC. SURFACES. 3532'-3538' VOLCANIC BRECCIA AS ABOVE IN 3438'-3517'. THIS INTERVAL CONTAINS GREATER RED BRN OXIDATION (PRIMARY). RARE FRACTURES @ 45° to ℄ W/ LT. SHEARING OF CLAY. COMMON PALE GRY GRN.
3537'	A L ↓ A L M L A ↓ L A ↓ L	CLAY in FINE VESICLES W/ CLR, DRUSY, SLIGHTLY BOTRYOIDAL ZEOLITE ON TOP OF CLAY (Both < 1mm thick coatings), est. 10% of ROCK is VOIDSPACE W/ ~80% filled W/ CLAY & ZEOLITES in this interval. This is well above the average % of filled VOIDS 3538'-3546' VOLCANIC BRECCIA changes character: fractured dense dk gry b.a. (pilotaxitic g.m., sparse & finely porphyritic W/ plag >> pyx + ol? phenos) with gry-grn clay ± ptlly silicified wht to bluish gry clay filling in the irreg, angular (≤1') cavities between r.f.s (that often fit together across the frac's - indicating less relative movement of r.f.s than upper unit @ 3532'). Inter r.f. material commonly is 2ndary. Irregular frac attitudes W/ cmn. sinuous break. Drusy zeolites on clay a/a. Rare microscopic copper colored min. a/a. @ 3542' grn clay is covered by pale blue clay which is covered by a platy clr zeolite & an opaque wht spherulitic?. or botryoidal zeolite in a ≤1cm vesicle. Uncommon 2-3mm wht silica vnlets. Overall lt. silica < zeolites < clays (which are v. lt on fracs. & lt to mod. as void fillings)
3557'		

Diamond Shamrock
Thermal Power Company

Form 2

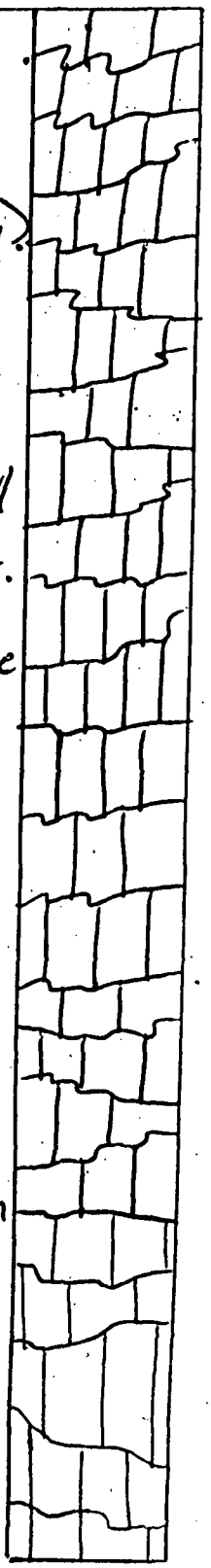
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES / CLACKAMAS

GEOLOGIST (S) McDANNEL / GOODWIN
BASIS BIN. MICROSCOPE DATE JULY 21, 1986

DEPTH INTERVAL		DESCRIPTION
3557'	A L A L A L A L A L A L M L A L A L A L A A A	BASALTIC ANDESITE (A/A) 3546'-3559' Return to Volcanic Breccia w/ 3532' character except red-brn matrix is less abundant. (Above 3549') Interval is matrix-supported w/ common gry grn coloration (due to ≤3" thick layers of fine ash-sz rfs (altering) → grn gry clay more commonly) light amt clr platy zeolite on fracs, botryoidal pale gry due to lt gry clay + zeolite?. in cavities (<2cm). Intermittent wht silica in ≤2mm vesicles (less common than clays, zeolites)). 3559'-3561½' Amygdular b.a. w/ gry-grn clay >> wht silica as vesicle filling material. Silica clearly postdates clay. 3561½'-3571' consolidated breccia a/a, relatively unfracd w/ fracs @ 45°-75° w/ lt. clay shear locally, increase in clr zeolite abundance in available sm. vesicles (≤1mm) but still light amt. rare silica (5mm vn) @ base of interval. Fracs occurring w/ or w/o clay a/a. This is notably lighter than clay occurrence 100' uphole. 3571'-3576½' dense b.a. flow, fracs @ 30°-45° w/ lt. to no clay a/a. Lt. gry clay & zeol? in vesicles are common. Localized lt. to mod. wht silica (up to 30% of vesicles in one 1' interval). Common gry grn clay filling vesicles & v. light amt. on fracs. Local mild. clay silicification. V. Rare microscopic v.f. dissem. copper min. 3576½'-3577½' breccia w/ v. common clr zeol. & local sm silica veinlets 3577½'-3580' dense flow, lg. subvert. frac. (8" long) in mid-interval w/ lams grn-gry clay below turquoise-colored clay below clr drusy zeol. below opalescent to wht silica. Zeolite most abundant & lt. coatings of all, overall (<<1mm). 3580'-3600.5 consolidated breccia a/a, lt. frac w/ most common & @ 45°. Cmn. lt. amt. lt. gry botryoidal zeol/clay coating ≤4cm vesicles. @ 3581': start 1' rubbly interval. @ 3586' wht 1mm spheroidal silica w/ clay or fairly hard zeolite in frac. Local pth. clay silicification (grn-gry & mod brn in vesicles). Overall zeolites more abundant (lt-mod) on fracs than clays. Rock still has plenty of open pore space for fluid movement (5-8% = ½ of available space before any 2ndary min deposition).
3577'		
3597'		



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CLACKAMAS/CASCADES
FIELD CTGH-1

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS BINOC. SCOPE DATE JULY 27, 1986

DEPTH INTERVAL

DESCRIPTION

3597'

BASALTIC ANDESITE (A/A)

3600.5'-3609.5' breccia grades into Basaltic Andesite lava [Lava is v. similar to those lavas described between volcanic breccias since 2965.6': med to med dk gry, finely & sparsely porphyritic, w/phenos of plag, pyx, ol?] fracture increases over that of previous interval. Hominent direction is vertical/sub-vertical, w/less common 45°-75° fractures. Pale blue, gry grn, gry blue grn clays thinly coat fracture surfaces, form thin veinlets, fill vesicles & voids. Gry brn & wht clays are less common & are found in vesicles & voids. Gry brn is the last clay to fill voids & is softer than the others. SiO_2 also fills vesicles, voids, & forms veinlets — color ranges from wht to the blues of the above described clays, & may replace some of the clays. Fine, clear zeolites may coat clays in voids. Clay may be botryoidal

3609.5'-3723' Volcanic breccia (a/a @ 3546'). Intergrain voids are small (generally ≤ 2mm) & are filled w/gry blue grn & gry grn clays, typically botryoidal. Clays may be silicified; white & blue silica common. Wht clay coats blue grn when both are present. Tr clear zeolite, typically as drusy coatings on clays, rare on fracture surfaces. 3 cm void filled w/; grn clay at bottom, overlain by lt. blue clay, & topped w/silica (white-v. pale blue). 3 short interval (3613'-3615') of dense basaltic andesite lava (a/a @ 3614') is more fractured than breccia & has more vesicles/voids & has more 2ndary silica than does breccia. Rare, fine plate of copper. Fracturing is minor, most commonly @ 30°-45°. Irregular break ~⊥ to & is more common and occasionally has soft lt gry clay seams. Silica occurs intermittently-usually in intermed. sz vesicles (1-8mm) in a 6" to 18" thick band (assoc. w/clays or lay itself). Intermittent = every 2' to 10' for silica occurrence.

3630' 2cm thick brn gry clay seam (soft) & 2mm coating on opposite fracture wall of clr zeolite and wht clay; surface of zeolite disturbed/resorbed

3636½'-3638½' matrix color becomes gry grn as clays of same color increase in voids of r.f.s & vesicles, clr zeolite remains common, increases. Hem. as clay. Volatile in 2-10mm vesic

3617'

3637'

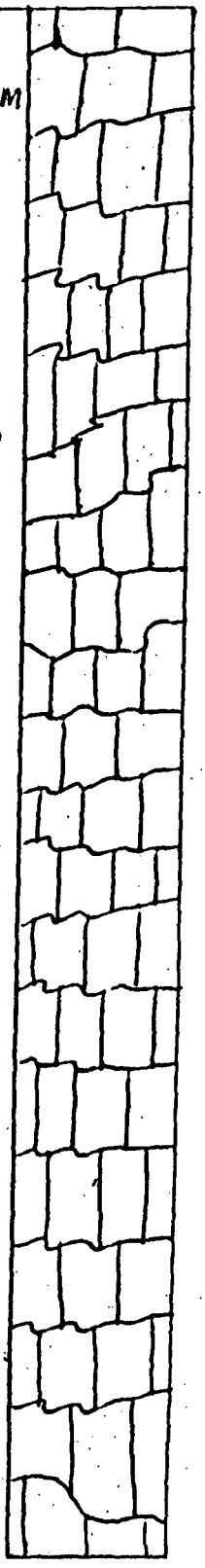
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE JULY 28, 1986

DEPTH INTERVAL	DESCRIPTION
3637'	BASALTIC ANDESITE (A/A) 3639' Wht botryoidal zeolite coats grngry clay in 5-10mm vesicles. Soft ltgray brn clay partially fills void interior. 3646' grngry clay less common over 1'-2' interval, lt. blue clay is predominate with vnlets, vesicles filling, & sm. frac. coating occurrence. Occasionally lt. blue clay is coated w/ very thin film of clr zeolite? /wht clay.
3657'	
3677'	



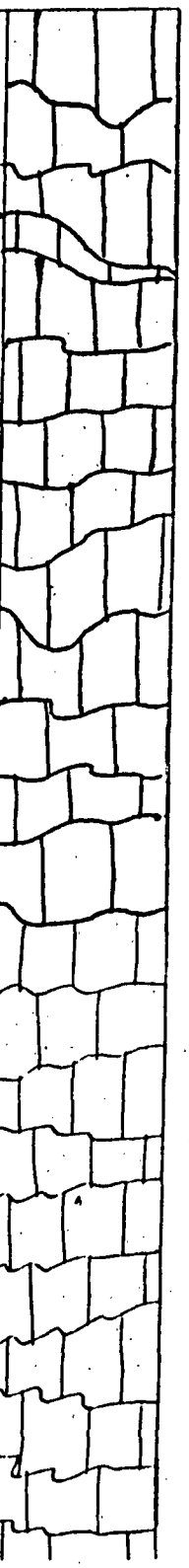
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC, SCOPE DATE JULY 28, 1986

DEPTH INTERVAL	DESCRIPTION
3677'	BASALTIC ANDESITE (A/A) Volcanic breccia continues. Rock is well indurated & generally dense with smaller & fewer intergran voids than observed @ 3600'. Small (≤2cm) pervasive vesicles & vugs filled w/waxy "clays" of variable hardness & include gry grn, gry blue grn (to turquoise), pale blue. Soft brn gry to gry brn common. Clays typically fill vugs from rim to interior in this order: gry grn → pale blue, and may have drusy coating of fine clear zeolite or silica. Cross section of this sequence is microscopically banded w/ fine undulations. Soft brn gry-gry brn clay is the most recent. Botryoidal form in clay is common. Clay & silica occur also, as short veinlets. Silica commonly fills vugs/vesicles. Rock has a tendency to break horizontally.
3697'	3690'- increase in fracturing?/breaking, forming discs (horizontal break) of variable thickness.
	3687'- slight increase in gry brn clay, coating break/fracture surfaces @ 3693.6'-3695' forming clay seams ≤ 1cm.
	3699' several ≤10mm vesicles w/ from rim to interior: pale gry grn clay, lt. blue gry botryoidal clay/zeolite?, clustered wht radiating 1mm fibers (open into void interior) = zeolite
	3701' clr zeolite microstalactites drip from top of ≤15mm vesicles w/ lt. blue gry botryoidal & drusy zeolite coating & pool @ bottom.
	3703' 30mm cavity w/ sparse ≤1mm copper flakes on top of clr drusy zeolite
	3704' heavy soft gry brn clay in narrow vuggy zone (3")
3717'	3714' >60mm cavity lined w/ gry-grn clay, clr drusy zeolite,



CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) MCDANNEL / GOODWIN

FIELD CASCADES / CLACKAMAS BASIS Binoc Scope DATE JULY 29, 1986

DEPTH INTERVAL	DESCRIPTION
3717'	BASALTIC ANDESITE (A/A) lt. blue clay is predominate in small (≤2mm) vesicles, silica and silicification of clays is sporadic (10' between occurrences) and diminishes with depth. Silica occurs in (≤10mm) larger vesicles only and no veins. Otherwise rock is as described @ 3677'. Soft brn clay occurs fairly commonly in ~2mm vesicles and in seams where the rock has broken irregularly, often @ 90° to ∠. 3715'-3721' slight increase in size & # of vesicles. wht, lt. blue grngry clays & clr drusy zeolite in vesicles, as @ 3677'. Clays are commonly laminated in larger vesicles w/ the zeolite occurring at the top of the void on occasion (last in the sequence). 3721'-3723½' ruddy, many fractures barren or v. lt. amt. lt. gry/clr zeolite & grygrn clay, silica rare/absent below 3720' 3723'-3727½' med gray dense, vesicular b.a. lava, fracs. @ subvert ∠45°, lt. amt clays & lt. gry zeolite on fracs & in vesicles
3731'	3727½'-3743' Volcanic breccia continues as @ 3677', overall v. light amt grngry clay & clr. drusy zeolite in vesicles & fractures, lt. blue clay becomes rare & overall alteration is decreasing. 3743'-3745½' dense b.a. lava w/ mod. amt. wht clay in ≤1mm vesicles. Lesser amt. waxy lt. blue & grygrn clays & clr. zeolite
3757'	3745½'-3760' Volcanic breccia, a/a @ 3727½. microscopic copper (~3757) in vugs w/ botryoidal - mammillary lt blue to milky opaline (?) material that forms v. small stalagtites. Clay coating on broken surfaces is very light.

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE JULY 30, 1986

DEPTH INTERVAL	DESCRIPTION
3757'	BASALTIC ANDESITE (A/A)
	3758.5 ~35° fracture w/minor shear on frac. surface
	3761'-3763' denser interval = basaltic andesite lava, fewer voids ∴ there is less clay than in breccia interval(s). Minor silica as void filling & forming thin (~2mm) vertical veinlet in green clay-lined fracture (3763').
	3763'-3796' return to volcanic breccia per above description @ 3745'; white clays in vesicles & voids. Green clays less common
	3769' - 30°-40° fracture (1) w/ 0.5cm gry clay on frac. surface
	3772'-3773' - broken, less consolidated (slightly) interval.
3777'	
	3782'-3783' - rubble zone
	3783' - 3787.5' - many of vesicles & voids are not lined or filled w/clay
	3789'-3790' - rubble zone — predom. vertical-sub-vertical fracturing
	3792'-3796' - matrix of breccia is red brn due to primary oxidation.
	3796'-3803' rock is denser, not oxidized a/a @ 3792'. Basaltic andesite lava a/a @ 3761' (& numerous preceding flows) near vertical fracture @ 3796.5' is coated w/green & white moderately hard, brittle, (thin) deposit — silicous?
3797'	

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANIEL

FIELD CASCADES/CLACKAMAS BASIS BINDL SLOPE DATE JULY 30, '86

DEPTH INTERVAL	DESCRIPTION
3797'	**BASALTIC ANDESITE (A/A)**
	3796'-3803' (cont.) mod. to intense fracturing w/fracs @ subvertical, 30° & 70°; light amt. secondary mins on fracs: discontinuous film admixed blue & grygrn clay ± clear drusy/film zeolite on top of clays or by itself; sparse vesicle filling by clays of same color + mnr. wht clay on interior of vesicles lined w/ grygrn clay; sparse ltgry silica & local clay silicification
	3803'-3813½' return to volcanic breccia as @ 3745', finely scoriaceous lapillisz rf.s to 3806, locally matrix clay alteration increases (grygrn clay & coloration of rock), intermittent very fine white acicular zeolite in voids on clr zeolite, radiating needles suggests natrolite eg 3807½' & 3814½', mnr soft brn clay in larger (>10mm) vesicles
	3813½'-3819' return to dense med. gray finely & sparsely porphyritic basaltic andesite lava, mod. frac. @ 45° & 70° w/ frac. alt. a/a @ 3803', mnr local silica vns (2x25mm max.), zeolites including natrolite as @ 3803'
3817'	
	3819'-3826½' return to volcanic breccia as @ 3745' common open voids w/ light amt. secondary clays & zeolite: vesicles >2mm generally have a rim of grn gry clay & an interior of clr drusy zeolite (no natrolite), smaller vesicles are empty or filled w/ grygrn clay, silica, &/or soft brn clay
	3826½'-3829' return to dense basaltic andesite lava, vesicles filled w/ wht, grygrn clays, &/or silica. Clays locally/adjacent to vns silicified, mnr natrolite? as @ 3803'
	3829'-3835' return to volcanic breccia, very lt. amt. secondary mins. as @ 3819'
3837'	

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Diamond Shamrock
Thermal Power Company

Form 2

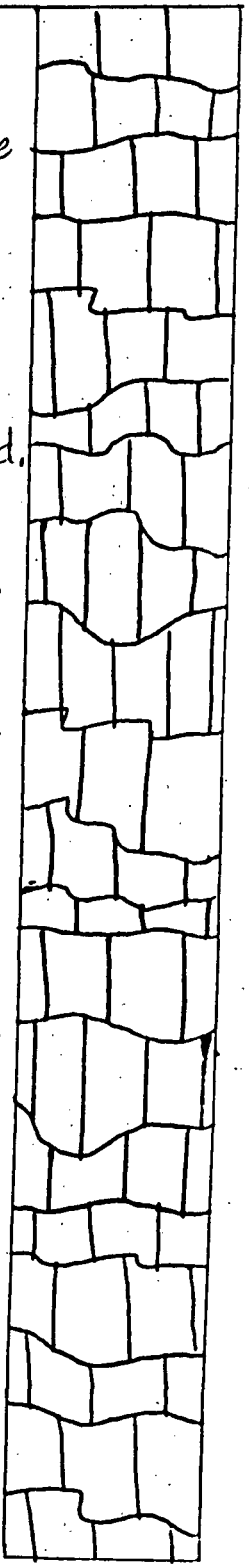
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE JULY 31, 1986

DEPTH INTERVAL	DESCRIPTION
3837'	BASALTIC ANDESITE (A/A) a/a @ 3813', 3826.5'
	3835'-3839' Basaltic andesite lava. Top 1.5' vesicular w/silica the predominate vesicle fill. Silica is white-blue & typically fills upper part of vesicle & is underlain by lt blue grn clay which typically has been silicified. In other vesicles grn clay overlies grn gry clay. Less common, soft, brn gry clay may fill vesicle or be at center of vesicle lined by other clays. V. light coating of blue grn & gry grn clays on frac. surfaces. V. minor fracture ~15°, 180°. 3838' is (tectonically) brecciated but consolidated.
	3839'-3852' Volcanic breccia a/a @ 3829' blue grn, pale grn, gry grn, white fill vesicles & voids. Minr. brn gry (soft) clay also. Clays form minor veinlets. Vesicles are often layered from bottom to top: dk grn → blue grn → lt blue/white. (No silica found). Fe zeolite. 3848-3850 - Rock is fractured & broken = mod. rubbly. Sheared surfaces. Fracture direction most commonly ~25°-30°.
3857'	3851' silica fills vugs
	3852'-3860' Basaltic andesite lava a/a @ 3835' Brecciated (2ndary - i.e. tectonic) but consolidated. Little to no movement occured between breccia fragments. Gry grn & dk blue grn clay fill narrow spaces between breccia fragments. Brecciation decreases by 3857' Broken frac. surfaces show minor shearing. Clays appear more abundant in this interval over the above vol. breccia interval. Grn clays (as described numerous times above), white clays, & minor silica occur as vein & void fill. Clays v. common on fracture surfaces. Red brn - orange red & dusky yellow Fe oxide stains(?) are common in this interval.
3877'	3860'-3867' Volcanic breccia, a/a @ 3834'. Clays as described above + zeolite.



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) MCDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE JULY 31, 1986

DEPTH INTERVAL	DESCRIPTION
3877'	BASALTIC ANDESITE (A/A)

3860'-3873' Return to Basaltic andesite lava [a/a @ 3852']. Increased fracturing, typically at high angle 0-15°, less commonly ~45° & 80°. Mnr shear on fracture surfaces. Abundant blue grn (waxy) clay on frac. surfaces, mnr pale blue. V. common red brn-orange red & dusky yellow oxidation -- usually follow small cracks/fractures.

3873'-3896' Volcanic breccia, a/a @ 3839'. secondary minerals/clays a/a w/ gry grn & mod blue most common, sequence from rim to interior on vesicles is typically gry grn → mod. blue → lt. blue → soft gry brn clay, a lt. amount of clr drusy zeolite commonly occurs on clay in cavities; rubbley @ 3889'-3891' & 6" interval at base of unit, v. minor fracturing, core breaks irregularly @ 90°

3896'-3902' Return to basaltic andesite lava [a/a 3852'] fracturing increases w/ common fracs @ subvert & 30°, clays on fracs are lt. w/ waxy wht & gry grn colors predom. over mod blue & pale blue & pale blue grn, rare limonite? yellow & orange oxides as @ 3873'

3897'

3902'-3915' Volcanic breccia, a/a @ 3839'
from 3903' to 3907' a notable increase in the variety of clays & zeolites occurs, a common sequence rimming vesicles towards the interior are blk, gry grn, mod blue, grnish olive grn & wht clays followed by a clear zeolite w/ rare matted or acicular v. fine wht zeolites last deposited. All clays are <<1mm laminations.
pale blue silica vns (<65mm) & vesicle fill occurs intermittently w/ overall lt. amt., > microscopic round plates of copper also occur on fracs. (rare concentration)

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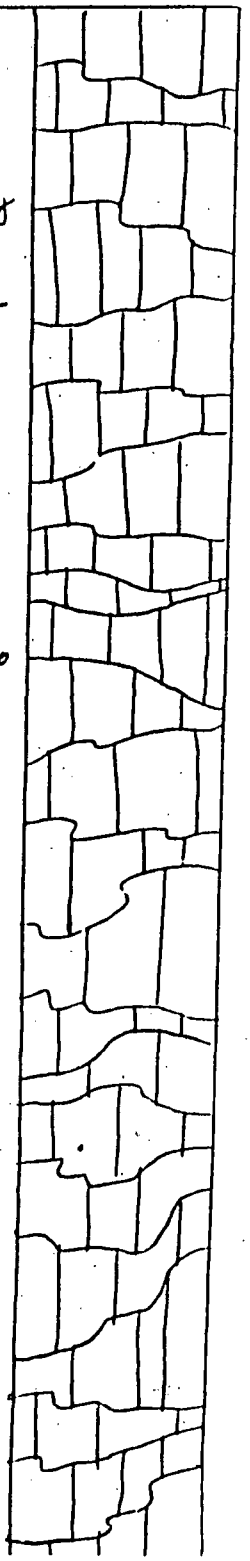


Diamond Shamrock
Thermal Power Company

Form 2

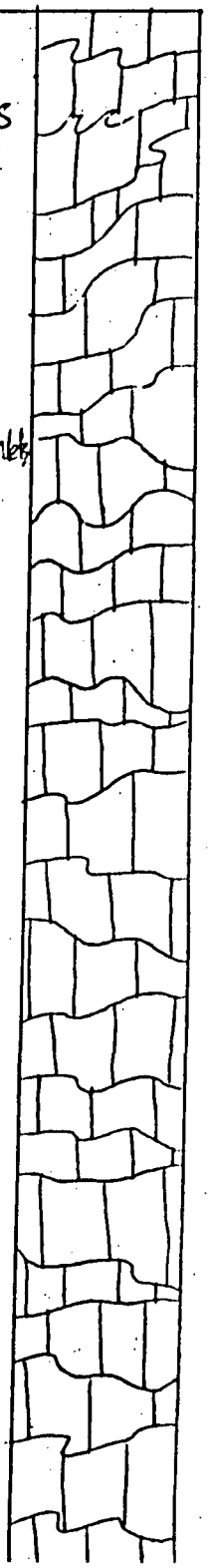
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES/CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binocular microscope DATE August 1, 1984

DEPTH INTERVAL	DESCRIPTION
3917'	BASALTIC ANDESITE (A/A)
	3915'-3922½' Return to basaltic andesite lava, most common fracs @ 30° & 90° in mod. frac. interval, rock commonly frac'd but un broken w/ thin vnlets wht & grngry clay & clr. zeolites. Lt brn clay also present but less common in vnlets & fracs., local lt. clay ptl. silicification.
	3922½'-3959' Volcanic breccia (a/a @ 3902). Fracturing decreases from above lava. Light amt of clays fill voids & mnr vnlets. Blue grn, gry grn clay commonly overlain by pale blue clay & may be coated by drusy zeolite (v. fine). Blue clay in voids is often botryoidal. Soft, gry brn clay common in voids. Minor white clay. V. fine acicular to fibrous zeolite(s) (natrolite?) also in vugs/voids ± clay. Small amt. of foliated, clear mineral cleaves into v. thin sheets (@ 3924.5'). No silica. Thin, med brn coating of FeOx(?) common on many fracture surfaces & predates clays. Mnr org oxidation (local).
3937'	



23571

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN

FIELD CLACKAMAS/CASCADES BASIS BINOC. + CORE DATE AUG. 1, 1986

DEPTH INTERVAL		DESCRIPTION
3957'	LILA LMIL	BASALTIC ANDESITE Cont'd VOLCANIC BRECCIA, A/A. 3958'-3959' subtle change in matrix character: med. ash size rock fragments are equigranular with a v. minor fraction of smaller material. Color is gry grn due to common alteration of v. f.s → clay of same color. 3959'-3961' dense b.a. lava, light amt. vesicle filling clays a/a @ 3922½', clr silica also fills vesicles 3961'-3965' Return to Volcanic Breccia with matrix character as @ 3958' 3965'-3982' Dense b.a. lava, commonly fract'd @ 50°-70° with very lt. amt grn gry & lt. blue clays ± pale blue (botryoidal) silica on clays (below 3972' rock is finely fract'd by tectonic brecciation @ 45° to subvert. most commonly, thin vns (<3mm) & vnlets are common through 3982') lt. amt. vesicle filling med blue grn, olive grn & gry grn clays above 3972' (base of zone of horizontally flattened (<8mm) vesicles which also contain lt. amt. pale blue/wht silica & or a white zeolite which is occasionally acicular & v. finely fibrous (natrolite?) on rim clays)
3977'	A	
	LA	3982'-3984' Return to Volcanic Breccia, no fracs, lt. blue & gry grn clays in vesicles & cavities (± wht zeolite) 3984'-3999.5' Dense basaltic andesite lava, vesicular to 3989½' with gry grn, pale blue clays & clr silica & white zeolite (natrolite?) in cavities & vesicles, local v. lt. FeOx staining adjacent to fractures, minr clays a/a (in vesicles) on fracs plus v. lt. amt soft brn gry clay, fracs. commonly @ 60° & 20°. From 3991'-3999.5': fine (tectonic) fracturing w/ vn & vnlets silica & gry grn clay. From 3997.5'-3999.5': increase in zeolites with increase in vesicles aligned @ 45° (stretched) at unit base
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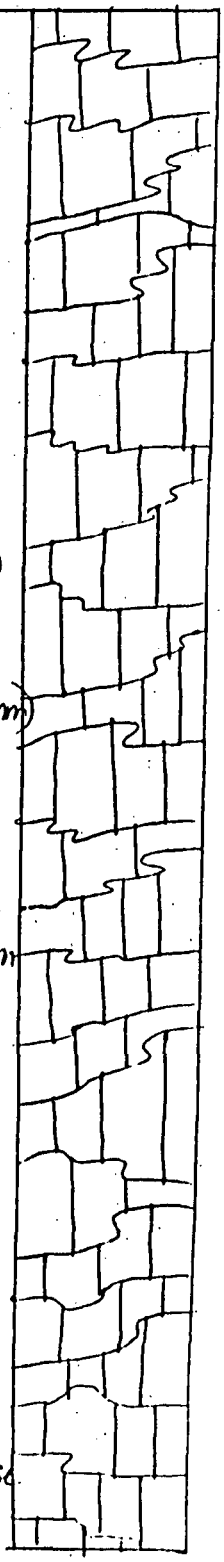


CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES / CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binoc. microscope DATE August 2, 1986

DEPTH INTERVAL	DESCRIPTION
3997'	BASALTIC ANDESITE (A/A)
	3999.5'-4010' Return to basaltic andesite breccia, matrix appears finer & denser than most preceding breccias of this kind. Small voids (≤1mm) are filled w/ clays (greens, o/a wht, gry) & zeolites. Clay is common but not abundant. Wht clay & zeolites precipitated after the dk green & blue grn clays. Foliated, clear mineral also in voids (zeolite? gypsum?). (Fibrous & acicular zeolites, less commonly fine, rectangular? form)
	4010'-4029' BASALTIC ANDESITE LAVA (o/a @ 3984') Generally v. fractured — subvertical, ~40° & 75°-80°. Fracture surfaces show shear. Thin green & blue green "clays" on surface are harder & more brittle than most clays but have no form (i.e. amorphous) are accompanied by thin brittle, clear coating of unidentified material. When scratched the coatings (green & clear) effervesce slightly w/HCl. Silica fills in voids & forms veins in fractures. Veins/voids may be lined w/ blue grn or dk grn "clay," which may have become silicified. (Veins are most often vertical-sub-vertical in orientation). Other veins show green "clays" layered w/ silica in fractures.
4017'	
	4029'-4044.5 volcanic breccia o/a @ 3999.5'. Same features & secondary mineralogy o/a. (see following page, also).

ALTERATION

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1
FIELD CASCADES / CLACKAMAS

GEOLOGIST (S) GOODWIN / MCDANNEL
BASIS BINOC. MICRO. DATE AUG 2, '86

DEPTH INTERVAL	DESCRIPTION
4037'	HALLIVALML MH MML MHM L VALVAL BASALTIC ANDESITE (AVA) Cont'd VOLCANIC BRECCIA from 4029' to 4044.5 voids, vesicles filled w/ grn clays, zeolites, wht clay & brn gry clay. Voids are often thinly lined w/med grn clay & then coated w/ very fine zeolite(s). DK gry grn "waxy" clay in matrix. Less blue grn clay in this interval than previous ones. 4044.5 - 4068' BASALTIC ANDESITE LAVA dk gry, v. sparsely porphyritic with 1% plag & (pyx → clay), dense, fine grained & brittle, moderate & locally heavy fracturing, most commonly at 45° & vertical with lt. to v. lt. dmt 2ndary mins. deposited as thin surface films & less commonly seams. From rim to interior of fracture, a common sequence is: gry grn clay (most common) → lt. blue clay (rare) → wht bacicular radiating fiber clusters (a zeolite = Natrolite?). From 4058'-4062.5' grn gry clays decrease & a thin coat of wht clay ± pale blue clay is predominate. At 4058' a waxy brn clay appears & continues to base of interval. Vesicles are uncommon & v. small (< 1mm) with gry grn clay fillings. Clr silica vns are rare & also intermittent yel. & orange FeOx/limonite is rare adjacent to fracs. Mlnr clay shear is intermittent. Moderate red clay is sparse & begins @ 4063' as vesicle fill & frac. coating material. @ unit base a film of pale blue botryoidal silica on gry grn clay is present as fracture filling material. 4057'
	4068' - 4072' Return to Volcanic Breccia, dense & unfractured, vesicles (< 2mm) ptly filled w/ thin lam gry grn clay covered w/ drusy clr zeolite ± wht fibrous (Natrolite?) zeolite 4072' - 4081' BASALTIC ANDESITE LAVA same as @ 4044.5' w/ less fractures & vesicular top 3', 4072'-4073' has common vert. - subvert. fracs w/ silica vns, lower fracs are @ 45° & vertical, silica ≥ = or > gry grn clay in common vns (< 4mm
4081'	

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN

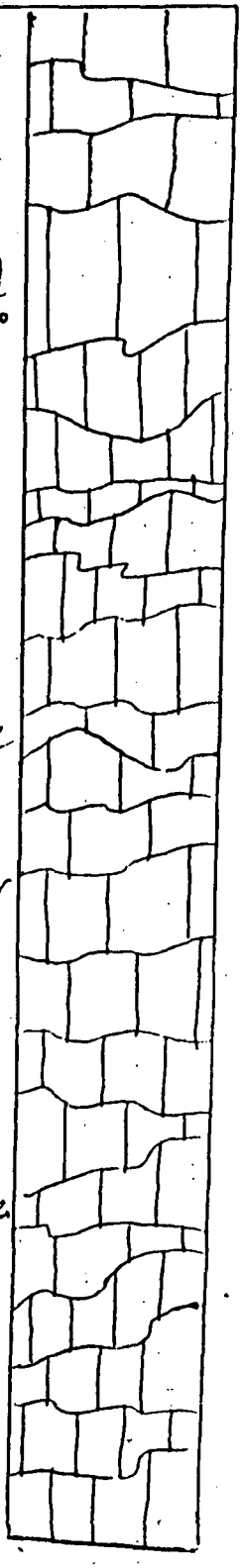
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 8/2/86

DEPTH INTERVAL	DESCRIPTION
4077'	BASALTIC ANDESITE (A/A)
	4072'-4081' (cont.) BASALTIC ANDESITE LAVA
	silicified gry grn and rarer lt. blue clays. Vesicles @ top of interval also contain a finely acicular wht fibrous zeolite (natrolite?). A notable increase in vn/fracture coating silica & decrease in clay occurs in this interval.
	4081'-4089' Return to Volcanic Breccia a/a @ 4068', very lt. or no fracture, lt. amt. 2ndary mins in vesicles, gry grn clay in small (<1mm) more common vesicles & clr fibrous zeolite in larger (2-5mm) relatively sparse vesicles on ± gry grn clay (thin coating)
	4089'- 4105' BASALTIC ANDESITE LAVA (a/a @ 4072') Rock is fractured but generally consolidated, with broken/fractured intervals. Fractures are commonly filled w/ grn blue "clay" & gry grn "clay" or silica, & are oriented in vertical to sub-vertical direction (i.e. high angle to core length). Clays & silica are also in small voids & silica appears to replace some clay. Fracture surfaces have thin coating of above grn clays, plus a translucent whitish coating that is relatively soft, thin & brittle. HCl causes weak effervescence of green/blue grn "clays." Darker grn clays were deposited first, followed by blue green, then silica or translucent whitish material described above. Mnr. slickenside on fracture surfaces. (wht clay also present on frac. surf.)
4097'	
	4105'- 4122' BASALTIC ANDESITE VOLCANIC BRECCIA (A/A @ 4081') Rare fractures: 0°-20°, & ~75°. Vesicles & small voids filled predominately w/white zeolites & wht clay. Lesser blue grn, gry brn clays. Gry Grn also v. common. Veins filling fractures are commonly gry green clay (thin v. coating) along walls, w/a drusy lining of very fine zeolites, & filled w/white clay (from zeolites). Wht clay dissolves in dil. HCl

LAVA MEMBER

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANNEL
FIELD CASCADES/CLACKAMAS BASIS BINOC. MICRO. DATE AUG. 3, '86

DEPTH INTERVAL	DESCRIPTION
4117'	BASALTIC ANDESITE (A/A) 4105'- 4122' VOLCANIC BRECCIA (cont'd) 4122'- 4125.5' - BASALTIC ANDESITE LAVA [A/A @ 4072'] Clays & silica form small veins following fracture. Fracture predominately vertical & subvertical, but includes near horizontal & 45° orientations. Clays are predom. blue grn. White clay less common. Clays & silica also fill voids (vesicles). Some clay appears to have been silicified/replaced by silica. 4125.5'-4139' VOLCANIC BRECCIA [A/A @ 4105'] red gray to dk gray, ± vesicular (<10mm w/common 2mm voids) r.f.s. in basaltic andesite matrix of grayish shade ± red brn matrix a/a, irreg-break ⊥ to ∢ w/ v. few fracs, v. lt. amt secondary mins w/ many empty vesicles, larger vesicles commonly rimmed by gry grn clay then either clr/lt gry drusy zeolites & / or wht acicular radiating fibers in spheroidal clusters (natrolite) = a zeolite, smaller vesicles commonly filled w/ clay of one color or horizontally laminated sequence of clays. eg: med brn - blk - blue grn - lt blue clay & clr/wht drusy zeolite & / - soft brn gry clay. Clays are locally silicified though no silica was observed. Rare microscopic copper flakes on zeolites or clays in larger open vesicles. The rare fracs have gry grn clay & wht fibrous zeolite. 4139'- 4143' BASALTIC ANDESITE LAVA [A/A @ 4122'] relatively unfrac'd w/ irreg ⊥ break, rare fracs w/ coatings gry grn clay ± clr/lt gry drusy zeo. ± wht fibrous zeo., vesicles coated w/ same materials as fracs + lt blue clay & soft brn gry clay, sparse silica veins + vesicle fillings also are present (<5mm x <30mm, pale blue) 4143'- 4176' [illegible]	
4137'		

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1
FIELD CASCADES / CLACKAMAS

GEOLOGIST (S) McDANNEL/GOODWIN
BASIS binocular microscope DATE 8/4/86

DEPTH INTERVAL		DESCRIPTION
4157'	L A L M L A	BASALTIC ANDESITE (A/A) 4143'-4175' continued Volcanic Breccia: common red-brn & lt. brn as well as grayish matrix, unfrac'd exc. irreg. break @ 0°+90°, soft brn gry clay common in larger vesicles & break-zones, ?ndary material in cavities & sm. (<2mm) vesicles is v. lt. amt. Many cavities have only v. thin coatings. The most common vesicle rim→interior sequence is: gry grn clay →± clr drusy zeolite →± wht fibrous zeolite →± soft brn clay. Also present are pale grn yel, olive grn, & blue grn clays as vesicle fill in minr amts. Minr amt dk gry grn botryoidal drusy zeolite is also present in larger vesicles.
4177'	L	4175'-4210' BASALTIC ANDESITE LAVA Breccia (above) passes into vesicular top (~4') of basaltic andesite lava. Vesicles filled w/ blue grn clay, dk gry grn clay (which underlies blue grn clay in some vesicles), silica, &/or zeolites. Dk gry grn to dusky blue grn clay most common & is pervasive throughout rock. Silica is wht to lt. blue & may replace blue grn clays. Zeolites include v. fine drusy crystal coating, acicular & radiating fibrous habits. (Medium hard botryoidal coating may also be silica). Zeolite may coat silica (which coats clays) in some vesicles. Fracture is generally light @ 55° or 75-80° &. 4183'-4187' rock is brecciated (tectonically) slightly, w/ dusky blue grn clay & less commonly, silica filling fractures. 4185'-4188' ~50° fracture angle common, 30° less common. slight shearing on fracture surfaces 4188'-4190.5' increase in vesicularity = increase in clays & silica

Diamond Shamrock
Thermal Power Company

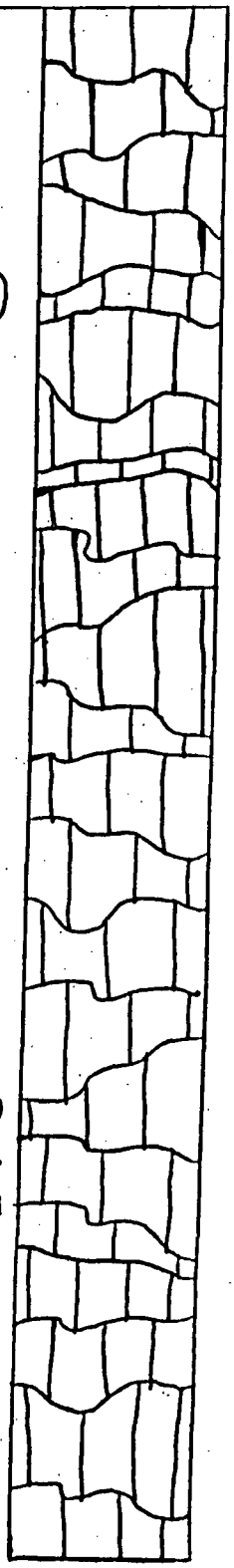
Form 2

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN / MCDANNEL

FIELD CASCADES / CLACKAMAS BASIS ~~binoc. microscope~~ DATE 8/10/86

DEPTH INTERVAL	DESCRIPTION
4197'	BASALTIC ANDESITE (A/A)
	4193'-4201'- silica fills increased void space
4202	
	4210'- 4217.5' (BASALTIC ANDESITE) VOLCANIC BRECCIA (a/a @ 4148')
4207	Voids are generally only coated/filled w/clays, mnr zeolite. Silica is present only in trace amounts. This is in contrast to above lava unit.
4212	
4217'	4217.5'-4232' BASALTIC ANDESITE (LAVA FLOW)
	Med gray - med dk gry - med bluish gry. Sparsely porphyritic w/ phenos of plag, mafic phenos ox. → red clay. Unit is brecciated (tectonic/secondary brecciation) between 4217.5'-4224', but consolidated, Unit is lightly to mod. fractured w/ most common direction 30°, less commonly vertical. Mnr shear on fracture surfaces.
4222	Grayish blue grn to dusky blue grn "clay" is pervasive throughout rock, most noticeably on fracture surfaces & between breccia fragments. Wht clay is common & typically overlies grn clays. Secondary FeOx (± hydrous FeOx?) yel brn & red brn common on fracture surfaces & as lineal stains throughout core, typically following hairline fractures. No silica found in this unit.
4227	
4232	
4237'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 8/11/86

DEPTH INTERVAL	DESCRIPTION
4237'	BASALTIC ANDESITE (cont'd)
	4232'–4255' VOLCANIC BRECCIA
	Dk gry to dk grnish gry, vesicular to dense blocks & lapilli of basaltic andesite in basaltic andesite matrix (which is v. ashy from 4232'–4236'). At 4236' breccia becomes mottled dk gry – med gry & red brn & less ashy. Dusky gry grn clay common in small voids/vesicles. Blue grn clays less common, generally. Zeolites commonly fill voids lined by clays & have drusy, fibrous (± radiating) & foliated habits; clear to white in color. Tr silica
4242	4239'–4241' increase in vesicles w/lava (a/a @ 4217.5) common. Vesicles may be as high as 10–15% of the rock. This interval is marked by an increase in clays a/a, zeolites, & silica. Also dk yellowish grn clay common as vesicle coating in this interval. Rare pyrite.
4252	
4257'	4251–4255' increase in red brn ashy matrix
	4255'–4267' BASALTIC ANDESITE LAVA
4262	dense, med gry to med dk gry, v. sparsely porphyritic, 1% phenos plag & pyx → gry grn clay (≤1mm); lt. amt. matrix alt → gry grn clay & FeOx (red brn) mixed w/clay; lt. to mod. fracturing most commonly @ 20°–55°, common micro frac/unbroken fracs. @ subvertical with clay seams/coatings (<1mm thick); fracs commonly coated w/ v.f. amt. gry grn clay (± lt. waxy sheen) ± gry yellow soft clay ± yel. & red limonite stain ± lt. white powdery or botryoidal zeolite (latest/2ndary min. deposited); v. few vesicles
4267	
4271	4267'–4271' VOLCANIC BRECCIA
	same A/A @ 4232'
	4271'–4282' BASALTIC ANDESITE LAVA
4277'	med gry, sparsely porphyritic – increasing to 4274' down to 4284'

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 8/12/86

DEPTH INTERVAL	DESCRIPTION
4277'	BASALTIC ANDESITE (continued)
	4271'-4282' BASALTIC ANDESITE LAVA basal 2' with mnr 2ndary alt. relative to top of unit, fracs lt. @ 30°-45° w/ v.lt. gry gry clay, 2ndary material common in vesicles: a common sequence includes lams. (horizontal) or rim → interior of 2-3 of the following: gry grn clay → mod. blue grn clay → pale blue botryoidal silica → clr foliated drusy zeolite → gry yellow soft clay → wht fibrous zeolite ± soft brn gry clay. These materials pilly (most common) or completely fill the ≤20 mm vesicles. Towards the center of unit silica vns increase. (≤8mm x 40mm).
	4282'-4287' VOLCANIC BRECCIA same as above at 4232', unfractured, v.lt. amt. 2ndary material in v.f. vesicles: gry grn clay ± pale blue silica ± wht fibrous zeolite
4292	
	4287'-4298' BASALTIC ANDESITE LAVA same as above at 4271', common fractures at subvertical & 60° w/ v.lt. amt. secondary mins: gry gry clay ± orange & yellow FeOx stain (in mixed clay) ± botryoidal pale blue silica (also present in mnr vns); clay locally yel gry & waxy
4297'	
	4298'-4300' VOLCANIC BRECCIA a/a @ 4282' (rim → interior: v.lt./NO matrix, v.lt. amt 2ndary mins in vesicular v.f.s.: yel gry clay ± clr/pale blue silica ± wht fibrous (± radiating) zeolite
	4300'-4305' BASALTIC ANDESITE LAVA a/a @ 4287', vesicular to 4302½', v.lt. 2ndary material in vesicles (≤5mm): pale blue botryoidal silica ± gry grn clay ± wht fibrous zeolite; mnr blue gry & olive gry clays also present.
	4305'-4309' VOLCANIC BRECCIA a/a @ 4298', unfrac'd, com. vesicles w/ v.lt. amt 2ndary material: rim → gry gry clay ± pale blue botryoidal zeolite ± foliated clr drusy zeolite ± wht fibrous zeolite, common 10mm cavities at base of unit w/ only film of zeolite on walls
4317'	4309'-4314' BASALTIC ANDESITE LAVA

LAVA FLOW

Diamond Shamrock
Thermal Power Company

Form 2

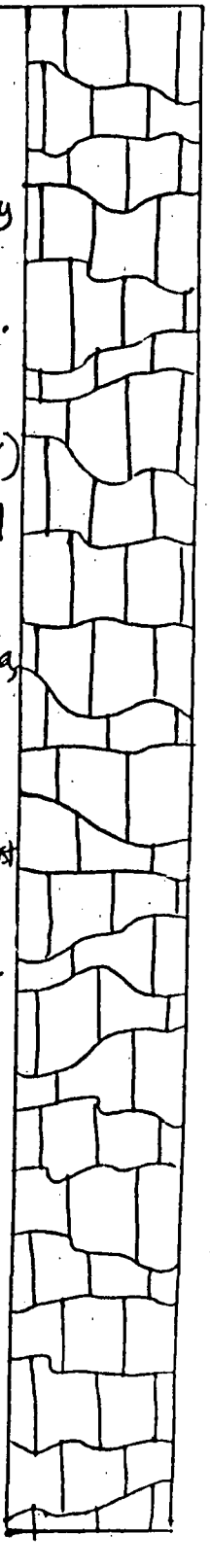
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTG1-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 8/12/86

DEPTH INTERVAL	DESCRIPTION
4317'	BASALTIC ANDESITE (A/A)
	4309'-4314' (cont'd) BASALTIC ANDESITE LAVA Moderately fractured. Brecciated (tectonically) but breccia is consolidated. Fracture direction predominately vertical-sub-vertical, less commonly 45°. Grn clays (as described above @ 4300') are predominate 2ndary alteration/mineralization. Clay & silica & zeolites form veinlets & fill small voids. (Botryoidal & fibrous zeolites). Shear is common on fracture surfaces.
	4314'-4315.5' VOLCANIC BRECCIA (A/A, @ 4305') gry to red brn matrix & lapilli.
	4315'-4321½' BASALTIC ANDESITE LAVA (A/A @ 4309') (all lavas & breccias in this thick unit are sparsely & finely porphyritic w/ plag. & mafics which have altered to clay → commonly dusky green). Lava is very vesicular (25%) to 4318.5'. Vesicles filled w/ green clays (as described @ 4300' & previously...) & zeolites, silica, with clays deposited prior to silica &/or zeolites.
4337'	4321½'-4330' VOLCANIC BRECCIA med dk gry & minor red brn. Unit is relatively dense. Grn & blue clays predominate as 2ndary mineral. (Still have slight effervescence w/ HCl). White zeolite, most commonly fibrous. Trace of small yel brn-orng feox, often at site of magnetic sulfide. Habit is tabular to thin sliver; bronze color (on fracture surfaces. May be superficial material washed into hole).
	4330'-4338' BASALTIC ANDESITE LAVA (A/A) Secondary mineralization: grn & blue clays/zeolites/silica/trace of metallic % @ 4335'. Unit is very fractured, predominately vertical to sub-vertical; less commonly horizontal. V. minor shear on surfaces.
	4338'-4379' VOLCANIC BRECCIA med. dk gry & minor red brn. Dense & few fractures. Most common frac. is irregular subvertical break with very light or no 2ndary mineralization, most commonly dusky grn clay. Small (≤ 6mm) vesicles have lt. amt. to mod. amt. 2ndary material - most commonly dusky grn clay and subt fibrous zeolite (± radiating). 2ndary material in vesicles
4357'	



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) McDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 8/13/86

DEPTH INTERVAL	DESCRIPTION
4357'	BASALTIC ANDESITE (continued) (A/A)
	4338'-4349' VOLCANIC BRECCIA (continued) include many possible combinations from rim to interior of the following material/minerals: dusky grn clay (less common are dusky blue grn & yellow gry clays) +/- pale blue botryoidal zeolite +/- clr drusy (+/- botryoidal) zeolite +/- wht radiating v.f. acicular fibrous zeolite --> wht clay. The fibrous zeolite is intermittently very common over 6" to 12" intervals. Less common is intermittent fracture & vesicle fill of pale blue (+/- botryoidal) silica (eg. of occurrence in vesicles within dense lava blocks from 4349' to 4353'). 4369' to 4396' is gradational to lower lava flow with common vesicular blocks with larger (≤1cm) cavities than upper unit, most of which have v. minr 2ndary mins. @4348.5' microscopic native copper flakes are present on zeolites/clays coating fracture.
4377'	4376'-4390½' BASALTIC ANDESITE LAVA med. dk gry, aphyric to v. sparsely porphyritic (<1% plags +/- pyx → FeOx and/or gry grn clay), v. lt. amt 2ndary mins. in dense unit w/ lt. (generally) fracturing @ variable attitude (15°, 45°, 80°). Vesicles absent. Fracture fill/veinlets include gry grn clay rims +/- pale blue (+/- botryoidal) silica. 4376'-4384' lt. amt. tectonic brecciation (but rock remains (consolidated) unbroken) with clay-silica in v. thin veinlets with sub vertical attitude. Lt. amt. FeOx (lt. olive brn & mod. red) mixed w/ clay near base of interval adjacent to fractures.
	4390½'-4399½' VOLCANIC BRECCIA same as above @ 4338', med. dk gray, dense with sparse to moderate small (≤5mm) vesicles, vesicles filled ptly to completely w/ lt. amt. +/- grayish blue grn clay +/- gry grn clay +/- wht +/- v. pale blue botryoidal zeolite +/- soft moderate brn clay, Unit is unfractured.
4397'	

LAVA LAVA LAVA

Diamond Shamrock
Thermal Power Company

Form 2

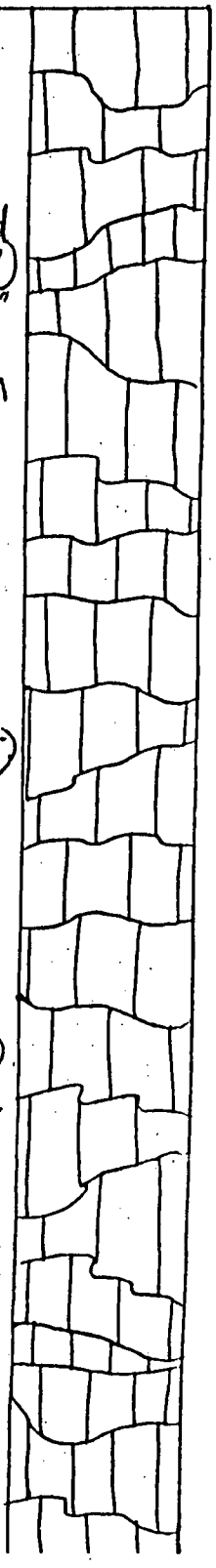
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANNEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 8/13/86

DEPTH INTERVAL		DESCRIPTION
4317'	A L ↓ M L ↓ M L ↓	BASALTIC ANDESITE (A/A) 4319.5' - 4426' BASALTIC ANDESITE LAVA Med - med dk gry dense basaltic andesite. Sparsely porphyritic. Phenos ≤ 2mm of plag, pyx → clay. Light to moderate and locally heavy fracturing; variably oriented fracture. Unit is brecciated (tectonically) with short (1'-2') unbrecciated intervals (rare). Blue grn & dusky grn "clay" is predominate 2ndary mineral/alteration. Clay, silica & fibrous zeolites fill fractures & voids. Clay common on fracture surfaces.
4417'	M H M L M L ↓ M L M M A	4426-4442' VOLCANIC BRECCIA. (ABRUPT CONTACT) DK gry - med gry w/ Red brn. VESICULAR TO DENSE (MINOR SCORIA) LAPILLI & LESS COMMONLY, BLOCKS OF BASALTIC ANDESITE IN MINOR ASHY MATRIX. WELL INDURATED. VOIDS & VESICLES LINED OR FILLED BY LT BLUE TO LT BLUE GRN CLAY, BOTRYOIDAL WHT ZEOLITE, FOLIATED WHT-CLEAR ZEOLITE. DUSKY GREEN & GRY GREEN "CLAY" (BRITTLE) ON FRACTURE SURFACES; ± WHT ZEOLITE (FOLIATED) WITH DEPTH A FINELY ACICULAR RADIATING ZEOLITE ALSO APPEARS IN VESICLES. THE PREDOMINATE 2ndary material in INTERVAL are GRY GREEN CLAY & FOLIATED WHT-CLEAR ZEOLITE. VESICLES are rarely 10mm and commonly ≤ 2mm. FRACTURING is v. lt. through interval with irregular breakage @ 15°-30° & 70°-90°. 6" rubble zone occurs at base of unit.
4437'		



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) MCDANNEL/GOODWIN
FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 8/14/86

DEPTH INTERVAL	DESCRIPTION
4437'	BASALTIC ANDESITE (A/A)
	4426'-4442' VOLCANIC BRECCIA
	4442'-4445½' BASALTIC ANDESITE LAVA med dk gry, dense, aphyric, 8-15% 5-30mm commonly horizontally stretched vesicles with lt. to mod. 2ndary mins. Cavities & vesicles commonly lined with gry olive grn clay (less commonly gry yel grn or dusky yel. brn), ± a/r foliated zeolite ± pale blue (botryoidal) silica. Core breaks commonly with irregular surface @ 45°-70°. A film of dk brn ± grn gry clay is often present on break surface.
	4445½'-4449' VOLCANIC BRECCIA A/A @ 4426' with 2ndary vesicle-filling material consisting of gry grn clay ± clr drusy zeolite ± pale blue botryoidal silica
	4449'-4451½' BASALTIC ANDESITE LAVA A/A @ 4442' with rubbly top 1'. 2ndary mins in vesicles and veins are dominated by pale blue botryoidal silica & include gry grn & pale blue clays ± opalescent pale blue silica ± wht acicular radiating zeolite.
4457'	
	4451½'-4454' VOLCANIC BRECCIA A/A @ 4445½' with 2ndary mins commonly lining vesicles in the following sequence: gry grn clay ± lt. blue clay ± pale blue botryoidal silica ± wht radiating acicular zeolite (a good example is @ 4451½' in a large cavity)
	4454'-4463.5' BASALTIC ANDESITE LAVA A/A @ 4449', irreg. fracture @ 95° to 70°, 2ndary material confined to vesicles & consists of dusky grn (less com. brn) clay ± pale blue botryoidal silica (predominate material) ± wht radiating acicular zeolite (also v. common) ± (less common) soft med. brn clay. Interval is 8-10% ≤ 10 mm vesicles with common ptl. to complete 2ndary fill. Silica vns also present but less common.
	4463.5'-4477.5' VOLCANIC BRECCIA Gradational contact into volcanic breccia from above unit. Red dk gry w/ mor red brn near contact. Unit is generally
4477'	

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/MCDANIEL

FIELD CASCADES/CLACKAMAS BASIS BINOC. SCOPE DATE 8/14/86

DEPTH INTERVAL	DESCRIPTION
4477'	LALLAMMALLAMALLAMMALLAMALL BASALTIC ANDESITE (A/A) (cont'd from pg. 99) &, less commonly, clear drusy zeolites fill voids & vesicles 4477'-4490' BASALTIC ANDESITE FLOW gradational with above unit. Med gry. dense. Sparse flattened vesicles near top of flow are filled w/clays & silica. Dusky green & blue grn clays line vesicles, or fill bottom of vesicles, and are overlain by silica. Minor fractures (vertical) filled w/ grn clays & silica. Fracture surfaces may have FeOx red brn stain or minor red brn clay. Yell brn "limonitic" stain less common. Lt grn clay less common than above clays. Predom. frac. direction 250-260.
4487	
4492	4490'-4495' VOLCANIC BRECCIA med dk gry & v. minor red brn. Lt/pale blue clays (may be bentonitic) & green clays fill vesicles & voids. Zeolites also fill vesicles/voids & include clear drusy, clear foliated, & white fibrous habits. Fibrous one coats or covers others & silica, when present. Silica common.
4497'	4495'-4503.5' BASALTIC ANDESITE FLOW Gradational contact into vesicular, med dk gry-med gry basaltic andesite flow. Stretched/flattened vesicles filled w/ blue grn & gry grn clays, zeolites (a/a). No predom. fracture direction. Shear is visible along most fracture surfaces, forming hard brittle coating from above clays. Red brn FeOx stains common on fractures. Rare orange FeOx specks on fracture surf. suggesting oxidation of iron mineral.
	4503.5'-4515' VOLCANIC BRECCIA Dk gry, blk, red brn. More grn textured than previous vol. breccia. Lt blue & bluish white clays predominate as void & vesicle fill.
4517'	

Diamond Shamrock
Thermal Power Company

Form 2

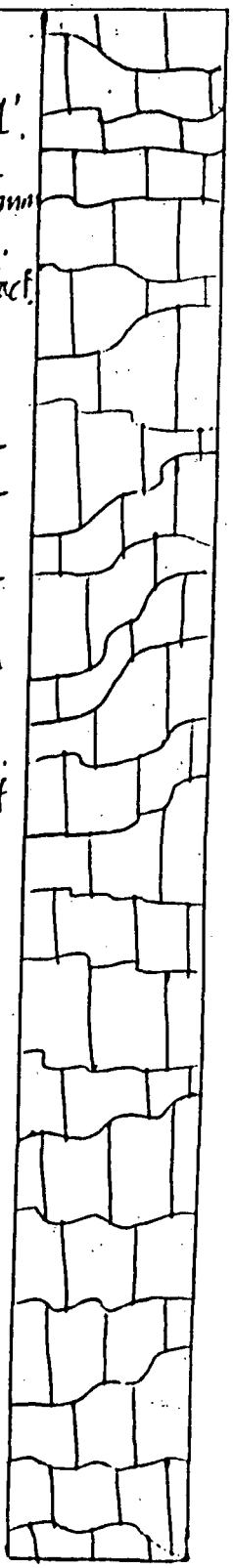
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) McDANNEL / GOODWIN

FIELD CASCADES / CLACKAMAS BASIS BINOC. MICROCORE DATE Aug. 14, '86

DEPTH INTERVAL	DESCRIPTION
4517'	4515'–4519' BASALTIC ANDESITE FLOW Dk gry–med gry, dense. Gradational contact with above unit. aphyric. Sparse ≤20mm vesicles (stretched @ 0° to 45°) in top 1'. Lt. to mod. frac.–irreg. @ 45° to 90° w/ lt. shear film of red brn FeOx +/– dk gry grn clay. Parting @ 90° + 0° w/ vnlets of frac.–fill material. In ≥5mm cavities pale blue silica predominate. In smaller vesicles lt. grn clay +/– silica. Base is sparsely porphyritic w/ 2–3% plag. phenos. Sharp brecciated contact. 4519'–4529' VOLCANIC BRECCIA (BASALTIC ANDESITE) brn gry & med gry b.a. lava lapilli-and less commonly, block-sized r.f. sin mod. red brn ash-sized matrix of b.a. r.f.s, common grn tinge due to abundant gry grn clay in common sm. (≤1mm) r.f. matrix vesicles. Fracs. lt. to absent with most common at 45°–70° with red brn FeOx stain. Vesicles are commonly ≤5mm and lined with clay, zeolites, and silica. Partial to complete vesicle fillings from rim → interior include: v. lt. gry/clr botryoidal (+/– dusty) zeolite +/– dk olive grn/blue grn/grn gry clays +/– v. fine disseminated grn stumpy zeolite w/ prismatic habit +/– clr (locally brn stain) foliated zeolite +/– rare wht acicular zeolite +/– pale blue (+/– botryoidal) silica +/– yel gry clay. Clays → foliated zeolite + wht acicular zeolite, or clays → silica are most common linings/fillings.
4537'	4529'–4553' BASALTIC ANDESITE LAVA med dk gry, aphyric. Top 13' is transitional, with intermittent narrow breccia intervals. Commonly vesicular to 4548' (2–25 vesicles/inch, commonly hor. elongate, 2–15%) with increase in 2ndary mins due to available pore space increasing. Pht. to complete vesicle and cavity fillings of gry gry clay + pale blue silica + wht acicular zeolite are most common. 2ndary material in linings & horizontal bands includes: clays (gry gry, blue gry, olive gry, yel gry, blk) +/– clr foliated zeolite +/– pale blue botryoidal silica +/– wht radiating fine needle zeolite. Silica is most abundant 2ndary material. Rare limonite (yellow to or. red) oxidation bands (2mm wide) in matrix adjacent to fracs. Fracs. v. lt. with variable ∠ but 45° most common. Mnr film FeOx brd +/– gry grn clay w/ lt. shear on fracs. @ 4532': nice silica stalactites. @ 4540'–4542' nice acicular & foliated zeolites w/ 2mm xtals (Big!).
4557'	4553'–4565' VOLCANIC BRECCIA (BASALTIC ANDESITE)



CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN / MCDANNEL
FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE Aug. 15, '86

DEPTH INTERVAL	DESCRIPTION
4557'	BASALTIC ANDESITE (A/A)

4553'-4565' VOLCANIC BRECCIA (cont'd)
Dense, med to dk gry. Blocks & lapilli of aphyric-sparsely porphyritic basaltic andesite (dense to reticular) in minor matrix of basaltic andesite lava. Green & blue green clays commonly line vesicle walls & are overlain by zeolites (clear drusy, v. pale blue botryoidal, fibrous). Fibrous, white zeolite is last 2ndary mineral to be deposited. Silica fills vesicles locally. Black (actually v. deep green when disaggregated) clay (min.) fills vesicles lined by green clay beginning @ 4559'.

4565'-4571' BASALTIC ANDESITE (LAVA FLOW)
Gradational contact w/above unit. Lava is aphyric, med to med dk gry. Vesicular near top but quickly becomes dense. Vesicles are lined or filled w/grn & blue grn clays, & commonly may be overlain by zeolite (drusy, fibrous) or silica. Lt. coating of blue grn clay on fracture surfaces. Fracturing generally is light & is oriented vertically, horizontally & rarely 30°. ("Black" clay, a/a, also common).

4577'

4571'-4591.5' VOLCANIC BRECCIA
a/a @ 4553', but w/ larger number of vesicles/void spaces. Grn clays, a/a, fill or coat vesicle walls. Clay generally is light in this interval. Zeolites common, particularly white fibrous one (is dominate). Appearance of gry clay & grey blue clay, typically thin brittle coating. Grey blue may be botryoidal. Fracture is horizontal - sub-horizontal.

4591'-4596' - BASALTIC ANDESITE (LAVA FLOW)
Gradational contact w/above unit. Flow is dense, aphyric. Sparse vesicles lined/filled w/green + "black" clay; typically accompanied by white zeolite or silica

4597'

Diamond Shamrock
Thermal Power Company

Form 2

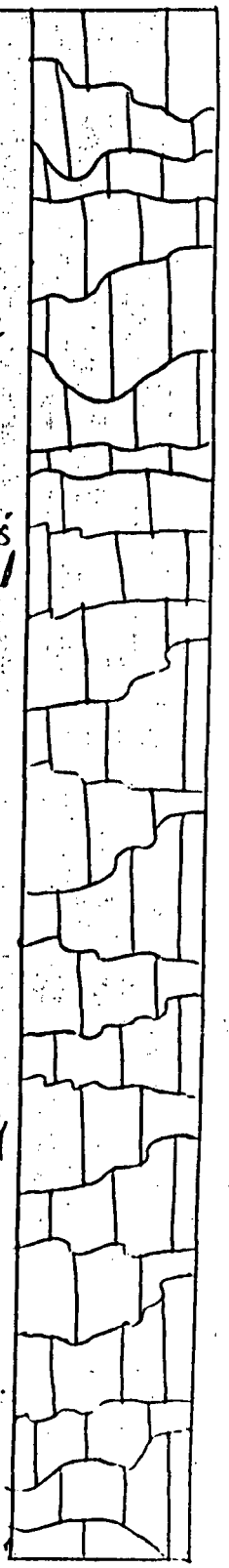
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) MCDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS BINX. SCOPE DATE Aug 15, 1986

DEPTH INTERVAL	DESCRIPTION
4597'	BASALTIC ANDESITE (A/A)
4602	4596'-4616' VOLCANIC BRECCIA Med-dk gry, red brn. Breccia is vesicular & has a more open texture than breccia @ 4553'. Secondary mineralization light & includes grn & blue gm clays, wht zeolite (fibrous). Fracturing is uncommon with mnr anht @ ~45° (sinuous) without 2ndary min. deposition. Vesicles are ≤ 6mm in size and commonly ≤ 3mm and rarely completely filled except when silica is the most recent cavity filling. All vesicles/cavities generally have a light coating of gry grn clay +/- the following materials toward the interior: +/- lt. tomed. blue clay +/- gry botryoidal zeolite +/- clr drusy zeolite +/- wht radiating acicular zeolite. The wht zeolite is predominate in this sequence. Silica rarely occurs with any zeolite except the wht acicular zeolite and is also common.
4617'	4616' - 4620' BASALTIC ANDESITE LAVA med dk gry, dense, aphyric to v. sparsely porphyritic with plag & pyx. phenos. Rare fracturing is @ 45° and irregular. No 2ndary material is present on fractures. Vesicles are ≤ 10 mm in size and commonly < 1mm. Again clays initially rim vesicles followed by zeolites and/or silica. Silica and the wht acicular zeolite (Natrolite?) are predominate and overall 2ndary mineralization is greater than preceding breccia though still light. A common vim → interior sequence of vesicle filling materials is: gry grn clay +/- lt. blue clay +/- pale blue botryoidal zeolite (more opaque than the commonly opalescent silica) +/- pale blue botryoidal silica +/- clr drusy zeolite +/- wht acicular (radiating) zeolite (locally chalky).
	4620'-4630' VOLCANIC BRECCIA A/A @ 4596'. Fx's virtually absent w/ mnr FeOx red brn stain. Cavities, as in the preceding lava, are ≤ 10mm with < 2mm vesicles more common. Cavities and vesicles are commonly partially filled w/ linings or bands of 2ndary mins as described above @ 4616'. Silica may completely fill vesicles but zeolites rarely do. Clays include gry grn, blue gry, blk, & yel. gry. Alteration remains light.
4637'	4630'-4636' BASALTIC ANDESITE LAVA



Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) MCDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS binoc. microscope DATE 8/16/84

DEPTH INTERVAL	DESCRIPTION
4637'	BASALTIC ANDESITE (A/A)
	4637'- 4636' BASALTIC ANDESITE LAVA (continued) ±grn 2bay. med. dk gry, aphyric, dense, lt. frac. @ 70° w/ dk. red brn film/stain, ~ fracs less common @ 30° & 45°. 2ndary mins. concentrated in top 1½', vesiculated lava. Vesicles rarely 10mm, commonly ≤ 3mm, 4-10% above 4632'. Silica is predominate. Linings include yel. gry, gry grn, & blue gry clays, clr drusy zeolite & pale blue (& botryoidal) silica.
	4636'- 4649' VOLCANIC BRECCIA Gradational contact w/ above unit. Med-dk gry. Dense, few lapilli w/ vesicles. Alteration is pervasive but light. Clays & zeolites fill small (≤2mm) voids. Clays are predominate & include grn, blue grn & lt blue (may be botryoidal) & black (actually is very dark grn). Most common zeolite is white, fibrous
4657'	4649'- 4658.5 BASALTIC ANDESITE (FLOW) Gradational contact. Lava is dense, aphyric. Green clays common throughout rock & often replace matic minerals. Sparse, small (≤5mm) vesicles are lined with clay, which may be coated with silica. ~3cm void near contact filled w/ V. pale blue silica. Mnr, sometimes brittle, grn & blue "clay" on fracture surfaces, & may show minor hematitic shear. Rusty red "clay" also on fracture surfaces & becomes common by 4652', accompanying blue & grn clays. Lt. green, soft clay on shear surface. Fracturing is low angle (horizontal to 75°) &, less commonly, vertical.
	4658.5- 4694.5' VOLCANIC BRECCIA Gradational w/ above unit. Med gry - red brn. Generally dense (minor vesicular lapilli). Lt blue clay appears most common secondary mineral but is not abundant. Alteration light. Grn clays, blue grn clays; foliated drusy, & fibrous zeolites. Vesicles commonly lined/filled in this order (vesicle wall → interior): dk grn or blue grn clay / lt green / drusy or foliated zeolite / fibrous zeolite. Minor black [illegible] silica (more common with depth) minor
4677'	

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) MCDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 8/17/86

DEPTH INTERVAL	DESCRIPTION
4677'	BASALTIC ANDESITE (A/A)

4658.5'-4694.5' VOLCANIC BRECCIA (continued)

soft brngry clay. Vesicles are commonly ≤ 2mm. Cavities are intermittent and ≤ 20mm. Cavity filling is similar to vesicles exc. pale blue (± botryoidal) silica is common on clays lining voids. The white fibrous (radiating) zeolite is the most common cavity fill material and generally occurs on the interior except @ 4688' where a dusky yel. grn v. fine spheroidal clay?/zeolite?, is present. While cavities are partially filled, vesicles (≤ 2mm) range from completely filled to barren & often are partially filled - most commonly with gry grn clay, giving the rock a grnish tinge. Basal contact is gradational.

4694.5'-4707' BASALTIC ANDESITE LAVA

med. dk. gry, aphyric to v. finely phaneritic, dense, intermittent vesicles (0-15%, ≤ 25mm & commonly < 2mm) above 4703', below 4703' rock is dense w/ incipient partings @ 45° @ 4704' and platey fracture @ 4704½' for 6" interval. Below platey fracture @ 90°, common fracture attitude is @ 15° to 45°. In the fractured interval FeOx-stained, lightly-sheared clays (mod. red brn, lt. olive brn + intermittently waxy) are present in v. lt. amts on fracs. (& in matrix/grdmass same color clays are present in v. lt. amts, unsheared). In upper unit fracs. are less common and irregular, most commonly @ vertical (sinuous) & 45°. These fracs. have v. lt to mod. amts. v. pale grn clay or dk gry gry clay ± pale blue silica (as inlets & vns to 6 x 60 mm max.) vesicles contain pale grn, dk gry grn, lt blue, gry olive grn clays ± clr to pale blue silica ± clr drusy zeolite ± wht fibrous (locally chalky) zeolite ± gry grn botryoidal clay?. Silica and clays are the predominate cavity/vesicle fillings. Contact is gradational in frac'd interval and overall 2ndary material is light.

4707'-4730.5' VOLCANIC BRECCIA

A/A @ 4658.5', fractures are rare @ 60°-80° with v. dk red brn stain ± gry grn clay. Rock is dense with fine (< ½mm) matrix voids and commonly vesicular r.f.s. Vesicles/cavities are filled

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH1 GEOLOGIST (S) McDANNEL / GOODWIN

FIELD CASCADES/CLACKAMAS BASIS Binoc. Microscope DATE 8/17/86

DEPTH INTERVAL	DESCRIPTION
4717'	BASALTIC ANDESITE (A/A)
	4707' - 4730.5' VOLCANIC BRECCIA
	partially to completely with clays, zeolites and silica. Clays are predominate in the < 2mm voids and silica & the white fibrous zeolite in the cavities. A common rim → interior cavity lining sequence is: dusky blue grn +/- grn gry +/- lt. blue +/- dk. olive gry clays → clr. foliated zeolite or pale blue tetragonal silica (opalescent) → wht radiating fibrous zeolite. 2ndary mineralization is commonly light and rock alteration very minor. Silica is much less common than zeolites.
	4730.5' - 4732' BASALTIC ANDESITE (LAVA FLOW)
	Gradational contact w/above unit. Lava flow is thin & very vesicular. Typically voids are lined w/ lt blue grn clay; w/dusky grn clay filling bottom of void (vesicle) & zeolite or silica overlying clays.
4731'	
	4732' - 4738' VOLCANIC BRECCIA (A/A @ 4707')
	Gradational contact. Dense. Secondary mineralogy same as breccia @ 4707'
	4738' - 3742' BASALTIC ANDESITE (FLOW)
	Gradational contact. Upper 3' of unit are vesicular. Vesicles filled w/dusky green clays. Blue grn clay less common & may thinly line vesicle walls. Clays are typically overlain by wht zeolite or silica, with silica predominate. Minor v. fine clear dusky zeolite lines some vesicle walls. Unit is fractured but consolidated w/silica filling fractures & voids. less commonly, grn clay in fractures.
	3742' - 3767½' VOLCANIC BRECCIA.
	med to dk gry lapilli-sz r.f.s (with rare blocks) in red brn aphanitic r.f. matrix - all basaltic andesite. Local common grn tinge from grn gry clays filling common sm. vesicles in r.f.s & sm. matrix voids (< 1mm). Rare fractures (eg @ 4758' with frac's @ 0° to 15° & lt. amt. 2ndary coatings of gry grn clay +/- red brn gry botry-
4775'	

Diamond Shamrock
Thermal Power Company

Form 2

CORE DESCRIPTION
40 FOOT INTERVAL

HOLE CTGH 1 GEOLOGIST (S) MCDANNEL/GOODWIN

FIELD CASCADES/CLACKAMAS BASIS BINOC. MICROSCOPE DATE 8/18/86

DEPTH INTERVAL	DESCRIPTION
4757'	BASALTIC ANDESITE (A/A)
	4742'-4767½' VOLCANIC BRECCIA (continued) and 2ndary min. deposition in fracs & voids light. Clays are predominate material in <1mm voids (vesicles & matrix) & wht fibrious radiating zeolite is most abundant in >1mm vesicles & cavities. Cavities (≤40mm) contain clays (gry grn, lt. blue, med olive grn, olive gry) +/- minr. pale blue silica +/- med. blue gry finely sphaeroidal zeolite?/clay? +/- clr drusy zeolite +/- wht brittle film (= silica+ clay?) +/- wht fibrous zeolite +/- soft brn gry clay. From 4763'-4765½' dense b-a. block w/ minr. breccia texture, c.mm. frac @ 45° w/ grn+brn clays +/- wht brittle film. Contact is gradational.
	4767½'-4784' BASALTIC ANDESITE LAVA
4777'	DK gry to med. dk gry, aphyric, dense, & brittle. Top 2' has vesicles & cavities stretched along sinuous subvertical planes (≤50mm, commonly <5mm, 5-15%). These voids are ptlly lined or completely filled (smaller voids only) with gry grn clay +/- clr (or stained yellow by FeOx) drusy zeolite +/- minr. pale blue silica +/- soft brn gry clay. Below 4769½', unit is dense & brittle w/o vesicles. Fracs. are common with a variable & but most commonly @ 40°-70° (+ local sinuous subvertical frac.). Fracs. are stained by red brn FeOx and coated w/ gry grn & mod. yel. brn (waxy) clays. FeOx stains in bands (≤40mm) and spots (mod red brn, dusky yellow, dusky red) become common below 4775' and may also color clays. Sharp irregular contact @ base.
	4784'-4790' VOLCANIC BRECCIA
	DK gry-red brn. Abrupt but transitional contact w/ above unit. Breccia is slightly scoriaceous. Secondary mineralization is light. Green & blue green clays are most common secondary material. Light amt of zeolites (as described above). Silica is present in v. light amounts & rarely forms well terminated quartz crystals as fine drusy lining on voids. Clays & zeolites occur in small (commonly ≤1mm, but up to 5mm) voids.
	4790'-4796' BASALTIC ANDESITE (LAVA FLOW)
11797'	Med gry, aphyric, vesicular. Vesicles are typically flattened & may be as large as 5cm. Smaller vesicles filled w/ clay & commonly silica or zeolites is above clay. (Clays are grn, blue grn, a/a). Larger voids filled by silica. Rare botryoidal silica. Fills fractures also. Alteration decreases w/ depth as unit becomes denser @ 4794.5'

Diamond Shamrock
Thermal Power Company

Form 2

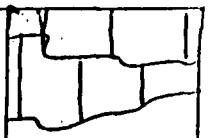
CORE DESCRIPTION

40 FOOT INTERVAL

HOLE CTGH-1 GEOLOGIST (S) GOODWIN/McDANIEL

FIELD CASCADES/CLACKAMAS BASIS BINOCULAR MICROSCOPE DATE 8/18/86

DEPTH INTERVAL	DESCRIPTION
4797	BASALTIC ANDESITE (A/A)
	4796- VOLCANIC BRECCIA (a/a @ 4784') Med gry – med dk gry. V. light Zn clay mineralization Green clays & zeolites a/a.
4817	



11021

COLOG INC.
COLORADO WELL LOGGING
1019-8th ST. SUITE 306 • GOLDEN, CO 80401 • (303) 279-0171 • TELEX: 45-0286

September 25, 1986

Mr. Joe Iovenitti
Thermal Power Co.
Suite 120
3333 Mendocino Avenue
Santa Rosa, CA 95401

Re: Borehole Geophysical Logging for Clackamas Geothermal Test Well No. 1, September 3-5, 1986.

Dear Joe,

The following letter serves as a report on the final logging program for Thermal Power's Clackamas Geothermal Test Well recorded September 3-5, 1986. I've also attached the original analog data in final form for both logging trips, a copy of the deviation data, and a tabular printout of the digitized log values including the temperature in degrees F.

Colog mobilized September 1-3 to the Clackamas job site and was on site ready to start the logging operations at noon, Sept. 3rd. HQ drilling pipe had parted and was left in the well as casing from approx. 830-4200 ft. HQ casing had been run back down to 830 ft. and the well then drilled from 4200 ft. to approximately 4800 ft. The drilling crew had run NX drill pipe into the well to T.D. and had started circulating (pumping cool water down the well; it did not return to the surface.) prior to Colog's arrival on-site. The drill pipe was pulled from the well and a MRT survey was recorded by the drillers prior to Colog starting logging operations. This MRT survey indicated that the well had been cooled to 153 degrees F, a level acceptable by Colog's downhole probes.

At 23:30 Colog started to rig up and then preceded to run the dual G-G density and caliper log in the well. The dual G-G function on the logging probe failed due to excessive borehole temperature before a density log could be obtained on the open portion of the drill hole (4200-4800 ft.). A caliper log was obtained in this portion of the well, and both caliper and density logs were recorded inside the drill pipe from 900 to 775 ft. These logs were recorded through this interval of drill pipe to investigate the area in which the HQ drill rods had parted at 830 ft. No gaps were apparent on the caliper log. It is possible from the density logs that the joint may be slightly thicker i.e. there is an overlap at the joint that shows as apparent higher density. This probe was out of the drill hole at 03:30 and the three MRT's on the cable immediately above the probe showed 184,188, and 217 degrees F. These temperatures all greatly exceed the dual density tool manufacturer's temperature rating of approx. 150 degrees F. Apparently the borehole temperature rebounded rapidly.

Colog next attempted the full-wave form sonic log. The probe centralizers had to be removed to get the tool down the HX (pipe ID - 3.5", tool OD 2.60") drill pipe because of the grease on the inside of the pipe. Sonic data was recorded going downward from 4225 to 4425'. The tool then failed due to the excessive borehole temperatures. Because of the way the tool failed, the digital full wave form data was lost, and only the analog Delta T and Amplitude data was salvaged. The Delta T data showed formation values of 50 to 100 micro sec./ft. (20,000 to 10,000 ft./sec.). The 100 micro sec./ft. occurred at 4320 ft. and is indicative of high porosity. Numerous cycle skips probably are indicative of fractures in the formation and should be correlated with the core.

Colog next attempted to record the 16-64" resistivity and SP logs. This data could not be collected, because of an apparent short that had developed in the cable. A 6 ft. lateral resistivity and SP log were recorded with this same probe. However, because of the problems demonstrated on the normal resistivity logs this data is questionable. Colog was out of the well at 11:30 and the drillers immediately started to 'trip' the NX pipe back into the well and cool the well. A short in the logging cable was found and repaired. No prints of these logs have been provided.

Cool water was pumped down the well bore for approximately 10 hours and the NX pipe was left in the well to T.D. At 23:30, Colog attempted the gamma-neutron log. This probe was lowered to the bottom of the well as fast as possible and then logged upwards. The probe failed because of the excessive borehole temperatures after logging from 4800 to 4650 feet. The gamma function never completely failed but, is very questionable from 4450 to approx. 4100 feet. The neutron log was totally dead from 4650 to 4520 feet and partially functional to 4100 feet. Data was recorded up to 3500 feet and then the probe was lowered back down to 3950 feet. It was then logged downward until it failed because of the borehole temperature at 4466 feet. The probe was then brought back to 3500 feet and logged out to the surface. At approximately 3000 feet, the gamma function died off to zero. The tool was turned off and initialized again and the gamma function started working. The logs were repeated over the questioned area and then logged to the surface. It is not known why the gamma function died at this point, however, it may have been a result of the high temperatures at depth. A composite gamma-neutron log is attached to this report. Baseline shifts occur in both the gamma and neutron logs where the hole diameter and casing changes. For example, at 4200 ft. the hole diameter decreases form approx. 3.5" to 3" and the neutron log is shifted to the right (less water effect because of smaller borehole - therefore greater count rate). The gamma log also shifts to the right at this point because it is no longer looking through two layers of casing; the NX and the HX. These same type changes also occur at the bottom of the surface casing.

A deviation log was to be the next log recorded in the well. However, a problem developed with the module and the temperature and fluid resistivity logs were recorded while a loose connection on the deviation module was repaired. The temperature and fluid resistivity logs were recorded downward to 4875 feet through the drill pipe. The maximum bottom hole temperature was 361 degrees Kelvin (88 degrees C or 190 degrees F). The temperature log showed only small changes including a cooling trend down to approximately 750 feet with gradual warming to depth. There were several zones that had significantly different temperature gradients including 860-1060 feet in which there was only a very slight increase in borehole temperature. The fluid resistivity log showed an apparent decrease in water quality with depth. From approx. 40 ohm-m at the surface to 9 ohm-m at the bottom of the well. This shift is almost entirely a function of the increase in borehole temperature. A copy of a calibration curve for the Fluid resistivity measurement (in tap water) versus temperature is attached. I have very limited experience with MRT surveys and based upon the variation between the apparent temperatures that were read with the three different MRTs used each time, I question their accuracy to greater than 10%. I have more experience with calibration of Colog's temperature tool and believe it to be accurate to within 1%.

The deviation log was recorded after the T,FR logs by logging downward through the drill pipe at 25 foot intervals. The directional deviation data is erroneous because of the steel casing and pipe in the well bore. The steel casing and pipe is randomly magnetized and the direction Colog's tool measures is magnetically based. It is obvious when the direction changes 180 degrees in 25 feet and the angle doesn't change that the steel is influencing the readings. The steel pipe doesn't effect the vertical angle reading. Overall, this was a very straight borehole.

Upon completion of the deviation survey, 600 feet of drill pipe was then pulled out of the well leaving the bottom 4200-4800 feet open. The 16-64" normal resistivities, SP, IP, and a 6 ft. lateral resistivity were recorded in this portion of the well. All of the resistivity data was consistent between the different types of measurements and the pre and post logging calibrations checks were the same. Additionally, Colog's equipment manufacture specifies that the 16" short normal resistivity log should indicate approx. 5.1 ohm-m for every ohm of load used in calibration, and the 64" long normal resistivity should indicate approximately 20 ohm-M for every ohm of load. This is consistent with the field calibration checks. The small variation between actual and theoretical resistivities is due to the cable length, variation within the load resistors (nominal 10% resistors), and contact resistance. Therefore, I believe the tool to be working correctly and the data to be valid. Please note that the previous 6 foot lateral resistivity and SP data showed the same shape of curve, however, the logging scales were substantially

different. I don't believe the original 6 foot lateral quantitative data to be valid because of the cable problems that were found after it was recorded.

It is somewhat disconcerting to see resistivity values in the 4 to 10 ohm-M range. The core samples were altered however, the neutron data indicates that the formation has very low hydrogen content (no water) and these resistivity values seem unrealistically low. The 9 ohm-M borehole fluid values would mean that apparent formation resistivity values of 9 ohm-M would indicate 100% porosity. For the apparent formation resistivity to be less than this value, the formation needs to be more conductive than the borehole fluid, i.e. contain saline formation water, disseminated sulfide, or some other conductive material.

The neutron logs suggest that there is very little formation water available. The slower sonic delta T's correspond to the lower resistivity values and also indicate higher porosity. Therefore, I am inclined to believe the porosity is dry. G-G density data in this area would have been very beneficial. The increase in borehole temperature will decrease the apparent resistivity some, however, I don't believe it would be significant enough to cause these extremely low values. At best, I think that the temperature correction would only increase these values by 20-25 ohm-M. One temperature correction formula for normal resistivity logs was obtained from literature and states that R1(T1+7) = R2(T2+7) with the temperature in degrees F. Five ohm-M at 200 degrees F would equal approx. 20 ohm-M at 50 degrees F with this formula. I haven't seen enough information to know the limits, if any, for this formula. More investigation, including some core resistivity measurements, needs to be made to explain this result. It should be noted that the higher resistivity layers correspond to the higher (lower apparent porosity) neutron values and faster sonic velocity values, which is consistent.

The gamma, neutron, dual G-G density, caliper, and sonic logs were simultaneously recorded in digital and analog format. The digital sonic data was lost when the tool failed from the temperature. This was a very different shut-down than the uphole logging equipment was designed for. The deviation data was also recorded digitally. The temperature, fluid resistivity, 16-64" normal resistivity, 6 ft. lateral resistivity, spontaneous potential, and induced potential logs were record only in analog form and then digitized.

The logging program for the well was effected by the overall borehole conditions. Significant data was not obtainable after the HQ drill pipe was parted and left in the well. This includes continuous resistivities from the surface to the bottom interval, density, and sonic data. Density and complete sonic, gamma, and neutron data could not be collected in the open portion of the well (4200-4800 ft.) because of the borehole temperatures. The

temperature in this drill hole rebounded very rapidly after the cooling attempts.

A major conclusion does seem to be apparent from the well log data collected. The well below 2000 feet appears to have a very low porosity, little permeability, and low potential as a natural geothermal aquifer. This is demonstrated by the lack of thermal gradient changes in the temperature log (which indicates lack of aquifer systems in this area), the overall low formation temperature, the high neutron count values (indicative of low formation water), and the lack of SP change which suggests little permeability. The low resistivity values are consistent with major clay alteration which would further reduce any permeability, however, they still need more explanation. They don't seem realistic with the known core and neutron values.

It was not practical to link the logging data from the first trip with these last logs primarily because of the lack of data that could be collected through the cased portion of the well. I will work with this data in more detail when I receive additional information, including a comprehensive geologic description, and ideally some resistivity and porosity values from the core and/or several pieces of the cores that we could test.

If you have any questions about this report or some additional information, please call.

Thanks again,

Robert E. Crowder
President / Geophysicist

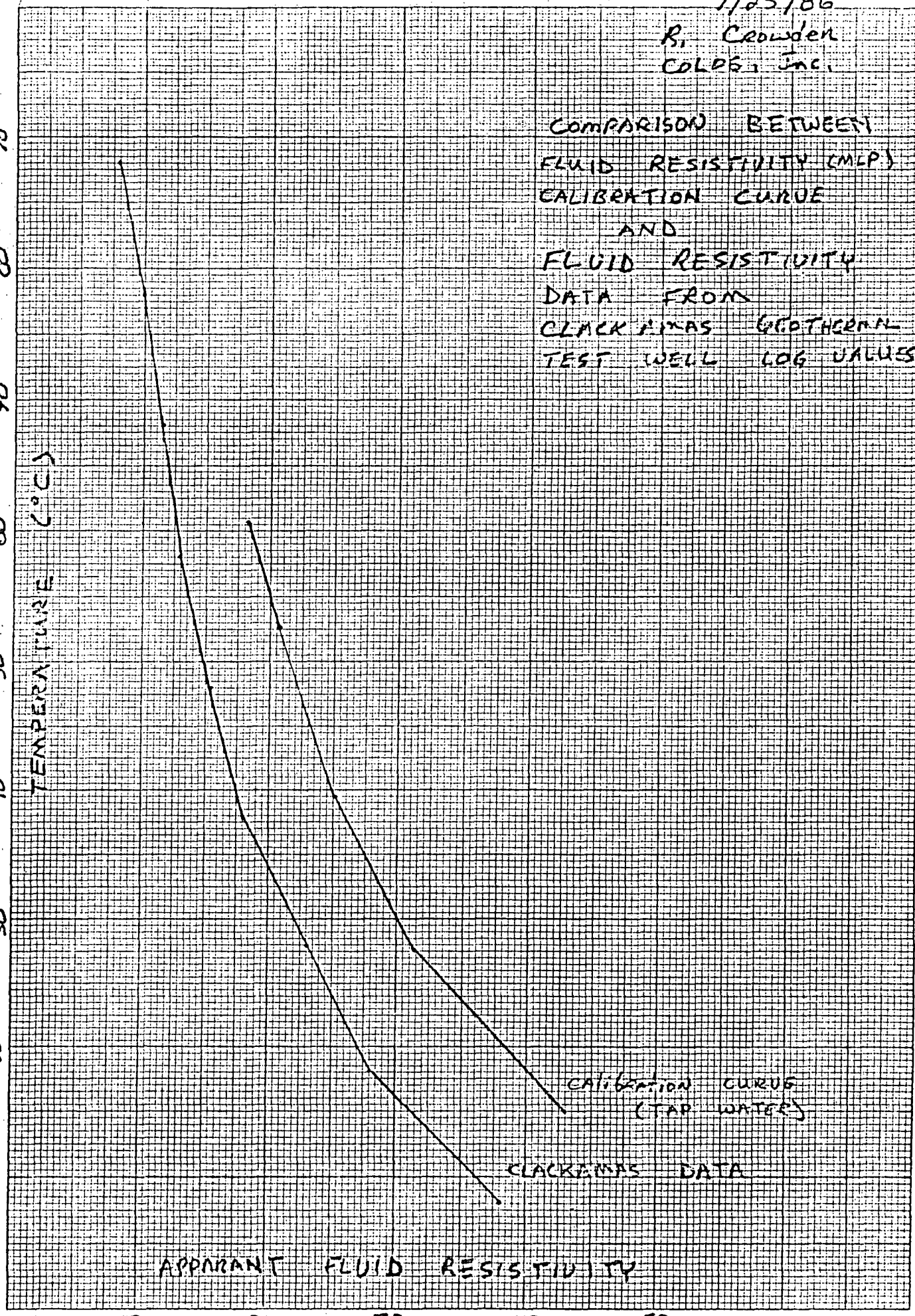
enclosures
thermal8.inv

9/25/86

R. Crowder

COLOG, Inc.

COMPARISON BETWEEN FLUID RESISTIVITY (MLP) CALIBRATION CURVE AND FLUID RESISTIVITY DATA FROM CLACKAMAS GEOTHERMAL TEST WELL LOG VALUES



POLYNOMIAL

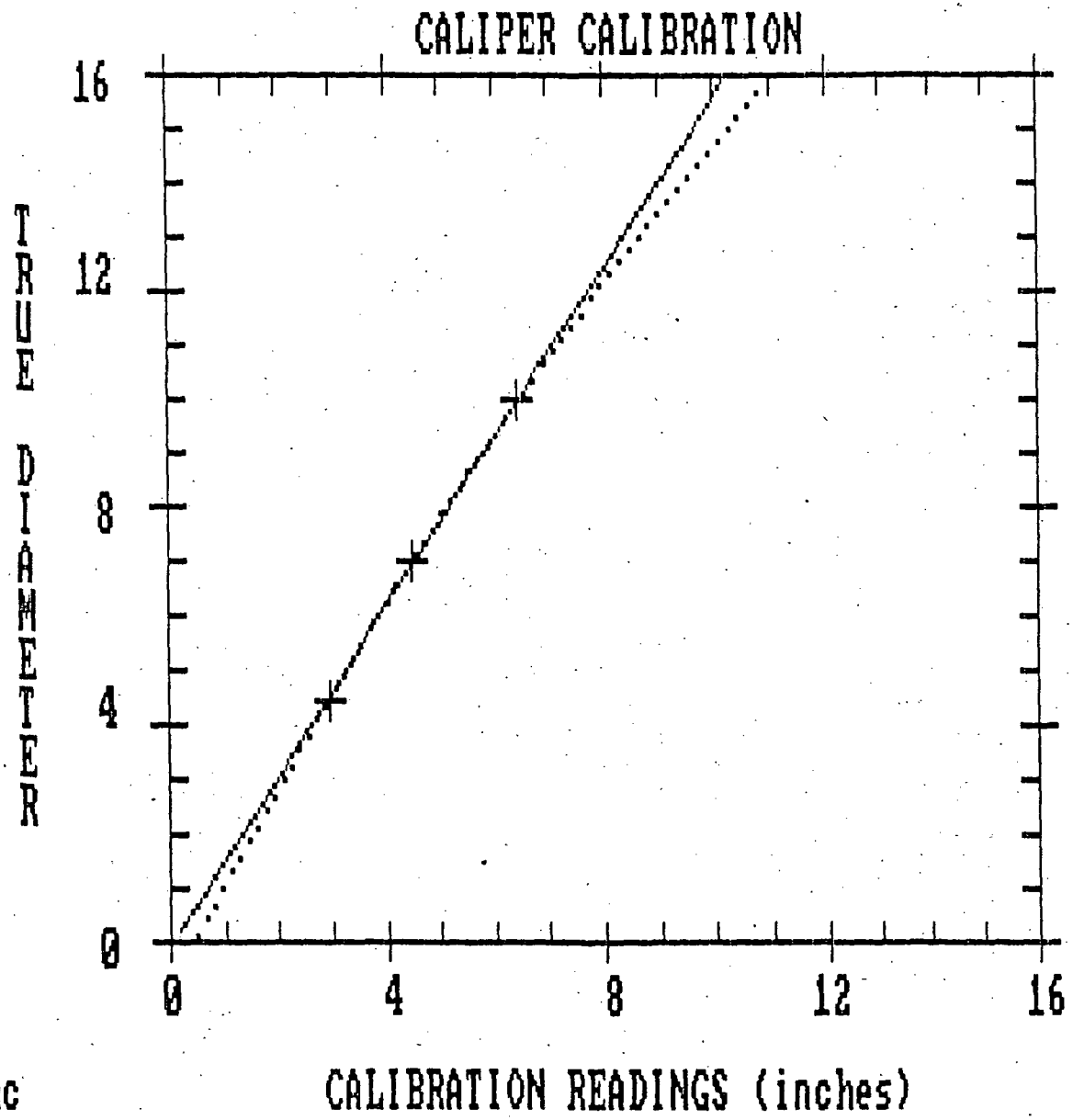
DEGREE	PATTERN
1	
2	

PLEASE SELECT DEGREE

(1 or 2)

D E F A U L T = 1

1



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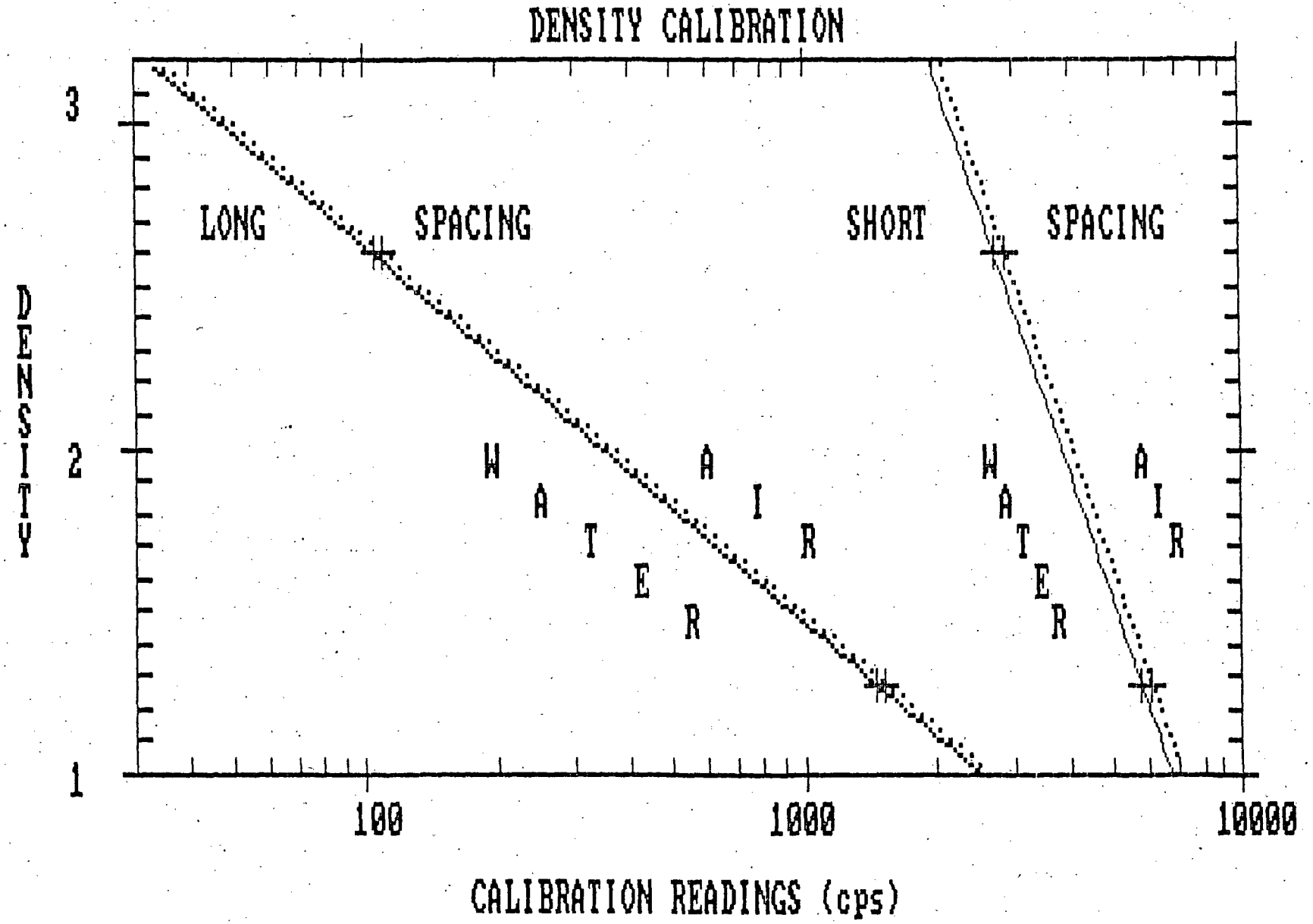
= Clackamas Geothermal Test well #1

COLOG, INC



CYGH 1

Color, Inc

CLACKAMAS GEOTHERMAL TEST WELL NO. 1 (CTGH-1)
ELECTRIC LOG TABULAR PRINTOUT
LOGGED BY: COLOG, INC.
DATE: SEPTEMBER 5, 1986

DEPTH	SP-1	LAT	SP-2	IP-1	16-1	64-1	SP-3	IP-2	16-2	64-2
4200.0	0.00	0.00	0.00	0.52	0.00	0.34	0.00	0.00	0.00	0.00
4200.5	0.00	0.00	0.00	0.50	0.00	0.29	0.00	0.00	0.00	0.00
4201.0	0.00	0.00	0.00	0.47	0.00	0.26	0.00	0.00	0.00	0.00
4201.5	0.00	0.00	0.00	0.45	0.00	0.23	0.00	0.00	0.00	0.00
4202.0	0.00	0.00	0.00	0.41	0.00	0.21	0.00	0.00	0.00	0.00
4202.5	0.00	0.00	0.00	0.34	0.00	0.18	0.00	0.00	0.00	0.00
4203.0	0.00	0.00	0.00	0.34	0.00	0.15	0.00	0.00	0.00	0.00
4203.5	0.00	0.00	0.00	0.37	0.00	0.19	0.00	0.00	0.00	0.00
4204.0	0.00	0.00	0.00	0.38	0.00	0.27	0.00	0.00	0.00	0.00
4204.5	0.00	0.00	0.04	0.36	0.00	0.47	0.00	0.00	0.00	0.00
4205.0	0.00	0.00	0.06	0.33	0.00	1.32	18.21	0.00	0.00	0.00
4205.5	0.00	0.00	0.06	0.29	0.00	5.17	17.75	0.00	0.00	0.00
4206.0	0.00	0.00	0.08	0.24	0.00	6.20	17.22	0.00	0.00	0.00
4206.5	0.00	0.00	0.13	0.21	0.00	6.93	15.81	0.00	0.00	0.00
4207.0	2.03	0.00	0.44	0.19	0.01	7.02	17.81	0.00	0.00	0.00
4207.5	1.45	0.00	6.56	0.18	0.04	7.12	23.84	0.00	0.00	0.00
4208.0	1.47	0.00	5.96	0.17	0.11	7.26	29.96	0.00	0.00	6.85
4208.5	2.23	0.00	6.17	0.16	0.88	7.38	40.88	0.00	0.00	6.94
4209.0	3.64	0.00	6.80	0.15	4.06	7.47	45.67	0.00	0.00	7.00
4209.5	4.98	0.00	7.55	0.15	4.87	7.57	45.24	0.00	0.00	7.07
4210.0	6.19	0.00	8.96	0.15	5.19	7.71	45.21	0.00	4.46	7.13
4210.5	8.31	0.00	11.93	0.15	5.31	7.84	47.75	0.00	4.88	7.22
4211.0	9.50	0.00	12.55	0.15	5.35	7.99	48.83	0.02	5.27	7.39
4211.5	9.70	0.00	13.63	0.14	5.30	8.17	50.90	0.02	5.53	7.55
4212.0	9.41	0.00	14.23	0.14	5.19	8.92	52.12	0.09	5.36	7.78
4212.5	8.80	0.00	13.95	0.14	5.11	9.50	52.58	0.16	5.20	8.21
4213.0	7.62	0.00	13.14	0.14	5.09	9.62	52.68	0.16	5.20	8.58
4213.5	7.56	0.67	12.45	0.15	5.35	9.61	52.55	0.15	5.27	8.92
4214.0	7.90	3.71	12.30	0.15	5.53	9.63	52.32	0.15	5.35	9.32
4214.5	8.32	5.50	12.39	0.15	5.66	9.68	52.06	0.15	5.40	9.61
4215.0	8.77	6.16	12.65	0.15	5.80	9.75	51.76	0.15	5.45	9.68
4215.5	9.24	6.12	13.26	0.15	6.77	9.85	51.55	0.16	5.51	9.52
4216.0	9.33	5.76	13.59	0.16	7.14	10.23	51.78	0.17	5.57	9.39
4216.5	8.86	5.23	14.10	0.17	7.33	10.87	52.23	0.18	5.97	9.41
4217.0	8.13	4.48	14.04	0.19	7.56	12.58	53.02	0.19	6.80	10.18
4217.5	7.41	3.88	13.47	0.23	7.81	12.77	53.06	0.21	7.28	11.05
4218.0	7.24	4.31	11.87	0.29	8.06	12.87	52.77	0.27	7.50	12.08
4218.5	7.28	5.68	11.78	0.35	8.31	12.93	52.33	0.33	7.64	12.62
4219.0	7.36	6.35	11.85	0.42	8.80	12.99	51.83	0.36	7.83	12.80
4219.5	7.44	6.80	11.94	0.47	10.53	13.03	51.52	0.38	8.53	12.93
4220.0	7.47	7.11	12.15	0.52	13.35	12.93	51.48	0.40	10.91	13.01
4220.5	7.48	7.45	12.30	0.55	14.92	12.70	51.56	0.48	11.54	13.08
4221.0	7.43	8.26	12.39	0.57	16.24	12.22	51.63	0.51	12.80	13.03
4221.5	7.38	10.61	12.43	0.58	16.88	11.67	51.63	0.54	14.69	12.73
4222.0	7.33	10.77	12.46	0.59	16.72	11.19	51.62	0.55	16.71	12.34
4222.5	7.28	10.45	12.49	0.59	16.55	10.72	51.61	0.56	16.73	11.87
4223.0	7.23	9.89	12.45	0.61	17.11	10.16	51.82	0.58	16.60	11.38
4223.5	7.16	9.85	12.40	0.62	18.95	9.63	51.96	0.60	17.43	10.89
4224.0	7.09	10.51	12.29	0.64	20.74	8.54	52.04	0.62	18.99	10.39

4224.5	7.09	12.47	12.19	0.65	20.96	7.09	52.11	0.60	20.55	9.28
4225.0	7.19	14.84	12.23	0.63	21.26	6.44	52.19	0.63	21.03	7.37
4225.5	7.31	18.31	12.35	0.60	22.07	6.47	52.28	0.65	21.16	6.55
4226.0	7.45	19.08	12.55	0.58	23.25	6.58	52.37	0.61	21.30	6.39
4226.5	7.60	19.51	12.77	0.57	26.05	6.72	52.37	0.54	22.65	6.33
4227.0	7.81	20.28	13.03	0.56	27.29	6.88	52.38	0.53	25.72	6.25
4227.5	8.08	20.86	13.28	0.55	28.04	7.02	52.40	0.53	27.49	6.47
4228.0	8.22	22.28	13.34	0.54	29.58	7.11	52.43	0.52	29.45	6.68
4228.5	8.33	24.27	13.33	0.54	29.87	7.13	52.47	0.52	30.03	6.90
4229.0	8.35	24.43	13.31	0.53	29.53	7.06	52.51	0.53	30.20	7.04
4229.5	8.40	24.12	13.29	0.54	29.13	6.98	53.11	0.57	29.60	7.10
4230.0	8.57	23.91	13.28	0.55	28.65	6.89	53.37	0.59	29.07	7.09
4230.5	8.76	23.88	13.29	0.55	28.38	6.80	53.35	0.59	28.85	7.07
4231.0	9.14	24.14	13.31	0.54	25.95	6.70	53.30	0.57	28.51	6.98
4231.5	10.36	24.59	13.39	0.53	21.39	6.58	53.24	0.52	28.02	6.86
4232.0	10.71	25.55	13.62	0.55	18.12	6.47	53.32	0.51	22.38	6.74
4232.5	10.77	20.11	14.74	0.57	14.03	6.34	53.42	0.51	18.99	6.59
4233.0	10.82	10.87	15.53	0.57	8.80	6.18	53.56	0.52	13.45	6.42
4233.5	10.69	6.50	15.60	0.56	6.48	6.02	54.14	0.54	7.96	6.23
4234.0	10.60	6.30	15.57	0.56	5.95	5.89	55.20	0.57	6.36	6.05
4234.5	10.62	6.60	15.47	0.57	5.41	5.76	55.41	0.60	5.83	5.92
4235.0	10.95	6.79	15.41	0.60	4.99	5.65	55.63	0.59	5.29	5.83
4235.5	11.42	6.60	15.44	0.62	4.78	5.58	55.80	0.58	4.84	5.73
4236.0	11.70	6.38	15.68	0.63	4.51	5.51	55.77	0.56	4.59	5.60
4236.5	11.75	6.14	16.09	0.61	4.52	5.50	55.74	0.55	4.49	5.48
4237.0	11.73	5.90	16.44	0.60	4.56	5.47	55.71	0.56	4.53	5.36
4237.5	11.69	5.69	16.50	0.56	4.58	5.40	55.68	0.56	4.59	5.31
4238.0	11.67	5.44	16.43	0.56	4.60	5.36	55.65	0.55	4.60	5.31
4238.5	11.74	5.32	16.36	0.59	4.62	5.39	55.64	0.55	4.59	5.33
4239.0	11.81	5.19	16.33	0.58	4.63	5.51	55.77	0.63	4.59	5.36
4239.5	11.88	5.08	16.45	0.57	4.63	5.63	55.91	0.65	4.65	5.40
4240.0	11.97	5.26	16.67	0.56	4.64	5.73	56.04	0.65	4.72	5.51
4240.5	12.04	5.34	16.88	0.54	4.83	5.83	56.13	0.60	4.81	5.63
4241.0	12.05	5.23	16.93	0.53	4.92	5.91	56.22	0.55	4.90	5.77
4241.5	11.97	5.05	16.92	0.50	4.91	5.99	56.30	0.50	4.98	5.93
4242.0	11.89	4.90	16.89	0.49	4.89	6.05	56.40	0.49	4.97	6.05
4242.5	11.81	4.91	16.84	0.47	4.88	6.07	56.50	0.49	4.96	6.05
4243.0	12.33	4.99	16.76	0.42	4.86	6.10	56.61	0.48	4.95	6.03
4243.5	13.17	4.90	16.81	0.38	4.87	6.15	56.70	0.47	4.94	6.01
4244.0	13.15	4.68	17.23	0.35	4.81	6.19	56.77	0.40	4.93	5.99
4244.5	12.85	4.31	17.99	0.31	4.68	6.23	56.83	0.35	4.89	6.01
4245.0	12.57	3.95	17.87	0.28	4.85	6.27	56.83	0.30	4.84	6.02
4245.5	12.45	3.88	17.63	0.26	4.86	6.31	56.80	0.26	4.78	6.02
4246.0	12.52	3.86	17.44	0.25	4.76	6.37	56.77	0.24	4.72	6.02
4246.5	12.59	3.85	17.34	0.25	4.66	6.49	56.74	0.24	4.64	6.10
4247.0	12.65	3.87	17.36	0.24	4.56	6.66	56.76	0.24	4.56	6.17
4247.5	12.69	3.89	17.42	0.24	4.47	6.96	56.78	0.24	4.50	6.28
4248.0	12.65	3.89	17.43	0.26	4.42	7.34	56.81	0.24	4.48	6.42
4248.5	12.52	3.87	17.41	0.28	4.37	7.71	56.80	0.24	4.45	6.56
4249.0	12.39	3.86	17.36	0.30	4.35	7.92	56.72	0.25	4.42	6.68
4249.5	12.26	3.85	17.28	0.31	4.36	8.02	56.63	0.25	4.40	6.89
4250.0	12.09	3.83	17.11	0.32	4.38	8.04	56.51	0.24	4.37	7.33
4250.5	11.76	3.80	16.92	0.31	4.46	8.05	56.33	0.24	4.35	7.69
4251.0	11.30	3.85	16.64	0.30	4.54	8.07	56.16	0.24	4.34	7.83
4251.5	10.94	3.89	16.24	0.30	4.64	8.08	56.06	0.24	4.34	7.96
4252.0	10.70	3.94	15.70	0.30	4.80	8.07	55.96	0.23	4.37	8.06

4252.5	10.56	4.04	15.40	0.30	4.92	8.06	55.52	0.24	4.50	8.12
4253.0	10.56	4.07	15.37	0.31	5.01	8.04	55.09	0.29	4.67	8.18
4253.5	10.62	4.02	15.52	0.34	5.11	8.04	54.89	0.36	4.88	8.24
4254.0	10.69	3.89	15.64	0.42	5.22	8.16	54.74	0.41	5.05	8.29
4254.5	10.81	3.69	15.72	0.47	5.55	8.46	54.74	0.39	5.18	8.31
4255.0	10.58	3.32	15.46	0.50	5.95	9.81	54.73	0.41	5.32	8.33
4255.5	9.75	3.10	15.06	0.52	6.44	10.49	54.61	0.46	5.40	8.45
4256.0	9.40	3.05	14.53	0.53	6.84	10.87	54.42	0.50	5.50	8.67
4256.5	8.97	3.52	14.35	0.54	7.21	11.18	54.21	0.50	5.66	8.99
4257.0	8.79	5.51	14.25	0.56	7.56	11.37	53.85	0.51	6.27	10.46
4257.5	9.27	6.73	14.13	0.58	7.91	11.33	53.69	0.54	6.94	11.05
4258.0	9.35	8.83	14.04	0.63	8.22	11.12	53.57	0.54	7.64	11.27
4258.5	9.34	8.92	14.14	0.83	8.52	10.80	53.73	0.61	8.33	11.43
4259.0	9.33	8.58	14.25	0.69	10.99	10.10	53.95	0.69	8.93	11.43
4259.5	9.33	8.44	14.36	0.48	15.60	9.41	54.18	0.72	9.69	11.37
4260.0	9.32	8.32	14.47	0.41	17.28	8.82	54.43	0.57	14.80	11.22
4260.5	9.31	8.27	14.47	0.48	17.71	8.38	54.65	0.55	16.43	10.59
4261.0	9.33	8.25	14.47	0.47	17.59	7.98	54.68	0.53	17.61	9.96
4261.5	9.39	8.37	14.47	0.46	16.96	7.88	54.70	0.53	17.79	9.19
4262.0	9.51	8.61	14.45	0.45	16.63	7.91	54.70	0.52	17.64	8.50
4262.5	9.62	8.86	14.44	0.44	16.31	7.87	54.67	0.46	17.39	8.20
4263.0	9.64	9.27	14.43	0.43	15.83	7.82	54.49	0.40	16.91	8.05
4263.5	9.70	10.15	14.42	0.43	15.46	7.79	54.31	0.38	16.16	7.95
4264.0	9.84	12.94	14.41	0.43	14.97	7.78	54.32	0.36	15.62	7.89
4264.5	9.97	15.37	14.40	0.41	14.25	7.80	54.38	0.38	14.96	7.85
4265.0	10.01	15.61	14.56	0.40	14.14	7.84	54.41	0.44	14.22	7.81
4265.5	10.00	15.94	14.73	0.41	14.37	7.86	54.42	0.46	13.80	7.81
4266.0	10.00	16.90	14.93	0.43	14.26	7.76	54.44	0.43	13.96	7.84
4266.5	10.01	19.01	15.05	0.48	13.69	7.61	54.51	0.41	14.14	7.78
4267.0	10.05	20.84	15.75	0.50	12.85	7.43	54.58	0.45	14.00	7.71
4267.5	10.80	21.50	16.28	0.51	11.90	7.27	54.66	0.52	13.55	7.63
4268.0	12.12	22.50	16.71	0.50	10.57	7.11	55.04	0.54	11.66	7.52
4268.5	12.59	22.20	17.31	0.46	8.29	7.00	56.02	0.53	9.72	7.41
4269.0	13.54	20.87	18.22	0.45	7.04	6.91	56.64	0.49	8.71	7.23
4269.5	13.75	11.45	18.53	0.47	6.34	6.83	56.98	0.45	7.25	7.09
4270.0	13.71	8.83	18.61	0.51	5.94	6.75	57.16	0.45	6.47	7.01
4270.5	13.68	8.06	18.60	0.55	5.48	6.64	57.23	0.51	5.60	6.90
4271.0	13.69	7.79	18.60	0.58	5.05	6.55	57.27	0.56	5.32	6.76
4271.5	13.70	7.83	18.60	0.58	4.92	6.46	57.32	0.55	5.06	6.65
4272.0	13.74	7.81	18.60	0.58	4.83	6.41	57.32	0.55	4.86	6.42
4272.5	13.76	7.53	18.61	0.58	4.87	6.38	57.30	0.55	4.75	6.23
4273.0	13.61	7.03	18.63	0.58	5.29	6.36	57.28	0.63	4.73	6.22
4273.5	13.45	6.52	18.67	0.55	5.34	6.36	57.27	0.63	4.73	6.22
4274.0	13.37	6.41	18.69	0.50	5.42	6.35	57.27	0.57	4.93	6.26
4274.5	13.29	6.27	18.67	0.48	5.48	6.36	57.27	0.45	5.17	6.31
4275.0	13.22	5.57	18.59	0.46	5.52	6.40	57.28	0.42	5.35	6.32
4275.5	13.18	5.42	18.45	0.44	5.79	6.44	57.29	0.40	5.57	6.33
4276.0	13.24	5.47	18.28	0.39	6.50	6.47	57.31	0.38	6.09	6.30
4276.5	13.34	5.61	18.04	0.28	6.66	6.58	57.32	0.35	6.49	6.27
4277.0	13.58	6.33	17.69	0.22	6.66	6.69	57.26	0.28	6.68	6.32
4277.5	13.71	7.71	17.64	0.20	6.64	6.81	57.20	0.23	6.80	6.54
4278.0	13.68	7.91	18.05	0.18	6.62	6.97	57.14	0.18	6.86	6.70
4278.5	13.58	7.65	18.75	0.17	6.57	7.18	57.13	0.17	6.81	6.77
4279.0	13.08	5.99	18.95	0.16	6.52	7.40	57.13	0.17	6.66	6.72
4279.5	11.85	4.71	18.90	0.16	7.17	7.63	57.29	0.16	6.75	6.76
4280.0	11.97	5.40	18.62	0.16	7.31	7.93	57.50	0.16	7.07	6.93

4280.5	12.26	6.85	17.76	0.17	7.05	8.12	57.44	0.16	7.09	7.24
4281.0	12.69	7.45	17.26	0.17	6.72	8.30	56.95	0.16	7.12	7.58
4281.5	12.86	7.54	17.30	0.18	6.40	8.42	56.29	0.16	7.03	7.84
4282.0	12.81	7.30	17.64	0.19	6.22	8.37	56.30	0.18	6.61	8.04
4282.5	12.62	6.81	17.83	0.28	6.16	8.20	56.36	0.21	6.18	8.19
4283.0	12.34	6.09	17.80	0.39	6.20	8.04	56.46	0.26	5.95	8.23
4283.5	12.20	5.97	17.62	0.48	6.19	7.84	56.67	0.34	5.97	8.18
4284.0	12.25	6.14	17.36	0.51	5.91	7.72	56.52	0.45	5.99	8.08
4284.5	12.19	6.02	17.32	0.54	5.49	7.57	56.36	0.53	5.90	7.96
4285.0	11.90	5.41	17.41	0.66	5.21	7.36	56.26	0.56	5.41	7.73
4285.5	11.64	4.55	17.33	0.79	5.32	7.01	56.16	0.54	5.29	7.45
4286.0	11.83	4.54	17.16	0.78	5.47	6.61	56.06	0.55	5.25	7.11
4286.5	12.79	4.70	17.09	0.75	5.60	6.89	56.06	0.57	5.21	6.88
4287.0	13.14	4.77	17.17	0.70	5.58	7.61	56.15	0.65	5.26	6.71
4287.5	12.83	4.37	17.97	0.68	5.51	8.15	56.23	0.67	5.39	6.77
4288.0	12.39	3.93	18.20	0.70	6.55	8.31	56.32	0.66	5.37	7.40
4288.5	11.79	3.60	18.06	0.72	7.32	8.28	56.38	0.61	5.42	7.98
4289.0	11.61	4.66	17.54	0.73	7.84	7.87	56.38	0.67	5.79	8.30
4289.5	11.56	6.62	17.23	0.70	8.11	6.51	56.39	0.67	6.51	8.36
4290.0	11.55	8.59	17.11	0.59	8.33	6.19	56.39	0.62	8.25	7.91
4290.5	11.49	10.29	17.13	0.53	10.51	6.36	56.36	0.57	9.15	7.17
4291.0	11.41	10.85	17.17	0.53	15.20	6.54	56.31	0.53	11.76	6.35
4291.5	11.32	11.00	17.20	0.62	22.39	6.74	56.26	0.51	16.05	6.07
4292.0	11.32	10.92	17.23	0.73	26.29	6.94	56.20	0.67	20.47	6.07
4292.5	11.37	10.80	17.22	0.67	27.22	7.16	56.17	0.91	23.47	6.26
4293.0	11.47	10.70	17.17	0.63	27.45	7.34	56.21	0.72	25.65	6.50
4293.5	11.52	10.76	17.03	0.56	27.61	7.41	56.24	0.56	27.11	6.79
4294.0	11.59	11.05	16.80	0.60	27.57	7.44	56.22	0.57	27.60	7.17
4294.5	11.59	11.50	16.81	0.65	27.27	7.35	56.18	0.62	27.68	7.30
4295.0	11.56	13.67	16.83	0.67	26.65	7.26	56.14	0.64	27.61	7.29
4295.5	11.57	15.90	16.85	0.65	25.85	7.12	56.14	0.56	27.38	7.25
4296.0	11.75	19.37	16.85	0.61	21.34	6.87	56.14	0.48	26.87	7.13
4296.5	12.94	20.89	16.85	0.57	18.29	6.71	56.23	0.54	26.18	6.97
4297.0	15.08	20.43	17.26	0.53	15.36	6.57	56.39	0.67	24.69	6.80
4297.5	15.04	13.22	18.15	0.49	9.16	6.38	56.55	0.67	20.41	6.63
4298.0	14.61	9.14	19.96	0.46	7.26	6.11	56.90	0.59	15.47	6.45
4298.5	13.90	6.43	20.37	0.43	5.91	5.72	58.76	0.52	8.52	6.19
4299.0	13.46	4.77	20.16	0.41	5.36	5.43	58.95	0.45	6.64	5.92
4299.5	13.38	5.37	19.65	0.38	4.82	5.41	58.81	0.36	5.96	5.69
4300.0	13.27	5.64	18.70	0.36	4.41	5.40	58.49	0.29	5.32	5.52
4300.5	13.11	5.99	18.68	0.34	4.34	5.53	58.11	0.26	4.88	5.40
4301.0	12.95	6.10	18.50	0.39	4.40	5.68	57.46	0.29	4.42	5.31
4301.5	12.90	6.12	18.33	0.43	4.62	5.84	57.00	0.36	4.43	5.31
4302.0	13.08	5.95	18.41	0.46	4.69	6.14	56.92	0.48	4.54	5.37
4302.5	13.33	5.78	18.57	0.48	4.78	6.67	56.91	0.53	4.65	5.61
4303.0	13.41	5.59	18.73	0.51	4.94	7.34	56.94	0.52	4.77	5.88
4303.5	13.44	5.38	18.80	0.53	5.12	7.81	56.94	0.53	4.87	6.24
4304.0	13.17	5.18	18.62	0.56	5.41	7.89	56.82	0.54	4.98	6.86
4304.5	12.20	5.95	18.30	0.59	5.64	7.72	56.63	0.60	5.14	7.44
4305.0	12.15	7.53	17.59	0.64	5.45	7.53	56.49	0.65	5.64	7.75
4305.5	12.89	9.41	17.43	0.63	4.92	7.29	56.38	0.65	5.67	7.59
4306.0	13.36	8.03	17.74	0.59	4.42	7.00	56.30	0.65	5.26	7.34
4306.5	13.21	6.48	18.71	0.55	4.88	6.30	56.26	0.67	4.73	7.01
4307.0	12.96	3.29	18.60	0.60	5.55	5.85	57.04	0.63	5.25	6.69
4307.5	12.97	2.59	18.44	0.67	5.87	5.63	57.18	0.59	5.88	6.48
4308.0	13.02	2.57	18.18	0.75	5.69	5.54	57.22	0.55	5.89	6.23

4308.5	13.11	2.63	18.23	0.80	5.54	5.48	57.13	0.62	5.67	5.95
4309.0	13.16	2.93	18.35	0.81	5.41	5.54	56.96	0.69	5.42	5.76
4309.5	13.07	3.26	18.57	0.73	5.44	5.68	56.85	0.82	5.18	5.67
4310.0	12.78	3.57	18.48	0.62	5.58	5.86	56.82	0.71	5.32	5.61
4310.5	12.80	3.88	18.27	0.65	5.72	6.13	56.87	0.66	5.98	5.72
4311.0	12.83	4.21	18.21	0.72	5.87	6.42	56.98	0.67	6.27	5.84
4311.5	12.81	4.73	18.28	0.78	6.03	6.69	57.09	0.72	6.30	6.08
4312.0	12.78	6.89	18.40	0.83	6.40	6.91	57.09	0.80	6.48	6.55
4312.5	12.60	7.31	18.47	0.80	7.07	7.19	57.00	0.96	6.86	7.22
4313.0	11.97	7.11	18.45	0.82	7.66	7.13	56.88	0.94	7.67	7.20
4313.5	11.62	7.36	17.98	0.87	8.37	6.92	56.75	0.90	8.33	7.17
4314.0	11.45	8.29	17.51	0.92	8.89	6.70	56.61	0.86	9.05	7.13
4314.5	11.53	10.92	17.31	0.87	8.68	6.32	56.47	0.86	9.19	6.67
4315.0	12.15	12.21	17.26	0.82	8.44	5.88	56.31	0.93	8.88	6.32
4315.5	12.79	11.31	17.37	0.81	8.19	5.24	56.31	0.99	8.55	5.95
4316.0	12.93	9.40	17.74	0.86	7.94	4.89	56.54	0.76	8.21	5.46
4316.5	12.76	6.23	18.24	0.82	7.44	4.71	56.74	0.65	7.30	5.00
4317.0	12.47	4.37	18.36	0.73	6.80	4.83	56.77	0.71	6.96	4.77
4317.5	12.28	3.24	18.34	0.61	6.67	4.95	56.73	0.77	6.82	4.75
4318.0	12.23	3.49	18.05	0.57	6.51	5.08	56.68	0.68	6.48	4.85
4318.5	12.30	4.65	17.90	0.59	6.21	5.22	56.55	0.56	6.24	4.99
4319.0	12.42	5.33	17.91	0.59	5.67	5.46	56.48	0.40	5.89	5.22
4319.5	12.58	5.97	18.00	0.56	5.66	5.71	56.59	0.44	5.53	5.38
4320.0	12.88	6.34	18.19	0.50	5.94	6.06	56.80	0.53	5.62	5.51
4320.5	13.41	6.66	18.45	0.44	6.25	6.80	57.04	0.56	5.73	5.65
4321.0	13.48	7.36	18.85	0.42	6.38	6.76	57.34	0.53	5.83	6.18
4321.5	13.18	8.12	19.06	0.41	6.34	6.72	57.42	0.47	5.89	6.47
4322.0	12.72	8.39	19.03	0.35	6.20	6.69	57.35	0.33	5.94	6.73
4322.5	13.32	10.93	18.73	0.28	5.84	6.55	57.23	0.25	5.86	6.68
4323.0	13.74	11.58	18.42	0.24	5.30	6.50	57.05	0.26	5.04	6.62
4323.5	13.76	10.23	19.09	0.27	4.49	6.53	57.04	0.28	4.32	6.50
4324.0	13.77	8.05	19.16	0.36	4.63	6.54	57.20	0.31	4.98	6.44
4324.5	13.79	3.33	19.11	0.43	5.41	6.58	57.45	0.42	5.35	6.44
4325.0	13.76	2.96	18.91	0.52	5.19	6.61	57.69	0.54	5.02	6.42
4325.5	13.62	2.89	18.69	0.51	4.67	6.65	57.72	0.52	4.45	6.41
4326.0	13.32	2.88	18.93	0.50	4.26	6.78	57.75	0.48	4.03	6.43
4326.5	13.00	2.85	19.33	0.51	4.22	6.89	57.72	0.49	3.87	6.44
4327.0	12.84	2.99	19.41	0.58	4.22	6.92	57.63	0.55	3.85	6.52
4327.5	12.76	3.27	19.11	0.67	4.22	6.80	57.45	0.62	3.88	6.63
4328.0	12.44	3.45	18.59	0.70	4.20	6.58	57.13	0.63	3.95	6.76
4328.5	12.05	4.02	18.30	0.64	4.19	6.21	56.62	0.63	4.05	6.68
4329.0	12.13	4.91	18.02	0.70	4.23	5.74	56.41	0.66	4.15	6.50
4329.5	12.33	5.06	17.96	0.86	4.32	5.14	56.19	0.71	4.20	6.12
4330.0	12.81	5.04	17.95	0.82	4.46	4.82	56.34	0.78	4.31	5.72
4330.5	13.50	4.75	18.05	0.79	4.61	4.59	56.37	0.67	4.50	5.32
4331.0	13.68	4.32	18.29	0.78	4.85	4.56	56.39	0.71	4.72	4.84
4331.5	13.74	4.03	18.64	0.78	5.12	4.57	56.41	0.91	4.98	4.59
4332.0	13.67	3.86	19.04	0.80	5.29	4.63	56.43	0.84	5.17	4.34
4332.5	13.53	3.76	19.19	0.83	5.45	4.77	56.67	0.77	5.36	4.24
4333.0	13.27	3.84	19.17	0.95	5.59	4.92	56.81	0.72	5.56	4.54
4333.5	12.62	3.97	19.10	1.00	5.74	5.22	56.80	0.84	5.76	4.96
4334.0	11.66	4.65	18.70	1.02	6.13	5.54	56.65	0.88	5.98	5.34
4334.5	11.54	6.97	17.94	1.04	6.68	5.96	56.57	0.84	6.28	5.70
4335.0	11.50	8.35	17.52	1.24	7.92	6.22	56.50	0.86	6.70	5.95
4335.5	11.62	9.49	17.24	1.51	8.36	6.30	56.42	1.11	7.23	6.06
4336.0	11.80	9.75	17.27	1.66	8.84	6.28	56.38	1.09	7.95	6.06

4336.5	11.99	9.79	17.36	1.82	9.65	6.09	56.34	0.97	8.73	6.04
4337.0	12.25	9.80	17.48	1.58	11.80	5.88	56.35	0.79	9.88	6.01
4337.5	12.80	9.69	17.64	0.64	12.56	5.61	56.37	0.82	11.22	5.94
4338.0	13.13	8.86	17.82	1.01	12.33	5.38	56.39	0.89	12.42	5.81
4338.5	12.85	6.51	18.10	0.88	11.68	5.23	56.59	0.91	12.39	5.66
4339.0	12.58	4.13	18.54	0.87	10.27	5.18	56.68	0.87	10.79	5.43
4339.5	11.90	3.27	18.23	0.86	8.33	5.17	56.61	0.81	8.52	5.30
4340.0	11.55	3.15	17.79	0.77	6.32	5.16	56.49	0.65	7.41	5.17
4340.5	11.79	3.38	17.53	0.73	6.04	5.13	56.33	0.68	6.72	5.06
4341.0	12.15	3.87	17.50	0.75	5.76	5.11	56.15	0.80	6.10	5.09
4341.5	12.71	4.96	17.89	0.82	5.47	5.11	55.95	1.07	5.76	5.13
4342.0	13.05	5.42	18.63	0.85	5.31	5.12	56.30	0.80	5.45	5.16
4342.5	13.64	5.99	19.08	0.78	5.19	5.16	56.89	0.64	5.21	5.23
4343.0	14.36	6.38	19.40	0.71	5.08	5.15	57.41	0.85	5.04	5.34
4343.5	14.62	6.47	19.73	0.65	4.98	5.12	57.86	0.99	4.95	5.30
4344.0	14.71	6.47	20.26	0.79	4.73	5.09	58.17	0.92	4.87	5.27
4344.5	14.70	6.47	20.45	0.83	4.43	5.06	58.28	0.84	4.73	5.22
4345.0	14.68	6.42	20.32	0.88	4.13	5.00	58.37	0.73	4.29	5.16
4345.5	14.61	6.32	20.20	0.95	3.84	4.99	58.50	0.64	4.07	5.11
4346.0	14.54	5.96	20.07	0.96	3.62	4.99	58.54	0.68	3.95	5.07
4346.5	14.45	5.21	19.92	0.87	3.46	4.96	58.46	0.73	3.82	5.04
4347.0	14.34	4.70	19.89	0.82	3.36	4.92	58.38	0.79	3.71	5.01
4347.5	14.24	4.31	19.92	0.80	3.27	4.87	58.36	0.78	3.63	4.99
4348.0	14.15	3.98	19.92	0.79	3.23	4.83	58.34	0.75	3.57	4.96
4348.5	14.07	3.72	19.77	0.79	3.19	4.79	58.31	0.71	3.51	4.92
4349.0	13.97	3.56	19.53	0.83	3.16	4.77	58.20	0.71	3.45	4.89
4349.5	13.85	3.46	19.42	0.86	3.13	4.77	58.06	0.79	3.40	4.87
4350.0	13.74	3.46	19.53	0.86	3.11	4.76	57.92	0.86	3.34	4.85
4350.5	13.66	3.48	19.62	0.83	3.08	4.76	57.79	0.84	3.33	4.82
4351.0	13.60	3.52	19.51	0.80	3.12	4.77	57.71	0.79	3.32	4.77
4351.5	13.59	3.59	19.36	0.76	3.18	4.78	57.57	0.79	3.36	4.72
4352.0	13.58	3.71	19.31	0.74	3.32	4.76	57.44	0.83	3.38	4.68
4352.5	13.57	3.83	19.30	0.73	3.40	4.73	57.34	0.83	3.40	4.67
4353.0	13.58	3.86	19.34	0.75	3.49	4.70	57.28	0.75	3.42	4.67
4353.5	13.62	3.78	19.38	0.78	3.60	4.69	57.22	0.80	3.45	4.67
4354.0	13.73	3.71	19.43	0.82	3.72	4.69	57.24	1.02	3.49	4.66
4354.5	13.54	3.67	19.39	0.88	3.84	4.73	57.34	0.96	3.55	4.66
4355.0	13.31	3.87	19.35	0.86	3.86	4.77	57.34	0.78	3.61	4.68
4355.5	12.88	4.05	19.19	0.84	3.83	4.77	57.34	0.70	3.68	4.71
4356.0	13.13	4.21	18.89	0.82	3.82	4.77	57.35	0.74	3.77	4.73
4356.5	13.89	4.35	19.17	0.80	3.87	4.79	57.35	0.86	3.82	4.75
4357.0	13.94	4.42	19.61	0.78	3.92	4.81	57.28	0.72	3.83	4.79
4357.5	13.93	4.40	19.74	0.76	3.98	4.80	57.21	0.65	3.83	4.85
4358.0	13.85	4.02	19.70	0.75	4.05	4.80	57.14	0.77	3.81	4.91
4358.5	13.68	3.60	19.53	0.73	4.10	4.79	57.07	0.84	3.79	4.92
4359.0	13.28	3.53	19.34	0.72	4.14	4.81	57.00	0.76	3.75	4.93
4359.5	12.92	3.50	18.90	0.78	4.18	4.83	56.91	0.84	3.70	4.94
4360.0	12.89	3.50	18.61	0.78	4.20	4.85	56.82	0.72	3.79	4.92
4360.5	13.06	3.49	18.67	0.73	4.18	4.89	56.73	0.65	3.90	4.91
4361.0	13.20	3.55	18.81	0.63	4.15	4.93	56.77	0.61	4.01	4.89
4361.5	13.28	3.64	18.97	0.56	4.13	4.97	56.83	0.64	4.12	4.93
4362.0	13.37	3.74	19.09	0.62	4.13	5.02	57.05	0.67	4.18	4.99
4362.5	14.14	3.84	19.42	0.68	4.14	5.08	57.28	0.77	4.22	5.03
4363.0	14.29	3.88	19.91	0.71	4.12	5.13	57.46	0.70	4.26	5.07
4363.5	14.38	3.88	20.18	0.67	4.10	5.21	57.58	0.58	4.30	5.11
4364.0	14.45	3.86	20.36	0.59	4.08	5.29	57.73	0.45	4.33	5.14

4364.5	14.50	3.74	20.48	0.50	4.06	5.36	57.98	0.41	4.33	5.18
4365.0	14.51	3.62	20.51	0.42	4.09	5.43	58.18	0.37	4.32	5.21
4365.5	14.47	3.52	20.48	0.34	4.13	5.48	58.31	0.35	4.32	5.25
4366.0	14.41	3.48	20.39	0.28	4.17	5.52	58.29	0.32	4.33	5.32
4366.5	14.29	3.52	20.30	0.25	4.21	5.55	58.20	0.28	4.34	5.40
4367.0	14.16	3.60	20.21	0.23	4.23	5.55	58.14	0.26	4.36	5.48
4367.5	13.97	3.67	20.12	0.22	4.26	5.59	58.10	0.22	4.37	5.57
4368.0	13.74	3.73	20.03	0.22	4.28	5.79	57.99	0.19	4.36	5.70
4368.5	13.48	3.74	19.93	0.21	4.31	6.04	57.82	0.19	4.36	5.85
4369.0	13.39	3.71	19.81	0.20	4.33	6.36	57.62	0.18	4.35	6.01
4369.5	13.49	3.64	19.53	0.19	4.35	6.75	57.40	0.18	4.35	6.17
4370.0	13.37	3.51	19.32	0.18	4.36	7.19	57.17	0.18	4.36	6.46
4370.5	12.91	3.50	19.30	0.18	4.38	7.68	56.93	0.17	4.42	7.07
4371.0	12.32	3.50	19.23	0.17	4.39	7.82	56.72	0.17	4.49	7.29
4371.5	12.37	3.61	18.84	0.16	4.42	7.87	56.66	0.16	4.57	7.45
4372.0	12.51	3.95	18.46	0.15	4.44	7.91	56.73	0.15	4.65	7.59
4372.5	12.64	4.06	18.54	0.14	4.46	8.01	56.65	0.14	4.54	7.72
4373.0	12.74	4.01	18.62	0.14	4.48	8.15	56.56	0.13	4.54	7.78
4373.5	12.67	3.92	18.68	0.13	4.55	8.18	56.63	0.13	4.67	7.85
4374.0	12.60	3.83	18.72	0.13	4.64	8.23	56.71	0.13	4.86	7.93
4374.5	12.54	3.75	18.65	0.13	4.86	8.34	56.75	0.13	5.08	8.08
4375.0	12.49	3.67	18.58	0.12	5.10	8.44	56.78	0.14	5.18	8.18
4375.5	12.41	3.62	18.53	0.12	5.32	8.99	56.85	0.15	5.22	8.26
4376.0	12.77	3.57	18.59	0.13	5.56	9.62	56.97	0.16	5.31	8.38
4376.5	13.73	3.52	18.94	0.20	5.78	10.96	57.08	0.20	5.51	8.66
4377.0	13.74	3.47	19.84	0.27	5.97	13.04	57.21	0.25	5.74	9.66
4377.5	13.41	3.42	19.82	0.37	6.10	13.95	57.28	0.36	6.02	10.91
4378.0	12.24	3.21	19.07	0.44	6.52	14.70	57.22	0.46	6.30	11.81
4378.5	12.21	3.90	18.34	0.49	8.27	15.75	57.02	0.43	7.18	13.61
4379.0	12.34	5.63	18.17	0.53	8.84	16.00	56.75	0.40	8.21	14.69
4379.5	12.47	7.32	18.25	0.57	9.04	15.81	56.42	0.48	8.50	15.47
4380.0	12.63	8.48	18.43	0.76	9.27	15.56	56.09	0.55	8.90	15.93
4380.5	12.81	8.69	18.61	0.87	10.90	14.48	55.83	0.62	9.55	16.13
4381.0	12.80	8.75	18.67	0.87	14.79	13.31	55.67	0.60	11.23	15.87
4381.5	12.79	8.57	18.76	0.85	16.47	11.97	55.67	0.64	13.69	15.11
4382.0	12.71	7.87	18.84	0.82	17.66	10.15	55.68	0.70	16.02	14.04
4382.5	12.61	7.90	18.76	0.90	18.92	8.81	55.66	0.78	16.89	11.96
4383.0	12.54	8.06	18.68	0.91	20.74	8.11	55.64	0.92	19.55	10.83
4383.5	12.51	8.40	18.61	0.81	21.91	7.58	55.62	0.86	19.91	9.92
4384.0	12.39	8.75	18.67	0.74	23.02	7.13	55.63	0.75	20.56	9.23
4384.5	12.05	9.10	18.58	0.65	24.06	7.08	55.70	0.67	21.34	7.62
4385.0	11.92	10.76	18.12	0.58	24.34	7.10	55.76	0.71	23.99	7.01
4385.5	11.83	13.17	18.01	0.56	24.36	7.19	55.71	0.71	24.34	6.90
4386.0	11.61	19.56	17.76	0.57	25.79	7.41	55.62	0.70	24.10	6.99
4386.5	11.56	20.36	17.53	0.58	28.27	7.61	55.54	0.69	24.67	7.14
4387.0	11.64	21.11	17.66	0.56	29.58	7.61	55.51	0.69	26.79	7.39
4387.5	11.80	24.92	17.98	0.52	30.98	7.58	55.48	0.60	30.44	7.44
4388.0	12.37	30.95	18.21	0.47	31.19	7.59	55.64	0.55	31.01	7.50
4388.5	12.24	33.88	18.21	0.43	32.49	7.60	55.90	0.56	31.04	7.54
4389.0	11.87	35.70	17.93	0.40	32.48	7.58	55.84	0.52	31.69	7.58
4389.5	11.44	36.89	17.58	0.34	28.94	7.54	55.67	0.47	32.87	7.61
4390.0	10.88	37.46	17.14	0.32	26.21	7.54	55.50	0.40	32.97	7.62
4390.5	10.64	35.38	16.79	0.31	23.26	7.56	55.27	0.36	30.62	7.63
4391.0	10.53	32.12	16.62	0.30	19.21	7.59	55.05	0.33	25.14	7.65
4391.5	10.91	26.87	16.68	0.30	12.97	7.54	54.84	0.31	20.57	7.61
4392.0	12.49	22.77	16.92	0.31	10.38	7.49	54.70	0.30	17.26	7.57

4392.5	12.83	14.11	17.65	0.31	7.11	7.44	54.64	0.28	14.58	7.53
4393.0	12.79	10.61	18.73	0.31	6.39	7.38	54.61	0.26	9.94	7.49
4393.5	12.99	9.09	19.01	0.32	5.89	7.33	55.04	0.26	9.76	7.47
4394.0	13.73	8.24	19.30	0.34	5.17	7.27	56.22	0.28	9.39	7.46
4394.5	14.11	7.43	19.73	0.35	4.73	7.23	56.87	0.31	8.39	7.44
4395.0	14.31	6.75	20.06	0.35	4.40	7.21	57.28	0.33	6.08	7.42
4395.5	14.30	6.36	20.10	0.36	4.11	7.26	57.48	0.34	5.51	7.39
4396.0	13.89	5.84	19.93	0.37	3.96	7.32	57.42	0.34	4.88	7.34
4396.5	12.99	5.46	19.33	0.39	3.91	7.38	57.31	0.36	4.55	7.30
4397.0	12.53	5.10	18.97	0.42	3.92	7.46	57.05	0.38	4.31	7.27
4397.5	11.92	4.86	18.64	0.42	3.96	7.54	56.69	0.38	4.13	7.27
4398.0	11.02	4.82	17.92	0.37	4.06	7.64	56.09	0.39	4.10	7.27
4398.5	11.06	4.88	16.88	0.35	4.19	7.76	55.67	0.39	4.14	7.29
4399.0	11.71	5.01	17.48	0.34	4.42	7.92	55.30	0.37	4.26	7.37
4399.5	12.26	5.29	18.10	0.34	4.65	8.10	54.98	0.35	4.46	7.46
4400.0	12.81	5.23	18.64	0.36	4.91	8.36	54.77	0.35	4.66	7.56
4400.5	12.90	4.65	18.91	0.33	5.23	8.79	54.77	0.35	4.86	7.67
4401.0	12.97	3.63	18.98	0.35	5.62	9.33	54.92	0.36	5.06	7.95
4401.5	13.02	3.89	18.98	0.39	5.73	9.86	55.33	0.37	5.27	8.27
4402.0	13.00	4.36	18.98	0.38	5.95	10.15	55.64	0.38	5.67	8.73
4402.5	12.97	4.99	18.97	0.36	6.42	10.50	55.72	0.38	6.08	9.31
4403.0	12.94	5.54	18.96	0.35	7.23	10.85	55.80	0.38	6.52	10.04
4403.5	12.89	5.63	18.96	0.34	7.93	11.11	55.76	0.38	6.99	10.36
4404.0	12.82	5.71	18.94	0.35	8.37	11.29	55.66	0.37	7.46	10.67
4404.5	12.72	5.79	18.85	0.37	8.92	11.46	55.56	0.36	8.07	10.91
4405.0	12.63	5.95	18.76	0.39	9.74	11.59	55.46	0.35	8.75	11.10
4405.5	12.53	6.16	18.66	0.40	10.05	11.62	55.36	0.35	9.31	11.29
4406.0	12.34	6.37	18.55	0.41	10.19	11.65	55.29	0.37	9.80	11.43
4406.5	12.16	6.50	18.40	0.42	10.27	11.67	55.24	0.43	10.02	11.53
4407.0	11.96	6.67	18.23	0.42	10.34	11.63	55.20	0.45	10.12	11.55
4407.5	11.78	6.88	18.06	0.42	10.36	11.59	55.17	0.45	10.22	11.57
4408.0	11.65	7.05	17.87	0.38	10.39	11.54	55.14	0.43	10.30	11.56
4408.5	11.63	7.32	17.67	0.41	10.39	11.48	55.17	0.40	10.34	11.53
4409.0	11.69	7.62	17.79	0.48	10.37	11.42	55.05	0.39	10.30	11.48
4409.5	11.83	8.23	17.96	0.52	10.34	11.34	54.86	0.37	10.27	11.42
4410.0	11.90	8.97	18.18	0.49	10.29	11.20	54.69	0.39	10.25	11.35
4410.5	11.93	9.74	18.35	0.47	10.21	11.01	54.52	0.49	10.24	11.28
4411.0	11.94	10.48	18.37	0.45	10.11	10.97	54.43	0.50	10.23	11.17
4411.5	11.95	10.97	18.36	0.42	9.94	10.94	54.34	0.50	10.13	11.05
4412.0	11.94	11.35	18.33	0.41	9.76	10.81	54.25	0.48	10.00	10.95
4412.5	11.93	11.56	18.33	0.46	9.54	10.64	54.23	0.45	9.79	10.85
4413.0	11.91	11.79	18.34	0.52	9.33	10.48	54.27	0.48	9.52	10.75
4413.5	11.88	12.08	18.34	0.56	9.20	10.28	54.31	0.51	9.35	10.62
4414.0	11.85	12.56	18.39	0.54	9.11	10.06	54.34	0.63	9.19	10.48
4414.5	11.82	12.89	18.38	0.55	9.01	9.92	54.38	0.64	9.08	10.35
4415.0	11.78	12.86	18.22	0.61	8.94	9.84	54.34	0.67	8.98	10.23
4415.5	11.76	12.76	18.04	0.78	8.88	9.77	54.29	0.73	8.90	10.11
4416.0	11.73	12.43	18.03	0.78	8.85	9.70	54.25	0.65	8.83	9.99
4416.5	11.69	12.43	18.14	0.79	8.82	9.64	54.20	0.62	8.75	9.90
4417.0	11.65	12.54	18.08	0.84	8.80	9.63	54.26	0.78	8.72	9.81
4417.5	11.60	12.47	17.96	0.91	8.77	9.54	54.33	0.74	8.70	9.72
4418.0	11.54	12.25	17.88	0.84	8.75	9.34	54.40	0.61	8.70	9.64
4418.5	11.49	12.02	17.83	0.76	8.73	8.33	54.48	0.56	8.70	9.56
4419.0	11.46	12.08	17.79	0.63	8.71	7.49	54.56	0.70	8.67	9.45
4419.5	11.45	12.38	17.75	0.75	8.67	7.03	54.61	0.91	8.64	9.11
4420.0	11.50	12.58	17.69	0.82	8.59	6.65	54.58	0.89	8.60	8.60

4420.5	11.55	12.50	17.60	0.97	8.51	6.31	54.55	0.86	8.55	7.84
4421.0	11.65	12.36	17.65	0.95	8.41	6.12	54.60	0.83	8.42	6.91
4421.5	12.11	12.19	17.72	0.90	8.16	6.00	54.68	0.87	8.30	6.39
4422.0	12.43	11.92	18.01	0.85	7.86	5.97	54.76	1.00	8.18	6.17
4422.5	12.51	11.18	18.43	0.68	7.56	5.94	54.83	0.95	7.83	5.97
4423.0	12.46	10.03	18.54	0.85	7.33	5.91	54.89	0.91	7.39	5.86
4423.5	12.32	9.37	18.55	0.95	7.17	5.92	54.95	0.93	7.15	5.81
4424.0	11.60	9.05	18.43	0.85	7.11	5.92	55.00	0.91	7.01	5.87
4424.5	11.08	8.97	18.26	0.87	7.13	5.93	54.90	0.84	6.87	5.94
4425.0	10.58	9.59	17.94	0.99	7.08	5.96	54.67	0.87	6.84	5.97
4425.5	10.17	10.69	17.68	1.04	7.03	5.98	54.37	0.93	6.86	5.94
4426.0	10.24	12.64	16.91	1.07	7.00	5.95	53.95	0.99	6.89	5.87
4426.5	10.43	14.12	16.30	1.04	6.96	5.88	53.55	1.06	6.92	5.80
4427.0	11.81	15.42	16.26	1.00	6.27	5.78	53.16	1.09	6.92	5.73
4427.5	12.65	14.27	16.94	0.95	5.66	5.67	52.92	1.11	6.80	5.68
4428.0	12.72	9.67	18.22	0.85	5.29	5.50	52.95	0.96	6.38	5.64
4428.5	12.80	7.38	18.88	0.94	5.00	5.33	54.08	0.89	5.79	5.60
4429.0	12.88	5.97	18.83	0.77	4.75	5.17	54.92	0.94	5.49	5.51
4429.5	12.90	5.23	18.85	0.85	4.55	5.06	55.06	1.01	5.19	5.41
4430.0	12.89	5.05	18.92	0.89	4.32	4.96	55.18	1.07	4.89	5.27
4430.5	12.87	5.09	18.94	0.92	4.09	4.86	55.27	1.00	4.60	5.13
4431.0	12.91	5.15	18.95	0.89	3.95	4.77	55.32	0.87	4.32	5.01
4431.5	13.08	5.23	18.95	0.84	3.85	4.75	55.38	0.83	4.04	4.99
4432.0	13.39	5.40	18.97	0.78	3.80	4.73	55.53	0.87	3.75	4.97
4432.5	13.80	5.65	19.22	0.71	3.76	4.68	55.67	0.96	3.47	4.93
4433.0	13.91	5.85	20.11	0.89	3.70	4.63	55.83	0.97	3.38	4.89
4433.5	13.79	5.87	20.18	0.90	3.63	4.59	56.01	0.90	3.55	4.86
4434.0	13.42	5.72	19.97	0.83	3.59	4.56	56.07	0.77	3.62	4.83
4434.5	13.26	5.50	19.61	0.70	3.56	4.53	56.07	0.79	3.67	4.80
4435.0	13.16	5.26	19.32	0.70	3.52	4.52	56.05	0.84	3.66	4.78
4435.5	13.12	5.04	19.13	0.81	3.48	4.50	55.90	0.80	3.62	4.76
4436.0	13.15	4.68	19.08	0.89	3.43	4.47	55.63	0.71	3.56	4.71
4436.5	13.19	4.32	19.04	0.88	3.38	4.44	55.45	0.74	3.51	4.66
4437.0	13.24	3.93	19.04	0.86	3.34	4.41	55.31	0.85	3.45	4.61
4437.5	13.25	3.81	19.10	0.79	3.29	4.34	55.19	0.96	3.42	4.56
4438.0	13.21	3.72	19.19	0.74	3.24	4.25	55.06	0.92	3.36	4.51
4438.5	13.09	3.63	19.22	0.75	3.18	4.17	55.13	0.91	3.29	4.46
4439.0	13.31	3.58	19.25	0.77	3.12	4.09	55.26	0.94	3.26	4.41
4439.5	13.57	3.54	19.29	0.81	3.09	4.02	55.41	0.87	3.30	4.36
4440.0	13.89	3.51	19.47	0.86	3.07	4.01	55.55	0.96	3.29	4.31
4440.5	13.91	3.49	19.64	0.85	3.08	4.01	55.64	1.07	3.29	4.26
4441.0	13.75	3.47	19.65	0.77	3.10	4.01	55.68	1.04	3.30	4.21
4441.5	13.65	3.45	19.59	0.76	3.16	4.01	55.71	0.86	3.30	4.21
4442.0	13.66	3.44	19.50	0.76	3.22	4.04	55.71	0.76	3.27	4.20
4442.5	13.71	3.45	19.47	0.75	3.27	4.07	55.69	0.69	3.30	4.19
4443.0	13.86	3.52	19.57	0.69	3.33	4.11	55.73	0.76	3.38	4.15
4443.5	14.12	3.63	19.79	0.80	3.40	4.14	55.82	0.97	3.47	4.09
4444.0	14.42	3.73	20.30	0.78	3.48	4.17	55.92	0.82	3.54	4.11
4444.5	14.91	3.82	20.58	0.73	3.58	4.18	56.01	0.74	3.60	4.18
4445.0	15.00	3.99	20.54	0.66	3.66	4.19	56.13	0.69	3.66	4.25
4445.5	14.61	4.30	20.49	0.62	3.61	4.19	56.27	0.70	3.63	4.29
4446.0	14.30	4.38	20.36	0.67	3.43	4.21	56.35	0.75	3.53	4.33
4446.5	14.34	4.27	20.22	0.70	3.31	4.23	56.37	0.79	3.41	4.31
4447.0	14.27	4.07	20.09	0.73	3.33	4.22	56.37	0.79	3.28	4.28
4447.5	14.04	3.70	20.00	0.82	3.40	4.17	56.21	0.68	3.18	4.20
4448.0	13.88	3.20	19.91	0.82	3.54	4.12	56.06	0.68	3.20	4.12

4448.5	13.65	2.77	19.87	0.76	3.49	4.09	55.91	0.71	3.30	4.07
4449.0	13.49	2.68	19.84	0.75	3.42	4.12	55.87	0.76	3.48	4.14
4449.5	13.36	2.75	19.81	0.78	3.34	4.15	55.86	0.83	3.51	4.22
4450.0	13.27	3.07	19.77	0.85	3.26	4.20	55.88	0.86	3.55	4.30
4450.5	13.26	3.34	19.70	0.87	3.19	4.26	55.92	0.72	3.52	4.33
4451.0	13.34	3.50	19.65	0.83	3.33	4.31	55.92	0.69	3.45	4.35
4451.5	13.32	3.49	19.63	0.79	3.48	4.36	55.89	0.77	3.42	4.35
4452.0	13.14	3.52	19.67	0.84	3.72	4.38	55.87	0.82	3.58	4.34
4452.5	13.00	3.75	19.63	0.89	3.90	4.40	55.83	0.84	3.79	4.34
4453.0	12.91	3.99	19.58	0.97	3.87	4.36	55.79	0.77	4.03	4.33
4453.5	13.37	4.06	19.55	1.01	3.83	4.31	55.75	0.72	4.10	4.33
4454.0	13.79	3.89	19.70	0.98	3.78	4.26	55.73	0.71	3.99	4.33
4454.5	13.95	3.64	20.21	0.91	3.80	4.21	55.75	0.92	3.84	4.34
4455.0	13.99	3.34	20.34	0.91	3.85	4.15	56.39	0.91	3.76	4.33
4455.5	13.97	3.09	20.38	0.96	3.99	4.16	56.95	0.85	3.71	4.33
4456.0	13.95	3.16	20.37	0.97	4.17	4.21	57.22	0.89	3.86	4.32
4456.5	13.99	3.79	20.35	0.95	4.29	4.26	57.26	0.93	4.02	4.32
4457.0	14.09	4.29	20.34	0.86	4.26	4.30	57.20	1.05	4.19	4.33
4457.5	14.20	4.43	20.33	0.80	4.23	4.33	57.14	1.07	4.26	4.34
4458.0	14.16	4.44	20.37	0.79	4.26	4.35	57.08	1.05	4.31	4.41
4458.5	14.00	4.50	20.45	0.83	4.29	4.35	57.04	1.01	4.37	4.49
4459.0	13.71	4.55	20.50	0.86	4.43	4.34	57.01	0.92	4.45	4.57
4459.5	13.68	4.63	20.41	0.89	4.47	4.32	57.01	0.78	4.51	4.64
4460.0	13.70	4.74	20.03	0.90	4.41	4.28	57.04	0.89	4.53	4.66
4460.5	13.86	4.83	20.11	0.88	4.36	4.26	57.07	0.94	4.47	4.66
4461.0	14.06	4.80	20.20	0.80	4.31	4.26	57.05	0.96	4.42	4.63
4461.5	14.82	4.52	20.45	0.76	4.25	4.47	57.02	0.94	4.36	4.60
4462.0	15.52	4.32	20.88	0.75	4.18	4.60	57.35	0.82	4.32	4.57
4462.5	15.54	4.23	21.74	0.76	4.12	4.71	57.80	0.81	4.34	4.55
4463.0	15.21	4.23	22.06	0.71	4.07	4.73	58.20	0.83	4.28	4.53
4463.5	14.45	4.24	22.04	0.67	4.02	4.70	58.47	0.91	4.16	4.53
4464.0	13.37	4.20	21.40	0.69	3.96	4.66	58.38	0.88	4.03	4.53
4464.5	12.58	4.22	20.48	0.69	3.86	4.61	58.23	0.79	3.91	4.54
4465.0	12.31	4.31	19.64	0.66	3.75	4.58	57.79	0.78	3.80	4.61
4465.5	12.37	4.28	19.22	0.57	3.61	4.57	57.13	0.76	3.71	4.70
4466.0	12.81	4.25	19.07	0.50	3.45	4.55	56.39	0.71	3.62	4.70
4466.5	14.03	4.14	19.23	0.47	3.31	4.54	55.76	0.58	3.51	4.66
4467.0	14.87	3.94	19.74	0.41	3.20	4.51	55.93	0.46	3.39	4.60
4467.5	14.75	3.53	20.75	0.36	3.11	4.49	56.56	0.40	3.27	4.55
4468.0	14.47	3.06	20.93	0.32	2.98	4.67	57.25	0.34	3.14	4.54
4468.5	14.33	2.76	20.59	0.26	2.87	4.86	57.65	0.30	2.98	4.57
4469.0	14.27	2.91	20.39	0.22	2.79	4.97	57.88	0.26	2.83	4.63
4469.5	14.22	3.05	20.35	0.18	2.87	5.08	57.73	0.22	2.72	4.69
4470.0	13.98	3.15	20.25	0.16	3.10	5.27	57.37	0.18	2.67	4.85
4470.5	13.40	3.33	20.10	0.14	3.32	5.50	57.09	0.16	2.74	5.03
4471.0	12.87	3.78	19.79	0.14	3.48	5.95	56.96	0.14	2.90	5.22
4471.5	12.62	4.22	19.36	0.14	3.76	6.29	56.91	0.12	3.14	5.43
4472.0	13.32	4.33	19.33	0.14	3.86	6.60	56.87	0.12	3.37	5.74
4472.5	13.66	4.15	19.49	0.14	3.91	6.93	56.81	0.12	3.61	6.05
4473.0	13.61	3.87	19.83	0.17	3.93	7.19	56.74	0.12	3.85	6.36
4473.5	13.55	3.54	20.19	0.20	3.91	7.42	56.70	0.14	3.95	6.70
4474.0	13.22	3.20	20.31	0.19	3.90	7.57	56.74	0.16	4.04	7.08
4474.5	12.88	2.99	20.24	0.18	3.91	7.68	56.78	0.17	4.14	7.43
4475.0	12.45	2.80	20.04	0.20	3.91	7.81	56.80	0.19	4.24	7.52
4475.5	11.72	2.73	19.79	0.27	4.12	7.83	56.70	0.21	4.25	7.58
4476.0	11.22	2.73	19.65	0.31	4.25	7.81	56.51	0.24	4.26	7.61

4476.5	11.15	2.80	19.40	0.31	4.30	7.79	56.25	0.29	4.32	7.63
4477.0	11.61	2.97	18.72	0.33	4.35	7.77	56.08	0.34	4.39	7.62
4477.5	12.25	3.18	18.55	0.39	4.39	7.75	55.90	0.39	4.57	7.63
4478.0	12.78	3.26	18.51	0.46	4.46	7.73	55.68	0.44	4.75	7.65
4478.5	12.92	3.19	18.59	0.52	4.53	7.80	55.57	0.47	4.90	7.71
4479.0	12.94	3.12	19.13	0.56	4.79	8.35	55.81	0.51	5.05	7.79
4479.5	12.90	3.12	19.70	0.63	5.36	8.87	56.09	0.54	5.24	7.93
4480.0	12.91	3.27	19.89	0.69	6.09	11.22	56.27	0.57	5.44	8.30
4480.5	12.92	3.49	19.83	0.71	6.59	14.06	56.44	0.64	5.77	8.79
4481.0	12.73	3.97	19.70	0.71	7.07	14.63	56.49	0.70	6.19	9.49
4481.5	12.41	4.74	19.62	0.71	7.68	14.13	56.48	0.72	6.79	11.58
4482.0	12.17	6.78	19.37	0.71	8.57	12.79	56.47	0.73	8.88	13.53
4482.5	12.35	9.62	18.81	0.71	9.94	11.10	56.49	0.75	9.96	14.71
4483.0	12.52	10.13	18.55	0.72	14.24	8.01	56.54	0.74	11.09	14.25
4483.5	12.57	9.28	18.49	0.71	18.78	5.03	56.45	0.64	12.38	10.59
4484.0	12.46	8.87	18.48	0.69	25.87	4.40	56.31	0.59	16.49	8.07
4484.5	12.69	8.89	18.52	0.66	32.96	4.43	56.26	0.60	20.73	5.74
4485.0	12.56	10.03	18.59	0.63	42.08	4.99	56.31	0.61	26.52	4.63
4485.5	12.49	10.30	18.63	0.59	44.08	5.71	56.41	0.55	32.30	4.57
4486.0	12.71	10.85	18.65	0.55	41.04	6.32	56.50	0.51	44.70	4.62
4486.5	13.51	12.82	18.58	0.52	39.31	6.84	56.44	0.47	42.62	5.41
4487.0	14.63	16.04	18.64	0.47	40.94	7.09	56.43	0.44	40.04	5.82
4487.5	15.07	20.24	18.93	0.38	39.55	7.60	56.54	0.42	39.83	6.25
4488.0	15.35	20.87	19.92	0.31	37.35	8.22	56.67	0.39	40.94	6.90
4488.5	15.42	21.84	21.32	0.28	37.48	8.41	56.97	0.34	40.76	7.76
4489.0	15.16	27.41	21.43	0.30	39.41	8.43	58.52	0.30	39.17	8.07
4489.5	14.62	39.77	21.42	0.35	38.23	8.36	59.26	0.28	37.55	8.32
4490.0	13.57	45.89	21.55	0.39	36.25	8.24	59.38	0.36	38.79	8.35
4490.5	12.84	48.56	21.36	0.42	33.01	8.11	59.14	0.38	39.38	8.37
4491.0	13.37	42.09	19.92	0.43	25.52	7.95	58.88	0.36	37.43	8.34
4491.5	14.08	32.37	19.78	0.43	21.16	7.77	58.53	0.35	33.51	8.24
4492.0	14.61	13.58	20.41	0.44	8.21	7.53	58.29	0.35	14.69	8.04
4492.5	15.16	3.67	21.24	0.47	6.60	7.33	58.34	0.38	12.20	7.84
4493.0	15.26	3.54	21.89	0.50	5.83	7.13	58.71	0.45	6.86	7.65
4493.5	15.10	3.62	22.08	0.54	5.46	6.95	59.44	0.49	6.01	7.44
4494.0	14.89	3.96	22.10	0.58	4.96	6.66	60.44	0.53	5.59	7.23
4494.5	14.54	4.71	21.80	0.63	4.63	6.17	60.60	0.56	5.12	7.09
4495.0	13.89	5.26	21.18	0.69	4.32	5.68	60.60	0.60	4.88	6.93
4495.5	13.43	5.68	20.80	0.72	4.27	5.28	60.56	0.64	4.69	6.69
4496.0	12.60	5.99	20.56	0.67	4.27	4.91	60.53	0.69	4.47	6.38
4496.5	11.89	5.97	20.26	0.68	4.35	4.76	60.43	0.75	4.38	6.02
4497.0	11.74	5.85	19.14	0.67	4.42	4.70	60.22	0.79	4.40	5.50
4497.5	12.10	5.63	18.79	0.66	4.60	4.69	60.02	0.75	4.51	4.88
4498.0	12.45	5.42	18.86	0.67	4.90	4.79	59.80	0.69	4.61	4.86
4498.5	12.57	5.26	19.28	0.72	5.21	5.01	59.59	0.66	4.78	4.91
4499.0	12.91	5.22	19.89	0.77	5.53	5.39	59.42	0.69	4.97	4.96
4499.5	13.23	5.21	20.09	0.82	5.94	5.76	59.34	0.72	5.16	5.17
4500.0	13.21	5.35	20.25	0.72	6.40	6.09	60.16	0.72	5.46	5.49
4500.5	13.19	5.74	20.35	0.61	6.82	6.58	61.44	0.71	5.78	5.78
4501.0	13.18	6.90	20.36	0.58	7.13	6.98	61.97	0.69	6.09	6.01
4501.5	13.11	8.69	20.34	0.59	7.40	7.35	61.98	0.73	6.37	6.24
4502.0	12.81	9.54	20.26	0.58	8.02	7.52	61.97	0.72	6.94	6.75
4502.5	12.66	10.51	19.94	0.55	11.07	7.55	61.97	0.70	7.90	7.13
4503.0	13.28	11.02	19.80	0.52	11.40	7.51	62.62	0.66	8.86	7.26
4503.5	13.48	10.23	20.15	0.53	9.43	7.42	63.69	0.61	12.14	7.33
4504.0	13.39	6.15	20.56	0.45	9.25	7.32	63.86	0.53	11.33	7.34

4504.5	13.11	4.72	20.66	0.46	9.59	7.21	63.10	0.45	9.08	7.34
4505.0	11.99	4.55	20.63	0.53	9.36	7.09	66.82	0.41	9.80	7.35
4505.5	11.04	4.97	20.03	0.68	8.97	7.00	68.29	0.61	10.10	7.33
4506.0	10.32	5.39	19.01	0.70	8.50	6.90	70.14	0.89	9.88	7.29
4506.5	9.80	5.48	18.02	0.54	7.56	6.80	70.39	0.75	9.30	7.24
4507.0	9.44	5.28	17.24	0.50	6.84	6.79	70.46	0.54	8.33	7.18
4507.5	9.26	5.08	16.74	0.50	6.51	6.78	70.17	0.47	6.97	7.08
4508.0	9.37	5.01	16.45	0.53	6.10	6.78	69.38	0.49	6.31	6.97
4508.5	9.60	5.18	16.88	0.59	5.63	6.92	66.52	0.53	5.82	6.83
4509.0	9.86	5.70	17.54	0.64	5.29	7.07	65.77	0.63	5.50	6.80
4509.5	10.07	6.70	17.71	0.68	4.91	7.06	67.45	0.66	5.35	6.84
4510.0	10.42	6.97	17.73	0.67	4.67	7.02	67.65	0.66	5.20	6.87
4510.5	10.52	6.81	17.88	0.63	4.57	6.80	68.84	0.67	5.08	6.91
4511.0	10.46	6.61	17.84	0.60	4.56	6.25	67.96	0.68	4.96	6.92
4511.5	10.37	6.46	17.70	0.63	4.55	5.17	71.38	0.69	4.83	6.91
4512.0	10.59	6.35	17.50	0.70	4.56	4.47	74.43	0.71	4.71	6.79
4512.5	11.15	6.32	18.23	0.81	4.57	4.16	75.59	0.76	4.67	6.54
4513.0	11.57	6.26	19.05	0.91	4.59	3.92	77.47	0.85	4.64	5.81
4513.5	11.88	5.72	19.24	0.92	4.69	3.82	80.89	0.87	4.64	4.46
4514.0	12.33	5.29	19.40	0.87	4.80	3.76	87.21	0.84	4.69	4.11
4514.5	12.87	5.01	19.65	0.82	4.91	3.70	87.79	0.81	4.74	3.97
4515.0	14.11	4.85	20.12	0.77	4.96	3.69	86.88	0.76	4.78	3.85
4515.5	15.00	4.78	20.64	0.72	5.00	3.71	85.72	0.97	4.83	3.76
4516.0	15.01	4.64	21.55	0.67	5.03	3.76	84.34	0.92	4.89	3.67
4516.5	14.98	4.28	22.15	0.72	5.06	3.98	84.78	0.83	4.94	3.60
4517.0	14.88	3.96	22.27	0.80	5.10	4.83	86.88	0.82	4.98	3.53
4517.5	14.34	3.95	22.31	0.88	5.20	5.28	88.68	0.79	5.00	3.76
4518.0	13.27	4.93	22.30	0.87	5.37	5.44	88.18	0.68	5.02	4.09
4518.5	12.85	6.12	22.10	0.80	5.74	5.48	87.79	0.72	5.14	4.87
4519.0	13.10	11.64	20.55	0.79	6.64	5.53	90.51	0.82	5.54	5.25
4519.5	12.74	13.91	20.71	0.87	5.44	5.58	89.17	0.90	6.21	5.39
4520.0	11.43	10.82	21.05	0.88	3.93	5.59	85.22	0.92	5.49	5.44
4520.5	10.96	8.41	20.01	0.76	5.76	5.60	86.68	0.81	4.37	5.45
4521.0	11.70	4.75	19.23	0.72	6.38	5.59	88.78	0.77	5.72	5.47
4521.5	12.73	2.76	19.27	0.75	6.15	5.55	91.51	0.81	6.49	5.43
4522.0	13.40	2.79	19.79	0.82	5.78	5.49	93.64	0.88	6.44	5.37
4522.5	13.74	3.20	20.77	0.86	5.40	5.36	94.38	0.85	6.13	5.30
4523.0	14.10	3.62	21.28	0.89	5.07	5.21	95.41	0.80	5.70	5.24
4523.5	14.38	3.51	21.73	0.73	4.86	5.08	95.55	0.76	5.16	5.18
4524.0	14.70	3.41	22.34	0.77	4.62	4.93	95.55	0.74	4.83	5.11
4524.5	14.83	3.41	22.48	0.90	4.37	4.72	95.49	0.74	4.60	5.01
4525.0	14.45	3.95	22.56	0.93	4.20	4.56	95.42	0.85	4.35	4.91
4525.5	14.32	5.17	22.96	0.94	4.07	4.53	95.32	0.94	4.17	4.80
4526.0	14.26	5.34	22.72	0.95	3.95	4.48	95.21	0.99	3.99	4.67
4526.5	13.97	5.23	22.40	0.96	3.84	4.41	95.11	0.95	3.81	4.54
4527.0	13.54	5.03	22.37	0.99	3.69	4.37	94.49	0.91	3.77	4.46
4527.5	13.46	4.83	22.31	0.95	3.55	4.35	93.54	0.86	3.71	4.41
4528.0	13.64	4.61	21.95	0.84	3.45	4.35	93.91	0.80	3.59	4.36
4528.5	14.35	4.41	21.60	0.78	3.43	4.36	94.30	0.76	3.48	4.36
4529.0	13.93	4.32	21.58	0.83	3.41	4.37	94.98	0.74	3.46	4.38
4529.5	13.58	4.30	21.94	0.89	3.40	4.38	95.33	0.74	3.45	4.41
4530.0	13.37	4.50	22.28	0.90	3.43	4.41	95.52	0.75	3.50	4.43
4530.5	13.20	4.59	21.55	0.88	3.47	4.44	95.67	0.77	3.61	4.44
4531.0	13.00	4.50	21.40	0.83	3.54	4.47	95.47	0.79	3.72	4.45
4531.5	12.97	4.38	21.45	0.77	3.59	4.50	95.10	0.84	3.59	4.47
4532.0	13.31	4.22	21.45	0.70	3.58	4.52	94.51	0.87	3.48	4.48

4532.5	13.81	4.08	21.36	0.68	3.57	4.55	94.56	0.79	3.75	4.48
4533.0	13.76	3.96	21.42	0.63	3.55	4.58	95.22	0.71	3.87	4.49
4533.5	13.45	3.79	21.71	0.56	3.54	4.63	95.84	0.64	3.79	4.49
4534.0	12.94	3.74	21.94	0.49	3.60	4.68	96.38	0.54	3.71	4.50
4534.5	12.74	3.81	21.76	0.38	3.69	4.73	96.78	0.48	3.74	4.54
4535.0	13.08	4.22	21.40	0.33	3.75	4.79	97.13	0.40	3.86	4.57
4535.5	13.32	4.27	21.08	0.26	3.78	4.85	97.37	0.31	4.06	4.64
4536.0	13.23	3.85	21.04	0.22	3.66	4.91	97.35	0.24	3.98	4.71
4536.5	13.15	3.34	21.25	0.18	3.82	4.99	97.29	0.20	3.78	4.78
4537.0	13.04	3.20	21.17	0.15	3.90	5.06	97.20	0.17	3.76	4.86
4537.5	12.90	3.27	20.61	0.13	3.94	5.13	97.11	0.15	4.05	4.94
4538.0	12.81	3.84	20.00	0.11	3.95	5.22	97.06	0.13	4.11	5.03
4538.5	12.83	4.20	19.68	0.10	3.87	5.33	97.04	0.11	4.02	5.15
4539.0	12.78	4.12	19.67	0.10	3.79	5.53	96.95	0.10	3.93	5.27
4539.5	12.79	4.04	19.65	0.11	3.74	5.73	95.99	0.08	3.82	5.41
4540.0	13.14	4.05	19.83	0.16	3.73	5.93	94.42	0.11	3.69	5.56
4540.5	13.54	4.02	20.20	0.43	3.73	6.20	93.92	0.25	3.57	5.71
4541.0	14.15	4.05	20.59	0.47	3.77	6.62	93.65	0.44	3.56	5.80
4541.5	14.96	4.00	21.08	0.48	3.80	7.08	94.03	0.48	3.55	5.92
4542.0	14.78	3.55	21.86	0.58	3.84	7.54	95.17	0.50	3.56	6.12
4542.5	14.47	3.05	21.88	0.67	3.87	7.65	96.06	0.52	3.57	6.36
4543.0	14.07	2.99	21.48	0.73	3.90	7.69	96.41	0.55	3.62	6.65
4543.5	13.47	3.17	20.94	0.71	3.93	7.64	96.70	0.78	3.69	7.06
4544.0	13.10	3.45	20.51	0.69	3.96	7.47	96.96	0.73	3.76	7.47
4544.5	12.91	3.52	20.14	0.75	4.06	7.16	97.21	0.72	3.83	7.69
4545.0	12.73	3.49	19.87	0.84	4.24	6.73	97.42	0.80	3.92	7.68
4545.5	12.71	3.39	19.87	0.91	4.47	6.05	97.52	0.96	4.05	7.42
4546.0	13.41	3.28	20.07	0.87	4.72	4.21	97.62	1.04	4.23	7.01
4546.5	13.68	3.16	20.61	0.81	5.02	3.22	97.64	0.96	4.47	6.34
4547.0	13.98	3.11	21.20	0.79	5.47	2.80	97.63	0.86	4.74	5.25
4547.5	14.27	3.10	21.52	0.80	6.05	2.94	97.59	0.78	5.18	4.27
4548.0	14.67	3.24	21.82	0.85	6.86	3.15	97.54	0.85	5.63	3.43
4548.5	14.98	3.52	22.21	0.93	8.21	3.67	97.48	0.98	6.18	2.82
4549.0	14.91	4.07	22.11	0.94	9.27	4.19	97.29	0.96	6.73	2.61
4549.5	14.84	7.01	21.90	0.91	10.50	4.68	97.12	0.95	8.73	2.70
4550.0	14.75	8.50	21.80	0.92	12.99	5.14	97.17	0.89	11.05	3.16
4550.5	14.69	9.89	21.75	0.90	16.89	5.70	97.78	0.89	14.09	3.73
4551.0	14.76	11.63	21.73	0.85	21.16	5.81	98.10	0.91	17.12	4.26
4551.5	14.95	13.61	21.76	0.80	24.71	5.74	98.07	0.92	20.15	4.74
4552.0	15.15	14.75	21.84	0.76	29.46	5.68	98.00	0.90	23.18	5.18
4552.5	15.35	16.18	21.91	0.72	39.13	5.62	97.86	0.79	24.89	5.45
4553.0	15.66	19.41	22.05	0.66	43.69	5.56	97.76	0.70	28.40	5.56
4553.5	16.21	20.38	22.34	0.61	46.94	5.48	97.75	0.66	39.03	5.59
4554.0	16.83	18.73	22.92	0.55	43.69	5.41	97.87	0.64	45.53	5.55
4554.5	16.87	16.24	23.37	0.38	41.40	5.33	97.92	0.58	47.00	5.43
4555.0	16.84	10.24	23.41	0.36	15.12	5.23	97.91	0.50	46.81	5.28
4555.5	16.82	3.62	23.36	0.26	6.58	5.14	97.92	0.44	36.37	5.18
4556.0	16.89	2.82	23.31	0.18	5.75	5.04	98.19	0.39	11.86	5.07
4556.5	16.97	2.99	24.13	0.16	5.14	5.10	98.26	0.35	6.75	4.99
4557.0	17.10	3.57	24.27	0.18	4.74	5.19	98.25	0.24	5.84	4.90
4557.5	17.14	4.03	24.31	0.23	4.44	5.30	98.13	0.15	5.19	4.87
4558.0	17.04	4.50	24.31	0.32	4.19	5.40	97.88	0.13	4.57	4.87
4558.5	16.62	4.98	24.31	0.38	3.93	5.48	97.60	0.30	4.20	4.91
4559.0	16.18	5.41	23.58	0.46	3.74	5.58	97.81	0.35	3.99	5.00
4559.5	15.82	5.69	23.10	0.66	3.68	5.76	98.42	0.35	3.82	5.12
4560.0	15.76	5.64	23.03	0.69	3.63	6.04	98.42	0.46	3.65	5.28

4560.5	15.74	5.14	23.03	0.67	3.57	6.31	98.29	0.64	3.56	5.53
4561.0	15.69	4.87	23.05	0.65	3.55	6.43	98.10	0.71	3.60	5.84
4561.5	15.68	4.65	23.09	0.62	3.54	6.34	97.97	0.73	3.71	6.08
4562.0	15.84	4.58	23.15	0.70	3.53	6.04	97.85	0.72	3.75	6.26
4562.5	16.16	4.64	23.33	0.80	3.51	5.15	97.74	0.67	3.69	6.21
4563.0	16.43	4.67	23.54	0.88	3.50	4.20	97.68	0.64	3.59	6.13
4563.5	16.34	4.57	23.66	0.93	3.56	3.44	97.64	0.78	3.50	5.68
4564.0	16.03	4.22	23.26	0.93	3.63	2.86	97.61	0.84	3.51	5.00
4564.5	15.74	3.88	22.75	0.90	3.69	2.31	97.58	0.74	3.63	4.29
4565.0	15.06	3.60	22.47	0.86	3.75	2.12	97.53	0.76	3.79	3.44
4565.5	14.65	3.34	22.09	0.80	3.91	2.19	97.49	0.84	4.03	2.38
4566.0	14.55	3.10	21.63	0.75	4.12	2.48	97.44	0.86	4.26	2.13
4566.5	14.69	2.90	21.72	0.78	4.36	3.33	97.38	0.86	4.44	2.15
4567.0	15.18	2.73	22.15	0.81	4.61	4.26	97.28	0.88	4.59	2.42
4567.5	15.60	2.62	22.98	0.85	5.15	5.22	97.15	0.93	4.55	2.73
4568.0	14.70	2.53	22.86	0.85	5.86	6.20	96.71	0.97	4.76	3.63
4568.5	14.34	4.04	22.29	0.82	7.01	6.94	95.57	0.90	5.79	4.54
4569.0	14.28	7.19	21.47	0.78	8.59	7.21	90.52	0.88	7.02	5.63
4569.5	14.22	11.18	21.40	0.74	11.49	7.12	88.51	0.85	8.59	6.49
4570.0	14.21	12.54	21.33	0.78	32.43	7.03	90.14	0.77	10.22	6.85
4570.5	14.24	13.55	21.33	0.89	52.30	6.85	88.26	0.74	18.94	6.85
4571.0	14.29	13.30	21.35	0.96	66.95	6.67	88.35	0.76	35.17	6.75
4571.5	14.76	11.69	21.60	0.99	80.90	6.46	86.12	0.79	51.41	6.54
4572.0	15.15	5.69	22.66	0.96	73.82	6.19	83.10	0.82	67.63	6.27
4572.5	15.30	2.46	22.71	0.92	15.04	5.93	82.25	0.84	80.59	6.02
4573.0	15.45	1.60	22.77	0.89	9.94	5.67	82.71	0.78	43.10	5.78
4573.5	15.64	1.14	23.08	0.86	7.49	5.51	81.03	0.74	15.63	5.49
4574.0	15.86	1.28	23.55	0.77	5.94	5.39	84.17	0.81	11.25	5.33
4574.5	15.86	1.69	23.47	0.69	4.98	5.29	82.50	0.87	6.86	5.25
4575.0	15.64	2.69	23.37	0.79	4.39	5.21	80.99	0.88	5.79	5.18
4575.5	15.48	5.28	23.18	0.81	4.23	5.16	80.83	0.89	4.94	5.12
4576.0	15.24	6.54	22.81	0.79	4.11	5.13	80.29	0.88	4.20	5.12
4576.5	15.14	6.92	22.60	0.77	4.00	5.11	78.56	0.85	3.91	5.12
4577.0	15.09	7.10	22.47	0.75	3.95	5.09	71.10	0.80	3.84	5.12
4577.5	14.86	7.07	22.53	0.73	3.91	5.07	67.23	0.87	3.80	5.11
4578.0	14.45	6.98	22.42	0.74	3.87	5.04	65.04	0.86	3.74	5.08
4578.5	14.24	6.73	22.11	0.72	3.84	5.01	63.54	0.80	3.69	5.05
4579.0	14.30	6.30	21.62	0.69	3.80	4.99	62.12	0.83	3.67	5.01
4579.5	14.76	5.62	21.78	0.54	3.74	4.97	61.48	0.91	3.67	4.95
4580.0	15.05	5.21	22.14	0.47	3.67	4.99	60.89	0.82	3.69	4.92
4580.5	15.17	4.86	22.60	0.45	3.69	5.01	60.46	0.72	3.70	4.91
4581.0	15.29	4.55	22.71	0.44	3.71	5.04	65.48	0.66	3.69	4.90
4581.5	15.37	4.34	22.82	0.46	3.73	5.07	69.50	0.52	3.70	4.88
4582.0	15.45	4.15	22.91	0.51	3.74	5.11	68.48	0.47	3.77	4.89
4582.5	15.58	3.98	22.96	0.50	3.75	5.18	69.26	0.45	3.75	4.96
4583.0	15.65	3.88	23.02	0.48	3.78	5.34	67.73	0.45	3.72	5.00
4583.5	15.68	3.89	23.10	0.50	3.81	5.50	65.01	0.45	3.70	5.03
4584.0	15.72	3.92	23.19	0.65	3.76	5.64	73.58	0.44	3.68	5.08
4584.5	15.95	3.93	23.30	0.82	3.72	5.74	73.23	0.42	3.66	5.15
4585.0	16.11	3.90	23.41	0.85	3.67	5.78	71.72	0.40	3.64	5.23
4585.5	16.00	3.82	23.42	0.83	3.62	6.00	70.89	0.50	3.62	5.30
4586.0	15.71	3.74	23.35	0.80	3.59	6.21	82.25	0.60	3.60	5.37
4586.5	15.30	3.67	22.94	0.77	3.57	6.26	84.63	0.82	3.56	5.46
4587.0	15.00	3.64	22.19	0.78	3.54	5.90	88.74	0.85	3.53	5.56
4587.5	14.92	3.62	21.84	0.86	3.55	5.17	92.79	0.82	3.53	5.84
4588.0	14.89	3.60	21.83	0.93	3.59	4.10	93.11	0.83	3.54	6.12

4588.5	14.86	3.58	21.92	0.91	3.63	3.40	93.12	0.85	3.54	6.04
4589.0	14.85	3.56	22.05	0.85	3.72	3.01	93.99	0.87	3.53	5.85
4589.5	14.85	3.53	22.18	0.79	3.83	2.87	93.87	0.88	3.50	5.36
4590.0	14.85	3.47	22.30	0.77	3.95	2.78	95.71	0.77	3.46	3.00
4590.5	14.83	3.38	22.32	0.88	4.07	2.70	96.81	0.78	3.42	2.72
4591.0	14.78	3.30	22.38	0.90	4.19	2.74	96.91	0.88	3.49	2.64
4591.5	14.83	3.28	22.44	0.90	4.33	2.79	95.32	0.86	3.61	2.61
4592.0	15.01	3.36	22.48	0.89	4.61	3.14	73.83	0.83	3.75	2.57
4592.5	16.07	3.27	23.34	0.92	4.86	3.87	57.05	0.79	3.88	2.59
4593.0	16.38	3.12	23.94	0.96	5.19	4.89	57.19	0.83	4.02	2.71
4593.5	16.54	2.88	24.18	0.91	5.62	5.46	57.32	0.87	4.17	3.18
4594.0	16.19	3.12	23.93	0.86	5.80	5.62	57.45	0.87	4.44	3.91
4594.5	15.83	4.25	23.60	0.85	6.51	5.74	57.72	0.81	4.91	4.73
4595.0	15.94	12.57	23.58	0.85	6.79	5.58	57.84	0.75	5.54	5.53
4595.5	16.64	15.02	23.79	0.85	6.63	5.44	57.94	0.78	6.58	5.85
4596.0	16.84	14.11	24.51	0.85	6.43	5.31	58.03	0.82	6.60	5.76
4596.5	16.51	12.13	24.44	0.92	6.69	5.11	58.04	0.86	6.26	5.63
4597.0	15.91	4.57	23.50	0.98	7.05	4.86	58.03	0.89	6.19	5.39
4597.5	15.15	2.84	22.87	1.03	7.28	4.71	57.95	0.92	6.57	5.24
4598.0	14.92	2.74	22.50	0.99	6.73	4.56	57.76	0.89	7.05	5.12
4598.5	14.66	2.46	22.36	0.95	5.79	4.46	57.30	0.86	7.24	5.05
4599.0	14.06	2.12	22.29	0.90	5.04	4.41	56.67	0.83	5.21	4.98
4599.5	13.77	1.96	22.21	0.85	4.59	4.37	55.93	0.86	4.52	4.91
4600.0	13.59	2.07	22.01	0.89	4.40	4.33	55.42	1.06	4.18	4.81
4600.5	13.47	2.29	21.35	0.95	4.32	4.30	54.97	1.06	4.07	4.71
4601.0	13.36	2.81	21.14	0.87	4.25	4.27	54.66	0.98	3.98	4.59
4601.5	13.28	5.68	20.93	0.82	4.23	4.24	54.36	0.94	3.94	4.46
4602.0	13.20	6.28	20.85	0.91	4.21	4.21	54.19	0.90	3.90	4.33
4602.5	13.15	6.32	20.88	0.92	4.18	4.20	53.99	0.87	3.90	4.26
4603.0	13.11	5.97	20.99	0.86	4.16	4.21	53.72	0.93	3.92	4.21
4603.5	13.08	5.78	21.08	0.79	4.17	4.22	53.47	1.00	3.97	4.16
4604.0	13.09	5.65	21.12	0.80	4.18	4.22	53.36	1.00	4.03	4.11
4604.5	13.10	5.59	21.09	0.92	4.20	4.22	53.30	0.83	4.08	4.07
4605.0	13.12	5.50	21.05	0.96	4.17	4.23	53.26	0.77	4.12	4.02
4605.5	13.13	5.33	21.03	0.98	4.12	4.26	53.23	0.82	4.15	4.00
4606.0	13.15	4.79	21.04	0.88	3.97	4.30	53.21	0.84	4.13	4.10
4606.5	13.18	4.32	21.10	0.80	3.86	4.35	53.22	0.79	4.10	4.17
4607.0	13.19	4.20	21.17	0.74	3.79	4.38	53.25	0.75	3.97	4.21
4607.5	13.20	4.10	21.27	0.71	3.73	4.42	53.93	0.83	3.82	4.24
4608.0	13.21	3.99	21.39	0.69	3.66	4.46	54.52	0.81	3.67	4.30
4608.5	13.28	3.91	21.49	0.68	3.61	4.50	54.88	0.77	3.56	4.35
4609.0	13.40	3.83	21.59	0.66	3.56	4.57	54.82	0.73	3.54	4.40
4609.5	13.54	3.75	21.68	0.74	3.51	4.61	54.75	0.79	3.53	4.45
4610.0	13.68	3.74	21.74	0.85	3.47	4.61	54.67	0.90	3.53	4.48
4610.5	13.83	3.77	21.78	0.97	3.48	4.62	54.63	0.81	3.53	4.52
4611.0	13.99	3.80	21.89	0.99	3.49	4.62	54.63	0.77	3.52	4.56
4611.5	14.20	3.86	22.02	0.94	3.49	4.61	54.61	0.80	3.51	4.59
4612.0	14.36	3.91	22.17	0.88	3.48	4.59	54.58	0.97	3.50	4.59
4612.5	14.43	3.92	22.17	0.83	3.46	4.58	54.57	0.81	3.48	4.59
4613.0	14.41	3.88	22.08	0.76	3.44	4.49	54.58	0.77	3.52	4.57
4613.5	14.37	3.80	21.97	0.77	3.46	4.40	54.59	0.91	3.55	4.50
4614.0	14.32	3.73	21.94	0.80	3.50	4.31	54.60	0.98	3.59	4.44
4614.5	14.18	3.69	21.97	0.77	3.53	4.24	54.62	0.93	3.53	4.39
4615.0	14.05	3.64	22.05	0.80	3.55	4.19	54.66	0.88	3.48	4.35
4615.5	13.90	3.49	21.98	0.99	3.56	4.21	54.71	0.78	3.43	4.24
4616.0	13.75	3.45	21.82	0.94	3.58	4.23	54.74	0.81	3.39	4.13

4616.5	13.60	3.58	21.49	0.90	3.60	4.26	54.71	0.86	3.36	4.03
4617.0	13.56	3.78	21.44	0.89	3.63	4.28	54.69	0.92	3.37	3.92
4617.5	13.60	3.98	21.65	0.87	3.66	4.32	54.65	0.93	3.39	3.97
4618.0	15.07	4.06	22.04	0.84	3.71	4.44	54.60	0.78	3.42	4.05
4618.5	15.77	4.06	22.96	0.69	3.82	4.56	54.77	0.73	3.46	4.13
4619.0	16.19	4.05	24.79	0.60	3.96	4.65	55.49	0.74	3.54	4.22
4619.5	16.46	4.04	24.90	0.50	4.05	4.74	56.67	0.73	3.63	4.31
4620.0	16.72	4.47	25.04	0.42	3.98	4.81	57.48	0.64	3.71	4.41
4620.5	16.99	4.80	25.15	0.37	3.70	4.89	57.72	0.53	3.68	4.58
4621.0	16.79	4.44	24.84	0.32	3.58	4.93	57.86	0.44	3.47	4.70
4621.5	16.39	4.10	23.61	0.34	3.86	4.98	57.83	0.38	3.69	4.81
4622.0	16.03	4.40	23.57	0.39	3.97	5.02	57.77	0.33	3.87	4.90
4622.5	16.03	4.53	23.63	0.41	3.97	5.08	57.67	0.28	3.85	4.95
4623.0	16.05	4.26	23.70	0.47	3.96	5.19	57.50	0.27	3.80	4.99
4623.5	16.10	3.94	23.81	0.58	3.95	5.30	57.19	0.42	3.89	5.05
4624.0	16.13	3.69	23.94	0.70	3.94	5.45	57.17	0.46	4.02	5.18
4624.5	16.17	3.60	24.10	0.69	3.92	5.67	57.24	0.59	3.95	5.40
4625.0	16.23	3.53	24.34	0.68	3.89	6.06	57.31	0.68	3.87	5.60
4625.5	16.41	3.56	24.62	0.70	3.85	6.59	57.40	0.74	3.80	5.76
4626.0	16.57	3.60	24.94	0.78	3.83	6.71	57.47	0.79	3.73	6.07
4626.5	16.70	3.71	25.17	0.80	3.82	6.63	57.48	0.77	3.69	6.21
4627.0	16.66	3.84	25.16	0.77	3.82	6.34	57.48	0.69	3.66	6.33
4627.5	16.51	3.94	25.11	0.78	3.84	5.16	57.44	0.61	3.66	5.77
4628.0	16.09	3.93	24.80	0.83	3.85	3.65	57.41	0.64	3.66	4.82
4628.5	15.65	3.82	24.12	0.81	3.84	2.88	57.13	0.69	3.68	3.87
4629.0	15.65	3.67	23.54	0.77	3.84	2.65	56.62	0.76	3.70	3.10
4629.5	15.55	3.50	23.47	0.72	3.84	2.53	55.78	0.81	3.72	2.68
4630.0	15.91	3.32	23.76	0.73	3.95	2.41	55.89	0.79	3.77	2.46
4630.5	16.26	3.08	24.23	0.77	4.05	2.30	56.31	0.77	3.83	2.40
4631.0	16.83	2.88	24.52	0.78	4.17	2.30	56.71	0.82	3.90	2.36
4631.5	17.20	2.74	24.80	0.76	4.30	2.86	57.12	0.87	4.06	2.35
4632.0	17.29	2.67	25.01	0.74	4.61	3.64	57.42	0.86	4.34	2.91
4632.5	17.39	2.86	25.16	0.71	4.99	4.76	57.62	0.82	4.62	3.61
4633.0	17.37	3.13	25.08	0.76	5.59	5.91	57.69	0.78	4.94	4.41
4633.5	17.32	4.38	24.79	0.88	6.35	6.17	57.74	0.74	5.26	5.84
4634.0	17.27	8.82	24.46	0.93	7.08	6.30	57.79	0.69	6.19	6.39
4634.5	17.20	11.96	24.19	0.87	8.07	6.13	57.72	0.70	6.68	6.35
4635.0	17.16	17.00	24.28	0.83	11.40	5.90	57.59	0.74	8.21	6.24
4635.5	17.19	15.76	24.51	0.81	18.71	5.66	57.68	0.81	12.10	6.08
4636.0	17.42	13.65	24.83	0.80	25.36	5.46	57.83	0.79	18.90	5.84
4636.5	17.62	3.67	25.20	0.79	13.99	5.26	57.98	0.74	26.44	5.61
4637.0	17.78	2.11	25.40	0.69	8.33	5.23	58.09	0.67	15.32	5.41
4637.5	17.86	1.70	25.45	0.50	6.11	5.22	58.15	0.58	7.87	5.29
4638.0	17.87	1.71	25.34	0.31	5.43	5.22	58.17	0.51	6.35	5.24
4638.5	17.82	1.75	25.10	0.24	4.89	5.22	58.13	0.47	5.51	5.21
4639.0	17.69	1.82	24.86	0.18	4.44	5.26	57.95	0.37	4.95	5.22
4639.5	17.50	1.93	24.69	0.15	4.15	5.35	57.73	0.21	4.59	5.24
4640.0	17.30	2.57	24.49	0.15	3.98	5.54	57.50	0.17	4.36	5.26
4640.5	17.24	3.81	24.40	0.17	3.87	5.67	57.32	0.15	4.14	5.29
4641.0	17.25	5.22	24.30	0.21	3.79	5.83	57.16	0.14	3.98	5.35
4641.5	17.21	6.07	24.03	0.23	3.72	6.08	56.94	0.12	3.86	5.42
4642.0	17.04	5.97	23.80	0.22	3.68	6.25	56.83	0.14	3.81	5.48
4642.5	16.82	5.65	23.71	0.21	3.68	6.49	56.78	0.15	3.78	5.64
4643.0	16.61	5.30	23.64	0.21	3.69	6.63	56.74	0.15	3.72	5.85
4643.5	16.40	4.91	23.62	0.22	3.70	6.65	56.71	0.14	3.71	6.02
4644.0	16.26	4.44	23.61	0.23	3.72	6.51	56.69	0.13	3.69	6.23

4644.5	16.21	4.02	23.62	0.35	3.73	6.37	56.66	0.11	3.68	6.46
4645.0	16.26	3.68	23.63	0.53	3.73	6.21	56.64	0.09	3.69	6.64
4645.5	16.31	3.27	23.63	0.70	3.73	6.02	56.61	0.15	3.70	6.49
4646.0	16.36	3.11	23.62	0.68	3.73	5.83	56.62	0.35	3.72	6.28
4646.5	16.13	3.40	23.59	0.59	3.77	5.68	56.66	0.44	3.73	6.00
4647.0	15.89	3.44	23.51	0.60	3.81	5.59	56.70	0.57	3.74	5.75
4647.5	15.86	3.36	23.43	0.69	3.86	5.52	56.73	0.54	3.75	5.59
4648.0	15.94	3.19	23.35	0.66	3.92	5.46	56.73	0.53	3.79	5.44
4648.5	16.13	2.82	23.34	0.61	3.99	5.89	56.73	0.62	3.86	5.26
4649.0	16.30	2.45	23.45	0.61	4.24	6.97	56.73	0.72	3.93	5.34
4649.5	16.46	2.45	23.74	0.78	4.35	9.09	56.74	0.73	4.03	6.02
4650.0	17.07	2.55	24.44	0.83	4.64	8.85	56.83	0.71	4.22	6.96
4650.5	17.23	2.66	24.47	0.78	4.98	7.46	57.16	0.75	4.49	8.22
4651.0	17.10	3.33	24.07	0.77	5.63	5.68	57.32	0.80	4.84	9.14
4651.5	16.97	5.59	24.05	0.83	6.73	5.09	57.27	0.84	5.18	7.84
4652.0	16.88	8.12	24.11	0.91	7.53	4.61	56.95	0.88	5.75	5.44
4652.5	16.81	8.12	24.16	0.97	8.77	4.80	56.70	0.96	6.38	4.93
4653.0	16.77	7.21	24.15	0.86	12.72	5.05	56.60	0.75	7.05	4.66
4653.5	16.76	6.77	24.09	0.66	22.85	5.33	56.50	0.99	8.14	4.87
4654.0	16.70	7.08	23.75	0.82	24.28	5.63	56.49	0.92	18.34	5.07
4654.5	16.67	7.56	23.44	0.82	27.35	5.92	56.49	0.83	23.53	5.34
4655.0	16.76	7.75	23.57	0.79	27.68	6.13	56.48	0.76	26.35	5.68
4655.5	16.86	7.96	23.64	0.69	27.93	6.22	56.47	0.76	27.22	6.06
4656.0	16.94	8.31	23.64	0.70	28.98	6.16	56.46	0.82	27.53	6.20
4656.5	16.99	8.82	23.63	0.76	29.49	6.05	56.44	0.91	28.74	6.29
4657.0	16.97	10.01	23.58	0.72	29.45	5.94	56.43	0.78	29.61	6.33
4657.5	16.95	11.95	23.38	0.66	29.45	5.74	56.43	0.66	29.69	6.27
4658.0	16.38	16.82	23.00	0.71	29.18	5.50	56.38	0.68	29.42	6.08
4658.5	15.32	24.39	22.27	0.79	26.61	5.28	56.31	0.72	28.56	5.89
4659.0	15.21	28.18	21.74	1.02	23.89	5.15	56.25	0.81	23.34	5.70
4659.5	15.11	26.72	21.88	0.90	16.86	5.06	56.20	0.84	19.79	5.49
4660.0	14.61	14.16	21.75	0.84	9.77	4.99	55.64	0.74	12.98	5.26
4660.5	13.83	10.37	21.11	0.87	6.62	4.92	55.20	0.85	6.72	5.12
4661.0	13.72	4.92	20.88	0.89	6.00	4.88	54.73	0.82	6.32	5.06
4661.5	13.67	5.11	20.80	0.80	5.53	4.84	54.35	0.79	5.99	5.05
4662.0	13.80	5.71	20.77	0.91	4.68	4.80	54.03	0.79	4.86	5.00
4662.5	14.18	6.10	21.10	1.04	3.98	4.74	53.86	0.85	4.20	4.96
4663.0	14.59	6.20	21.99	0.95	3.80	4.66	53.83	0.96	3.89	4.91
4663.5	14.97	6.13	22.06	0.89	3.77	4.61	54.54	1.02	3.66	4.88
4664.0	14.95	6.02	22.10	0.93	3.73	4.59	54.99	0.86	3.48	4.86
4664.5	14.88	5.97	21.79	0.99	3.69	4.58	55.34	0.84	3.39	4.83
4665.0	14.78	6.12	21.62	0.92	3.67	4.55	55.22	0.81	3.34	4.81
4665.5	15.05	6.28	21.64	0.83	3.66	4.50	55.07	0.85	3.38	4.76
4666.0	15.86	6.01	22.07	0.77	3.62	4.49	54.97	0.89	3.41	4.70
4666.5	16.95	5.38	23.27	0.48	3.58	4.51	55.00	0.93	3.41	4.63
4667.0	17.19	4.40	24.06	0.87	3.56	4.57	55.24	0.97	3.39	4.56
4667.5	16.96	3.94	23.82	0.78	3.57	4.65	55.89	0.93	3.38	4.51
4668.0	15.57	3.88	22.33	0.48	3.58	4.61	56.56	0.89	3.39	4.46
4668.5	13.65	3.97	20.54	0.95	3.63	4.56	56.59	0.83	3.40	4.42
4669.0	13.15	4.21	19.98	1.11	3.68	4.55	56.46	0.89	3.40	4.40
4669.5	12.95	4.53	19.82	1.14	3.72	4.50	54.54	1.07	3.42	4.38
4670.0	13.08	4.73	19.91	1.03	3.76	4.45	53.41	1.07	3.44	4.34
4670.5	13.23	4.70	20.07	0.91	3.79	4.36	53.34	0.97	3.48	4.30
4671.0	13.49	4.32	20.55	0.90	3.83	4.25	53.48	0.94	3.51	4.26
4671.5	15.05	3.95	21.79	0.95	3.86	4.15	53.63	1.04	3.53	4.22
4672.0	15.69	3.55	22.57	1.00	3.88	4.08	53.87	0.89	3.54	4.18

4672.5	15.79	3.39	22.68	0.96	3.85	4.04	54.17	0.92	3.56	4.14
4673.0	15.69	3.43	22.68	0.95	3.81	3.99	55.49	1.01	3.57	4.10
4673.5	15.81	3.49	22.75	1.04	3.73	3.95	56.14	1.10	3.53	4.07
4674.0	16.26	3.56	23.12	1.05	3.64	3.97	56.32	1.10	3.48	4.03
4674.5	16.53	3.63	23.61	0.94	3.54	3.99	56.45	1.03	3.42	4.00
4675.0	16.61	3.67	23.82	1.07	3.44	3.99	56.48	0.93	3.34	4.02
4675.5	16.69	3.71	23.71	1.03	3.35	3.99	56.43	0.84	3.26	4.05
4676.0	16.69	3.75	23.50	0.95	3.31	3.99	56.33	0.81	3.25	4.09
4676.5	16.69	3.78	23.33	0.84	3.31	3.98	56.27	1.06	3.24	4.08
4677.0	16.68	3.82	23.23	0.83	3.30	3.99	56.23	1.04	3.23	4.06
4677.5	16.63	3.83	23.18	0.90	3.30	4.03	56.29	0.96	3.19	4.05
4678.0	16.57	3.77	23.17	1.00	3.30	4.06	56.36	0.91	3.14	4.03
4678.5	16.53	3.70	23.15	0.74	3.30	4.10	56.42	0.95	3.09	4.01
4679.0	16.51	3.62	23.13	0.75	3.30	4.13	56.49	1.00	3.04	4.01
4679.5	16.50	3.53	23.13	0.80	3.31	4.16	56.52	0.92	2.98	4.04
4680.0	16.49	3.44	23.13	0.85	3.31	4.19	56.52	0.92	2.98	4.05
4680.5	16.50	3.38	23.11	0.91	3.32	4.22	56.52	0.89	2.99	4.06
4681.0	16.51	3.33	23.07	0.91	3.33	4.24	56.53	0.83	3.00	4.07
4681.5	16.53	3.28	23.05	0.87	3.37	4.27	56.53	0.71	3.01	4.09
4682.0	16.55	3.25	23.04	0.80	3.41	4.29	56.48	0.95	3.02	4.12
4682.5	16.58	3.23	23.04	0.72	3.46	4.31	56.43	1.00	3.03	4.16
4683.0	16.60	3.21	23.05	0.68	3.49	4.34	56.38	0.83	3.04	4.25
4683.5	16.62	3.20	23.01	0.65	3.49	4.40	56.30	0.78	3.06	4.34
4684.0	16.63	3.21	22.93	0.69	3.49	4.46	56.23	0.69	3.07	4.42
4684.5	16.64	3.21	22.86	0.70	3.50	4.52	56.15	0.71	3.08	4.49
4685.0	16.63	3.22	22.81	0.68	3.50	4.59	56.09	0.76	3.10	4.56
4685.5	16.62	3.24	22.77	0.66	3.50	4.67	56.03	0.80	3.12	4.62
4686.0	16.60	3.26	22.74	0.61	3.50	4.74	55.96	0.77	3.13	4.69
4686.5	16.58	3.27	22.71	0.52	3.50	4.82	55.91	0.71	3.13	4.76
4687.0	16.52	3.24	22.65	0.41	3.49	4.92	55.85	0.62	3.13	4.83
4687.5	16.44	3.22	22.55	0.34	3.48	5.01	55.79	0.54	3.13	4.91
4688.0	16.24	3.20	22.37	0.36	3.48	5.14	55.62	0.45	3.15	4.99
4688.5	16.08	3.18	22.17	0.43	3.48	5.26	55.45	0.44	3.19	5.03
4689.0	16.05	3.20	21.84	0.36	3.52	5.37	55.38	0.44	3.23	5.06
4689.5	16.03	3.24	21.74	0.29	3.55	5.48	55.45	0.41	3.27	5.08
4690.0	16.02	3.26	21.69	0.29	3.57	5.58	55.59	0.23	3.33	5.15
4690.5	16.01	3.27	21.65	0.36	3.59	5.69	55.69	0.22	3.38	5.23
4691.0	16.01	3.27	21.65	0.37	3.63	5.84	55.75	0.24	3.44	5.32
4691.5	15.97	3.26	21.64	0.30	3.67	5.99	55.94	0.26	3.50	5.43
4692.0	15.94	3.26	21.63	0.22	3.73	6.19	56.52	0.33	3.56	5.57
4692.5	15.91	3.29	21.64	0.16	3.80	6.41	57.33	0.30	3.63	5.73
4693.0	15.89	3.38	21.67	0.15	3.86	6.68	58.24	0.23	3.70	5.89
4693.5	15.87	3.48	21.74	0.16	3.93	6.84	59.33	0.19	3.78	6.07
4694.0	15.85	3.61	21.84	0.18	4.01	6.97	59.84	0.16	3.83	6.26
4694.5	15.89	3.69	22.01	0.29	4.08	7.06	60.21	0.14	3.88	6.49
4695.0	16.43	3.65	22.57	0.35	4.17	7.44	60.67	0.13	4.01	6.70
4695.5	17.46	3.42	23.85	0.38	4.27	7.90	61.57	0.17	4.13	6.87
4696.0	17.94	3.07	24.27	0.41	4.36	8.37	62.44	0.25	4.25	6.91
4696.5	18.25	3.03	24.40	0.44	4.55	8.09	63.01	0.34	4.40	6.91
4697.0	18.34	3.15	24.36	0.48	4.75	7.46	63.96	0.47	4.56	7.32
4697.5	18.24	3.47	23.03	0.71	4.88	6.44	65.51	0.63	4.65	7.94
4698.0	15.84	3.82	21.90	0.80	5.05	5.36	67.01	0.71	4.77	8.30
4698.5	15.39	4.18	21.09	0.68	5.50	4.89	68.27	0.77	4.91	7.93
4699.0	15.18	4.39	20.85	0.55	6.12	4.98	69.13	0.81	5.16	7.57
4699.5	15.50	4.48	21.13	0.61	6.80	5.01	68.80	0.81	5.58	7.14
4700.0	16.73	4.58	22.76	0.75	7.44	3.75	68.60	0.77	6.33	5.77

4700.5	17.39	4.37	23.38	0.71	8.48	2.22	68.50	0.74	6.64	5.01
4701.0	17.84	3.79	23.26	0.65	9.86	1.87	68.53	0.70	6.89	4.99
4701.5	18.11	3.25	23.00	0.80	11.43	2.21	69.85	0.78	7.63	5.03
4702.0	18.03	3.99	22.68	0.95	10.39	2.64	71.32	0.95	10.03	2.17
4702.5	17.49	6.01	22.52	0.86	8.95	3.27	73.32	0.93	11.12	1.80
4703.0	16.89	7.21	22.26	0.98	10.58	4.33	74.19	0.78	10.28	1.97
4703.5	16.88	6.28	22.11	1.00	12.80	5.15	74.64	0.56	8.71	2.31
4704.0	17.05	5.24	23.53	0.96	14.88	5.25	75.30	0.75	9.22	3.08
4704.5	19.05	4.19	24.97	0.83	14.30	5.37	76.47	0.91	11.40	4.97
4705.0	20.44	12.32	25.45	0.73	15.63	5.50	77.62	0.78	14.38	5.15
4705.5	20.63	15.90	25.50	0.66	30.20	5.68	78.47	0.73	14.24	5.23
4706.0	20.45	18.57	25.29	0.63	46.58	5.76	80.57	0.66	14.11	5.29
4706.5	19.45	15.21	24.44	0.68	62.79	5.78	83.90	0.54	15.20	5.39
4707.0	18.72	13.31	23.04	0.78	67.78	5.51	85.09	0.90	32.13	5.67
4707.5	18.31	11.49	22.93	0.84	58.22	5.12	85.35	0.92	68.34	5.97
4708.0	18.22	12.20	23.00	0.87	48.79	4.97	85.49	0.83	62.97	5.86
4708.5	18.21	13.36	23.19	0.86	39.36	4.84	85.67	0.83	52.21	5.67
4709.0	18.29	18.92	23.26	0.82	11.55	4.71	85.94	0.87	51.35	5.47
4709.5	18.31	9.72	23.23	0.73	6.10	4.60	86.28	0.94	8.77	5.27
4710.0	18.32	4.24	23.00	0.68	5.37	4.51	89.73	0.92	7.40	5.06
4710.5	17.87	1.52	22.65	0.84	4.81	4.46	90.43	0.81	6.92	4.83
4711.0	17.36	1.77	22.25	0.81	4.40	4.41	91.00	0.72	5.44	4.59
4711.5	16.93	2.81	21.88	0.76	4.10	4.35	91.35	0.64	4.80	4.39
4712.0	16.48	5.01	21.44	0.75	3.82	4.28	92.21	0.78	4.29	4.29
4712.5	16.68	5.31	22.11	0.85	3.70	4.23	91.87	0.84	3.80	4.25
4713.0	17.36	5.40	22.69	0.82	3.64	4.18	91.85	0.88	3.65	4.22
4713.5	17.39	5.44	22.75	0.79	3.61	4.13	94.11	0.91	3.51	4.19
4714.0	17.38	5.54	22.80	0.76	3.60	4.15	94.63	0.96	3.36	4.15
4714.5	17.60	5.64	23.07	0.73	3.58	4.18	94.96	1.07	3.27	4.12
4715.0	18.09	5.87	23.52	0.83	3.57	4.21	95.19	0.99	3.27	4.08
4715.5	18.23	5.62	23.73	0.91	3.55	4.24	95.36	0.83	3.27	4.06
4716.0	18.18	4.87	23.58	0.88	3.52	4.29	95.46	0.85	3.25	4.04
4716.5	17.25	4.33	23.05	0.85	3.49	4.34	95.39	0.89	3.18	4.05
4717.0	16.20	4.06	22.19	0.83	3.46	4.36	95.33	0.93	3.10	4.06
4717.5	15.18	4.02	20.85	0.81	3.43	4.35	95.24	0.94	3.04	4.08
4718.0	15.04	4.00	20.45	0.83	3.40	4.33	95.15	0.93	3.05	4.09
4718.5	15.21	3.98	20.58	0.89	3.40	4.31	95.07	0.85	3.06	4.11
4719.0	15.53	3.95	20.91	1.01	3.41	4.31	94.99	0.81	3.13	4.12
4719.5	15.94	3.89	21.14	1.13	3.43	4.31	94.91	0.79	3.21	4.12
4720.0	16.22	3.78	21.43	1.14	3.46	4.32	94.96	0.90	3.30	4.11
4720.5	16.39	3.65	21.81	1.08	3.53	4.29	95.24	0.88	3.38	4.10
4721.0	16.44	3.52	21.97	1.03	3.54	4.27	95.59	0.81	3.46	4.09
4721.5	16.57	3.35	22.01	0.97	3.44	4.25	95.74	0.74	3.47	4.08
4722.0	16.85	3.18	22.12	0.86	3.34	4.21	95.49	0.79	3.46	4.09
4722.5	17.19	3.06	22.41	0.76	3.38	4.17	95.06	0.83	3.43	4.10
4723.0	16.83	2.99	22.56	0.75	3.41	4.13	94.50	0.75	3.40	4.10
4723.5	16.34	3.02	21.80	0.81	3.59	4.08	93.86	0.67	3.40	4.07
4724.0	16.20	3.18	21.20	0.88	3.74	4.02	93.37	0.64	3.39	4.08
4724.5	16.37	3.35	21.16	0.83	3.71	4.00	92.74	0.64	3.39	4.10
4725.0	16.62	3.44	21.53	0.72	3.69	3.99	91.34	0.65	3.37	4.10
4725.5	16.78	3.49	21.83	0.64	3.65	4.00	92.30	0.68	3.35	4.07
4726.0	16.95	3.51	22.06	0.62	3.62	4.02	92.60	0.75	3.33	4.07
4726.5	17.47	3.49	22.27	0.62	3.58	4.04	92.29	0.75	3.35	4.10
4727.0	17.67	3.47	22.55	0.61	3.58	4.11	91.80	0.67	3.37	4.10
4727.5	17.05	3.47	22.47	0.60	3.59	4.20	91.17	0.64	3.40	4.10
4728.0	16.08	3.47	22.17	0.58	3.61	4.29	90.45	0.71	3.42	4.10

4728.5	15.68	3.53	20.65	0.55	3.57	4.43	90.43	0.67	3.43	4.10
4729.0	15.57	3.60	20.13	0.51	3.54	4.47	93.23	0.62	3.43	4.11
4729.5	15.46	3.74	20.08	0.49	3.61	4.50	93.82	0.58	3.44	4.07
4730.0	15.36	3.86	20.05	0.59	3.67	4.51	93.65	0.52	3.46	4.06
4730.5	15.22	3.91	20.03	0.74	3.71	4.52	93.36	0.49	3.49	4.09
4731.0	15.02	3.90	20.01	0.71	3.80	4.56	93.08	0.49	3.56	4.13
4731.5	14.74	3.86	19.92	0.69	3.91	4.62	92.55	0.50	3.67	4.26
4732.0	15.15	3.78	20.48	0.86	3.98	4.77	91.71	0.54	3.82	4.38
4732.5	16.75	3.70	21.48	0.80	3.93	4.94	90.49	0.60	3.96	4.53
4733.0	17.97	3.62	22.53	0.73	3.85	4.81	89.23	0.58	3.89	4.66
4733.5	18.19	3.56	23.02	0.85	3.68	4.61	87.88	0.55	3.73	4.77
4734.0	18.12	3.50	22.79	0.95	3.56	4.33	85.98	0.58	3.58	4.83
4734.5	17.71	3.45	22.36	0.95	3.45	4.12	81.54	0.85	3.47	4.79
4735.0	17.30	3.41	21.74	0.90	3.50	3.99	80.75	0.91	3.40	4.65
4735.5	16.98	3.37	21.31	0.80	3.56	4.00	80.70	0.90	3.38	4.46
4736.0	16.85	3.34	21.27	0.78	3.63	4.02	60.80	0.84	3.39	4.27
4736.5	16.69	3.32	20.98	0.88	3.73	4.07	58.10	0.78	3.62	4.08
4737.0	16.44	3.29	20.69	0.92	3.83	4.13	56.20	0.85	3.85	3.94
4737.5	16.23	3.23	20.66	0.90	3.93	4.20	54.93	0.94	3.89	3.97
4738.0	16.23	3.17	20.79	0.92	4.05	4.30	54.37	0.91	3.93	4.03
4738.5	16.41	3.08	20.92	0.97	4.19	4.39	54.23	0.87	3.97	4.08
4739.0	16.66	3.03	20.62	1.00	4.34	4.51	54.12	0.90	4.01	4.23
4739.5	16.78	3.06	20.21	0.99	4.53	4.64	54.05	0.96	4.22	4.49
4740.0	16.61	3.45	19.80	0.95	4.71	4.81	54.05	1.02	4.43	4.67
4740.5	16.25	4.98	19.55	0.91	4.95	4.87	54.05	0.95	4.60	4.83
4741.0	15.93	5.96	19.45	0.85	5.26	4.84	54.04	1.06	4.79	4.97
4741.5	15.69	6.66	19.47	0.76	5.60	4.77	53.85	0.93	5.04	4.96
4742.0	15.48	7.07	19.42	0.66	5.97	4.70	53.67	0.85	5.42	4.91
4742.5	15.37	6.75	18.96	0.75	6.15	4.59	53.46	0.78	5.81	4.86
4743.0	15.18	6.16	18.07	1.01	6.22	4.48	53.23	1.02	6.09	4.83
4743.5	14.50	5.24	17.75	1.21	5.98	4.37	52.91	0.85	6.21	4.81
4744.0	14.03	4.72	17.69	1.07	5.69	4.23	52.32	0.85	6.32	4.77
4744.5	13.84	4.69	18.50	0.91	5.24	4.09	52.26	0.92	6.40	4.72
4745.0	14.08	4.64	19.39	0.73	4.87	3.98	52.05	1.06	6.22	4.65
4745.5	15.27	4.54	20.44	0.91	4.57	3.90	50.94	1.10	5.85	4.58
4746.0	16.62	4.05	21.47	0.96	4.32	3.84	50.92	1.03	5.38	4.52
4746.5	17.48	3.78	22.11	0.98	4.09	3.89	51.33	0.91	4.81	4.47
4747.0	17.56	3.66	21.84	0.94	3.87	4.00	52.16	0.75	4.21	4.41
4747.5	16.66	3.84	21.15	0.90	3.72	4.05	53.53	1.01	3.96	4.34
4748.0	15.74	4.18	19.77	0.84	3.57	4.09	54.68	1.08	3.73	4.28
4748.5	14.76	4.57	18.27	0.79	3.56	4.12	55.19	1.02	3.53	4.24
4749.0	13.49	4.64	17.77	0.72	3.57	4.14	55.11	0.96	3.39	4.21
4749.5	13.09	4.66	17.53	0.73	3.59	4.17	54.73	0.84	3.32	4.20
4750.0	12.81	4.74	17.41	0.75	3.61	4.21	53.93	0.79	3.32	4.22
4750.5	12.74	4.84	17.39	0.76	3.62	4.25	52.54	0.75	3.32	4.25
4751.0	12.95	4.74	17.44	0.75	3.63	4.30	51.47	0.73	3.33	4.29
4751.5	13.33	4.56	17.61	0.71	3.64	4.37	50.39	0.74	3.35	4.34
4752.0	13.58	4.33	18.07	0.69	3.62	4.45	50.13	0.75	3.36	4.39
4752.5	13.87	4.08	18.86	0.67	3.59	4.52	50.13	0.72	3.37	4.46
4753.0	14.29	3.69	19.30	0.65	3.57	4.57	50.42	0.70	3.37	4.56
4753.5	14.67	3.44	19.66	0.65	3.56	4.61	50.84	0.77	3.39	4.59
4754.0	15.02	3.27	19.97	0.65	3.55	4.66	51.29	0.77	3.42	4.62
4754.5	15.28	3.17	20.39	0.65	3.53	4.69	51.83	0.74	3.45	4.64
4755.0	16.10	3.13	20.95	0.63	3.48	4.76	52.40	0.71	3.49	4.67
4755.5	16.36	3.17	20.97	0.61	3.42	4.86	53.01	0.69	3.54	4.71
4756.0	16.41	3.19	20.87	0.60	3.34	4.95	53.40	0.66	3.57	4.77

4756.5	16.39	3.14	20.82	0.59	3.27	5.06	53.64	0.63	3.55	4.85
4757.0	16.37	3.09	20.81	0.58	3.27	5.19	53.75	0.60	3.53	4.93
4757.5	16.35	3.07	20.85	0.57	3.28	5.28	53.75	0.59	3.52	5.01
4758.0	16.32	3.07	20.86	0.56	3.33	5.32	53.77	0.57	3.51	5.07
4758.5	16.30	3.13	20.83	0.55	3.46	5.36	53.79	0.57	3.56	5.13
4759.0	16.13	3.12	20.58	0.54	3.53	5.40	53.71	0.57	3.65	5.19
4759.5	15.07	3.11	19.92	0.53	3.49	5.44	53.37	0.59	3.69	5.29
4760.0	14.20	3.47	18.67	0.52	3.36	5.54	53.41	0.63	3.72	5.37
4760.5	13.51	3.56	17.39	0.50	3.17	5.73	53.31	0.61	3.66	5.44
4761.0	12.46	3.13	16.73	0.46	3.16	5.93	52.87	0.59	3.44	5.51
4761.5	11.90	2.64	16.20	0.39	3.73	6.11	51.33	0.54	3.19	5.61
4762.0	11.41	2.59	15.82	0.30	4.25	6.38	50.37	0.45	3.27	5.71
4762.5	11.21	2.72	15.70	0.24	4.52	6.68	49.49	0.40	4.03	5.86
4763.0	11.11	2.89	15.63	0.22	4.68	7.10	48.72	0.38	4.31	6.04
4763.5	11.24	3.08	15.65	0.21	4.92	7.54	48.33	0.26	4.49	6.29
4764.0	11.71	3.29	15.83	0.20	5.17	8.00	48.08	0.22	4.68	6.57
4764.5	12.09	3.72	16.45	0.19	5.44	8.46	47.97	0.20	4.93	6.92
4765.0	12.11	4.43	16.52	0.18	5.78	8.92	47.97	0.18	5.19	7.37
4765.5	11.91	4.83	16.50	0.17	6.05	9.39	48.05	0.17	5.33	8.16
4766.0	11.67	4.90	16.42	0.17	6.23	10.06	48.15	0.15	5.48	8.76
4766.5	11.41	4.92	15.82	0.17	6.53	10.50	48.43	0.14	5.95	9.27
4767.0	11.11	4.69	15.37	0.16	7.14	10.85	48.63	0.14	6.58	9.58
4767.5	10.86	4.42	15.19	0.16	7.95	11.06	48.71	0.14	7.04	9.93
4768.0	10.83	4.41	15.10	0.16	8.74	11.26	48.35	0.14	7.47	10.42
4768.5	11.05	4.59	15.19	0.16	8.95	11.16	47.88	0.14	8.21	11.07
4769.0	11.27	4.90	15.30	0.16	8.90	11.07	47.32	0.14	8.66	11.14
4769.5	12.08	4.89	15.58	0.17	8.84	10.96	47.36	0.14	8.75	11.08
4770.0	12.98	4.79	16.88	0.19	8.73	10.72	47.68	0.15	8.72	11.01
4770.5	13.33	4.65	17.27	0.25	8.62	10.41	48.04	0.15	8.61	10.87
4771.0	13.52	4.66	17.59	0.32	8.52	10.14	48.41	0.15	8.51	10.69
4771.5	13.49	5.61	17.95	0.40	8.40	9.98	48.97	0.16	8.53	10.45
4772.0	13.18	6.17	17.73	0.47	7.90	9.82	49.71	0.19	8.48	10.16
4772.5	12.86	6.76	17.37	0.46	7.48	9.68	51.72	0.36	7.90	9.87
4773.0	12.91	6.80	17.15	0.44	7.19	9.80	55.87	0.38	7.04	9.60
4773.5	13.16	6.64	16.99	0.44	6.99	11.18	62.07	0.38	6.84	9.72
4774.0	13.87	6.31	17.19	0.62	6.89	12.55	66.90	0.38	6.79	10.56
4774.5	14.30	6.06	17.44	0.78	7.44	13.55	68.66	0.56	7.22	11.45
4775.0	14.62	6.69	17.79	0.77	8.77	13.83	74.05	0.58	7.83	12.34
4775.5	14.39	7.75	18.92	0.73	9.28	13.90	74.05	0.62	8.43	13.15
4776.0	14.01	10.24	18.89	0.64	9.54	13.68	73.57	0.62	9.39	13.76
4776.5	13.25	12.47	18.13	0.59	9.84	13.33	73.06	0.57	10.27	13.88
4777.0	12.86	14.15	17.68	0.73	12.87	11.85	75.46	0.55	11.82	13.91
4777.5	12.67	14.06	17.26	0.63	15.16	10.35	78.89	0.67	14.79	13.41
4778.0	12.59	13.89	17.08	0.54	17.97	9.63	79.63	0.74	17.19	12.55
4778.5	12.52	13.76	17.01	0.52	22.92	9.42	79.44	0.69	18.66	11.74
4779.0	12.45	13.46	16.94	0.66	25.90	9.21	79.03	0.63	22.05	10.99
4779.5	12.31	13.23	16.86	0.62	26.99	8.99	78.63	0.48	24.75	9.65
4780.0	12.08	13.13	16.74	0.54	27.85	8.80	81.12	0.48	25.85	9.24
4780.5	11.85	13.44	16.63	0.39	28.95	8.74	82.55	0.41	27.31	9.05
4781.0	11.62	14.31	16.50	0.43	29.44	8.74	78.51	0.46	28.12	8.89
4781.5	11.38	18.14	16.32	0.46	29.78	8.74	79.15	0.50	28.44	8.73
4782.0	11.14	19.27	16.12	0.41	30.45	8.69	80.82	0.41	28.90	8.64
4782.5	11.02	20.13	15.86	0.35	31.09	8.62	81.76	0.36	29.78	8.64
4783.0	10.94	21.34	15.52	0.32	31.57	8.51	82.80	0.34	31.00	8.61
4783.5	10.87	27.32	15.35	0.50	31.24	8.38	82.81	0.32	31.40	8.57
4784.0	10.76	30.87	15.27	0.54	30.56	8.26	82.31	0.25	31.34	8.52

4784.5	10.61	33.36	15.20	0.57	29.73	8.16	84.72	0.17	30.88	8.49
4785.0	10.25	32.94	14.97	0.64	28.44	8.15	85.11	0.41	29.57	8.45
4785.5	9.53	20.41	14.58	0.00	26.00	8.14	84.96	0.00	28.24	8.33
4786.0	7.47	16.07	13.82	0.00	14.70	8.04	83.19	0.00	20.51	8.03
4786.5	6.54	16.01	13.03	0.00	13.53	7.89	80.56	0.00	14.00	7.77
4787.0	4.83	15.73	11.77	0.00	12.25	7.75	67.13	0.00	13.76	7.65
4787.5	6.52	14.50	10.31	0.00	9.59	7.53	60.45	0.00	13.28	7.58
4788.0	7.37	11.72	9.67	0.00	7.55	7.13	46.61	0.00	9.77	7.52
4788.5	7.85	11.26	11.65	0.00	6.59	6.16	44.62	0.00	8.09	7.44
4789.0	8.98	11.35	12.18	0.00	6.14	5.40	43.73	0.00	6.96	7.27
4789.5	10.07	11.16	13.02	0.00	5.81	4.76	41.63	0.00	6.46	6.95
4790.0	10.75	10.57	14.09	0.00	5.54	4.52	43.38	0.00	5.85	6.40
4790.5	11.44	9.77	16.23	0.00	5.30	0.00	0.00	0.00	5.50	4.67
4791.0	12.21	9.18	17.63	0.00	5.18	0.00	0.00	0.00	5.22	3.06
4791.5	12.98	8.26	18.30	0.00	5.10	0.00	0.00	0.00	5.02	0.53
4792.0	13.39	6.67	18.55	0.00	5.08	0.00	0.00	0.00	4.84	0.00
4792.5	13.43	6.08	18.50	0.00	5.06	0.00	0.00	0.00	4.70	0.00
4793.0	13.45	5.90	18.32	0.00	5.09	0.00	0.00	0.00	4.65	0.00
4793.5	13.46	5.73	18.16	0.00	5.32	0.00	0.00	0.00	4.82	0.00
4794.0	13.47	5.95	18.11	0.00	6.18	0.00	0.00	0.00	5.18	0.00
4794.5	13.47	7.33	18.07	0.00	7.06	0.00	0.00	0.00	6.07	0.00
4795.0	13.48	9.04	18.05	0.00	7.61	0.00	0.00	0.00	6.93	0.00
4795.5	13.49	10.68	18.04	0.00	8.08	0.00	0.00	0.00	7.44	0.00
4796.0	13.50	11.86	18.05	0.00	8.70	0.00	0.00	0.00	8.03	0.00
4796.5	13.51	11.91	18.06	0.00	9.54	0.00	0.00	0.00	8.64	0.00
4797.0	13.52	11.35	18.07	0.00	8.70	0.00	0.00	0.00	9.18	0.00
4797.5	13.52	10.19	18.08	0.00	7.14	0.00	0.00	0.00	8.89	0.00
4798.0	13.53	7.51	18.09	0.00	5.84	0.00	0.00	0.00	6.95	0.00
4798.5	13.52	3.95	18.10	0.00	4.92	0.00	0.00	0.00	6.00	0.00
4799.0	13.49	4.06	18.11	0.00	4.82	0.00	0.00	0.00	5.60	0.00
4799.5	13.51	4.23	18.11	0.00	4.76	0.00	0.00	0.00	5.05	0.00
4800.0	13.52	4.34	18.12	0.00	4.72	0.00	0.00	0.00	0.13	0.00

CLACKAMAS GEOTHERMAL TEST WELL NO. 1 (CTGH-1)
SONIC LOG TABULAR PRINTOUT
LOGGED BY: COLOG, INC.
DATE: SEPTEMBER 6, 1986

(JLI)

DEPTH	AMP	DT
4220.0	24.73%	0.0000
4220.5	43.34%	0.0000
4221.0	61.95%	0.0000
4221.5	58.55%	0.0000
4222.0	58.81%	0.0000
4222.5	60.72%	0.0000
4223.0	14.72%	0.0000
4223.5	34.39%	0.0000
4224.0	54.06%	0.0000
4224.5	73.73%	0.0000
4225.0	28.38%	21.7827
4225.5	60.62%	54.2059
4226.0	73.43%	81.9915
4226.5	37.32%	7.5380
4227.0	65.42%	8.1980
4227.5	39.58%	8.8587
4228.0	38.98%	9.5193
4228.5	71.72%	8.3906
4229.0	75.15%	6.7017
4229.5	69.91%	5.0141
4230.0	72.49%	200.0000
4230.5	31.24%	53.8847
4231.0	73.84%	77.1531
4231.5	76.70%	82.5144
4232.0	71.50%	83.7582
4232.5	69.19%	86.7295
4233.0	48.77%	74.3073
4233.5	70.00%	73.9961
4234.0	29.52%	59.2250
4234.5	52.78%	4.7907
4235.0	24.75%	6.5574
4235.5	40.41%	8.4421
4236.0	67.05%	27.5547
4236.5	47.16%	46.6774
4237.0	23.68%	65.7999
4237.5	33.11%	81.5975
4238.0	61.36%	83.6622
4238.5	67.63%	81.7832
4239.0	66.43%	79.0529
4239.5	64.92%	76.9548
4240.0	67.65%	75.1555
4240.5	67.94%	78.0892
4241.0	66.00%	79.3414
4241.5	65.30%	80.6865
4242.0	63.05%	81.4067
4242.5	56.05%	82.4476
4243.0	44.02%	82.0963
4243.5	38.58%	81.7446
4244.0	36.54%	81.3933

Note: Sonic deltat (DT) is in microsec. Used a 1-foot spacing between the 2 receivers (3' and 4' from transmitter, respectively). Therefore, deltat is microsec/ft and 1/deltat is velocity in ft/sec.

4244.5	34.27%	81.1390
4245.0	36.70%	81.3367
4245.5	39.33%	81.0072
4246.0	44.11%	80.0522
4246.5	42.96%	78.9286
4247.0	48.89%	77.9952
4247.5	56.97%	78.1880
4248.0	57.88%	78.4016
4248.5	56.73%	79.1833
4249.0	55.47%	79.9651
4249.5	55.99%	81.0254
4250.0	56.64%	82.8811
4250.5	57.18%	84.8173
4251.0	46.47%	86.8538
4251.5	21.43%	87.7596
4252.0	40.80%	79.2059
4252.5	51.48%	65.4236
4253.0	52.56%	61.5514
4253.5	53.07%	60.6730
4254.0	58.49%	58.5148
4254.5	64.35%	55.1295
4255.0	66.31%	52.0276
4255.5	18.68%	54.2997
4256.0	17.55%	53.8260
4256.5	16.42%	54.0742
4257.0	44.50%	54.4092
4257.5	37.73%	55.0303
4258.0	48.57%	20.2770
4258.5	45.30%	15.8201
4259.0	53.73%	36.6994
4259.5	69.65%	53.8879
4260.0	28.82%	54.4556
4260.5	66.63%	54.7317
4261.0	69.57%	53.5108
4261.5	68.37%	54.3088
4262.0	63.36%	54.9552
4262.5	27.09%	27.7856
4263.0	47.86%	56.0831
4263.5	63.65%	57.3240
4264.0	64.74%	23.9585
4264.5	63.65%	26.6663
4265.0	61.71%	32.9452
4265.5	59.77%	56.2939
4266.0	60.08%	34.2702
4266.5	61.72%	5.2198
4267.0	63.46%	50.1506
4267.5	65.17%	71.3925
4268.0	63.40%	72.8242
4268.5	56.59%	73.8324
4269.0	14.69%	72.8568
4269.5	15.00%	72.0011
4270.0	15.31%	74.3826
4270.5	21.10%	76.7642
4271.0	43.95%	72.6158
4271.5	45.74%	69.0774
4272.0	13.27%	63.8702

4272.5	37.40%	63.1055
4273.0	52.15%	63.1970
4273.5	55.70%	62.3218
4274.0	63.05%	59.7357
4274.5	25.63%	62.9492
4275.0	68.87%	66.9469
4275.5	66.10%	62.1562
4276.0	62.73%	32.9251
4276.5	61.01%	71.3912
4277.0	48.02%	62.9592
4277.5	28.58%	35.4949
4278.0	63.78%	47.4202
4278.5	63.04%	0.8834
4279.0	60.18%	17.4463
4279.5	62.27%	38.1851
4280.0	66.18%	190.0000
4280.5	67.28%	71.2056
4281.0	64.59%	74.6925
4281.5	63.23%	73.2357
4282.0	60.45%	67.0548
4282.5	58.16%	83.2466
4283.0	59.04%	82.5624
4283.5	60.80%	70.1866
4284.0	22.86%	26.9022
4284.5	40.31%	61.1122
4285.0	57.76%	74.3575
4285.5	69.46%	63.1951
4286.0	16.00%	53.9180
4286.5	65.05%	54.1323
4287.0	39.50%	54.3367
4287.5	69.77%	54.4467
4288.0	70.84%	54.5566
4288.5	69.14%	54.6577
4289.0	15.68%	54.7408
4289.5	41.76%	54.3747
4290.0	71.36%	53.2900
4290.5	71.16%	51.3131
4291.0	70.34%	51.8987
4291.5	71.34%	52.4841
4292.0	75.34%	52.3991
4292.5	77.50%	33.2864
4293.0	70.23%	14.1739
4293.5	19.59%	3.3829
4294.0	65.46%	2.5240
4294.5	17.47%	1.6651
4295.0	39.76%	0.8068
4295.5	42.52%	0.6023
4296.0	19.45%	20.7589
4296.5	46.57%	40.8954
4297.0	52.69%	61.0519
4297.5	53.94%	75.8981
4298.0	56.77%	76.7278
4298.5	19.33%	78.3477
4299.0	49.58%	20.2570
4299.5	78.06%	48.7051
4300.0	77.93%	77.1531

4300.5	75.76%	15.6796
4301.0	60.55%	52.2585
4301.5	58.38%	3.4933
4302.0	56.96%	25.1355
4302.5	54.85%	46.7777
4303.0	50.88%	68.3196
4303.5	48.20%	85.7157
4304.0	46.35%	84.3379
4304.5	47.00%	81.5963
4305.0	54.57%	78.9801
4305.5	58.22%	10.2791
4306.0	70.44%	80.0441
4306.5	73.06%	81.6477
4307.0	71.83%	79.6344
4307.5	70.11%	78.1368
4308.0	69.75%	75.7402
4308.5	74.48%	71.8304
4309.0	76.45%	70.8417
4309.5	75.31%	69.7048
4310.0	64.09%	66.5779
4310.5	57.68%	55.1320
4311.0	68.93%	52.0553
4311.5	60.99%	51.6384
4312.0	61.82%	52.7504
4312.5	59.85%	58.4922
4313.0	59.66%	71.4716
4313.5	61.40%	78.6036
4314.0	63.17%	82.5260
4314.5	62.42%	82.4858
4315.0	59.54%	80.0542
4315.5	67.05%	79.1532
4316.0	72.44%	78.5748
4316.5	71.89%	35.5751
4317.0	71.29%	65.8904
4317.5	70.53%	71.6246
4318.0	69.86%	70.4834
4318.5	70.50%	13.6117
4319.0	71.23%	38.2051
4319.5	70.98%	62.8187
4320.0	69.74%	86.0720
4320.5	68.78%	95.8191
4321.0	69.76%	93.2694
4321.5	70.69%	90.4612
4322.0	71.47%	89.1381
4322.5	72.81%	94.3610
4323.0	74.55%	97.1052
4323.5	77.79%	99.2797
4324.0	74.69%	96.6672
4324.5	69.80%	93.2596
4325.0	61.32%	93.8783
4325.5	58.33%	94.4974
4326.0	54.74%	94.2167
4326.5	56.04%	92.0146
4327.0	57.44%	89.5151
4327.5	59.14%	87.7559
4328.0	61.01%	84.8373

4328.5	63.68%	80.5938
4329.0	58.85%	77.5647
4329.5	36.17%	74.4327
4330.0	58.97%	70.7262
4330.5	62.13%	66.6683
4331.0	65.43%	63.1248
4331.5	69.87%	60.4321
4332.0	71.91%	58.5412
4332.5	71.90%	55.4381
4333.0	71.16%	50.9624
4333.5	63.80%	50.6936
4334.0	26.30%	50.7764
4334.5	59.59%	51.0385
4335.0	66.62%	53.0992
4335.5	66.88%	57.4182
4336.0	65.49%	69.4187
4336.5	63.74%	21.2006
4337.0	66.70%	79.1005
4337.5	68.48%	81.1821
4338.0	58.05%	81.6891
4338.5	55.10%	77.9913
4339.0	57.06%	74.0488
4339.5	52.71%	74.5150
4340.0	54.62%	75.8795
4340.5	57.84%	77.3413
4341.0	53.45%	78.8846
4341.5	53.79%	78.5936
4342.0	59.80%	78.7855
4342.5	62.02%	79.3564
4343.0	65.04%	81.4407
4343.5	67.64%	82.9640
4344.0	65.27%	88.9354
4344.5	65.15%	91.9393
4345.0	67.37%	89.7134
4345.5	69.63%	86.7972
4346.0	66.80%	85.9841
4346.5	63.05%	88.9756
4347.0	59.88%	83.8636
4347.5	55.85%	78.4581
4348.0	54.47%	75.1003
4348.5	57.28%	73.1617
4349.0	60.54%	76.5885
4349.5	61.72%	78.8295
4350.0	62.68%	74.6202
4350.5	62.60%	74.7126
4351.0	65.33%	76.7654
4351.5	70.78%	78.4694
4352.0	69.57%	78.4192
4352.5	63.39%	77.4982
4353.0	71.00%	79.0215
4353.5	72.12%	81.1697
4354.0	75.11%	83.5417
4354.5	19.17%	84.7275
4355.0	42.72%	85.3088
4355.5	66.28%	84.4885
4356.0	68.91%	78.7291

4356.5	68.60%	72.2169
4357.0	67.89%	72.3976
4357.5	65.46%	75.9135
4358.0	52.56%	76.1866
4358.5	69.55%	76.3262
4359.0	68.48%	77.7234
4359.5	67.12%	78.4204
4360.0	63.76%	78.6117
4360.5	47.97%	76.8169
4361.0	47.59%	73.8130
4361.5	51.95%	23.6097
4362.0	55.09%	81.6289
4362.5	50.12%	79.6711
4363.0	49.94%	79.4412
4363.5	52.77%	79.3436
4364.0	56.44%	66.4926
4364.5	60.77%	49.3475
4365.0	68.02%	84.8123
4365.5	74.37%	82.7380
4366.0	71.43%	79.7479
4366.5	64.11%	80.5146
4367.0	62.89%	81.7192
4367.5	62.87%	82.9244
4368.0	64.26%	75.5232
4368.5	66.89%	70.1565
4369.0	69.07%	70.3547
4369.5	69.01%	72.9296
4370.0	68.22%	75.4417
4370.5	67.46%	70.7889
4371.0	71.64%	69.6045
4371.5	70.18%	72.2520
4372.0	68.69%	76.0740
4372.5	64.75%	79.7455
4373.0	56.92%	74.6210
4373.5	51.52%	75.0583
4374.0	47.97%	75.6970
4374.5	47.72%	69.2029
4375.0	49.46%	60.4949
4375.5	51.76%	56.1433
4376.0	54.18%	54.3490
4376.5	55.00%	53.6614
4377.0	55.13%	54.9299
4377.5	55.21%	55.3876
4378.0	49.86%	56.6616
4378.5	44.55%	59.1943
4379.0	45.24%	58.0004
4379.5	46.24%	57.9778
4380.0	44.19%	59.3530
4380.5	44.02%	60.1962
4381.0	43.79%	59.1598
4381.5	31.68%	55.7794
4382.0	21.59%	54.4855
4382.5	37.05%	55.0275
4383.0	19.21%	55.2534
4383.5	68.62%	54.3603
4384.0	73.43%	53.6774

4384.5	74.89%	54.1150
4385.0	74.32%	54.3484
4385.5	70.39%	53.4424
4386.0	74.31%	52.2780
4386.5	69.78%	51.5042
4387.0	72.27%	51.1486
4387.5	67.33%	50.4254
4388.0	63.61%	50.1159
4388.5	60.06%	35.0130
4389.0	62.48%	40.1024
4389.5	66.31%	23.4993
4390.0	67.98%	6.8862
4390.5	68.53%	78.1067
4391.0	68.04%	80.2950
4391.5	64.77%	38.1449
4392.0	60.95%	36.2176
4392.5	58.54%	86.5388
4393.0	60.91%	83.9364
4393.5	63.27%	85.8412
4394.0	66.05%	88.1335
4394.5	68.31%	89.6792
4395.0	69.29%	89.6171
4395.5	63.82%	88.9706
4396.0	60.53%	86.7571
4396.5	62.10%	83.4722
4397.0	68.97%	79.5021
4397.5	67.06%	75.1907
4398.0	66.16%	70.5731
4398.5	66.37%	67.4563
4399.0	63.09%	64.7485
4399.5	56.88%	61.3406
4400.0	46.03%	61.1292
4400.5	61.76%	64.4994
4401.0	68.07%	62.0470
4401.5	70.98%	61.2446
4402.0	71.53%	60.9874
4402.5	67.17%	60.8447
4403.0	68.06%	56.5524
4403.5	70.94%	52.9462
4404.0	71.35%	49.9423
4404.5	66.54%	48.6210
4405.0	61.45%	49.2847
4405.5	61.96%	53.0566
4406.0	62.88%	56.5950
4406.5	61.63%	65.3884
4407.0	64.61%	65.8527
4407.5	62.17%	69.5216
4408.0	57.15%	71.5731
4408.5	25.63%	72.1366
4409.0	62.15%	70.9690
4409.5	59.69%	69.5054
4410.0	59.94%	68.0021
4410.5	59.47%	69.5090
4411.0	54.75%	69.9899
4411.5	52.91%	69.0781
4412.0	55.85%	69.4952

4412.5	53.40%	69.9219
4413.0	54.59%	67.1250
4413.5	56.43%	65.4348
4414.0	53.26%	63.3156
4414.5	49.50%	64.2076
4415.0	51.08%	36.4786
4415.5	52.53%	58.4220
4416.0	52.71%	65.3746
4416.5	52.66%	66.4092
4417.0	52.60%	66.7725
4417.5	52.51%	63.9329
4418.0	52.42%	67.5736
4418.5	52.33%	68.6270
4419.0	52.29%	69.2151
4419.5	52.25%	70.2155
4420.0	52.22%	71.7050
4420.5	52.20%	73.2659
4421.0	52.22%	67.7524
4421.5	52.23%	62.8890
4422.0	52.24%	60.1761
4422.5	52.24%	59.4197
4423.0	52.24%	59.5583
4423.5	52.25%	59.8140
4424.0	52.27%	60.0696
4424.5	52.26%	60.3253
4425.0	52.19%	60.3896

CLACKAMAS GEOTHERMAL TEST WELL NO. 1 (CTGW-1)
TEMPERATURE & FLUID RESISTIVITY
LOGGED BY: COLOG, INC.
DATE: SEPTEMBER 5, 1986

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
10	0.000	285.70	12.69	54.85
20	0.000	286.26	13.26	55.86
30	32.275	285.87	12.87	55.17
40	32.817	285.41	12.41	54.33
50	33.681	285.03	12.03	53.65
60	33.739	284.91	11.91	53.43
70	33.868	284.86	11.86	53.34
80	33.928	284.80	11.80	53.23
90	34.213	284.68	11.68	53.03
100	34.251	284.54	11.54	52.76
110	34.240	284.44	11.44	52.59
120	34.230	284.36	11.36	52.45
130	34.219	284.29	11.29	52.32
140	34.208	284.19	11.19	52.13
150	34.318	284.04	11.04	51.87
160	34.257	283.96	10.96	51.72
170	34.866	283.86	10.86	51.54
180	34.944	283.79	10.79	51.42
190	34.905	283.67	10.67	51.21
200	35.410	283.49	10.49	50.89
210	35.289	283.42	10.42	50.76
220	35.394	283.39	10.39	50.70
230	35.392	283.40	10.40	50.72
240	35.485	283.12	10.12	50.22
250	36.569	282.10	9.10	48.38
260	37.273	281.55	8.55	47.38
270	37.310	281.83	8.83	47.90
280	37.167	281.45	8.44	47.20
290	38.004	281.05	8.05	46.48
300	38.052	281.15	8.15	46.66
310	38.044	281.25	8.25	46.86
320	37.350	281.72	8.72	47.70
330	37.368	281.79	8.79	47.83
340	37.383	281.91	8.90	48.03
350	37.079	281.94	8.94	48.10
360	36.928	282.03	9.02	48.24
370	36.870	282.16	9.16	48.50
380	36.895	282.25	9.25	48.65
390	36.730	282.36	9.36	48.85
400	36.603	282.39	9.39	48.91
410	36.698	282.30	9.30	48.75
420	36.845	282.07	9.07	48.33
430	36.909	282.03	9.03	48.25
440	36.931	281.98	8.98	48.16
450	37.119	281.85	8.85	47.93
460	37.214	281.81	8.81	47.85
470	37.295	281.80	8.80	47.85
480	37.338	281.80	8.80	47.85
490	37.361	281.71	8.71	47.67

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
500	37.393	281.62	8.62	47.52
510	37.648	281.45	8.45	47.21
520	37.454	281.46	8.46	47.23
530	37.493	281.54	8.54	47.38
540	37.598	281.54	8.54	47.38
550	37.641	281.54	8.54	47.36
560	37.662	281.48	8.48	47.26
570	37.759	281.65	8.65	47.56
580	37.913	281.67	8.67	47.61
590	37.845	281.71	8.71	47.67
600	37.751	281.73	8.73	47.71
610	37.715	281.76	8.76	47.76
620	37.640	281.80	8.80	47.83
630	37.659	281.81	8.81	47.86
640	37.553	281.86	8.86	47.95
650	37.560	281.90	8.90	48.01
660	37.567	281.93	8.93	48.07
670	37.575	282.00	9.00	48.19
680	37.582	282.02	9.01	48.23
690	37.448	282.07	9.07	48.33
700	37.297	282.18	9.18	48.52
710	37.243	282.19	9.19	48.54
720	37.314	282.26	9.26	48.67
730	37.281	282.32	9.32	48.77
740	37.189	282.47	9.47	49.04
750	37.098	282.54	9.54	49.17
760	37.007	282.57	9.57	49.23
770	36.916	282.63	9.63	49.34
780	36.825	282.69	9.69	49.45
790	36.706	282.88	9.88	49.79
800	36.633	283.08	10.08	50.15
810	36.408	283.16	10.16	50.29
820	36.186	283.29	10.29	50.52
830	36.254	283.46	10.46	50.82
840	35.964	283.65	10.65	51.16
850	35.776	283.87	10.87	51.57
860	35.687	284.02	11.01	51.83
870	35.171	284.16	11.16	52.09
880	35.157	284.42	11.42	52.56
890	34.831	284.42	11.42	52.56
900	34.782	284.44	11.44	52.59
910	34.294	284.66	11.66	52.99
920	34.258	284.67	11.67	53.01
930	34.189	284.66	11.66	52.98
940	34.301	284.74	11.74	53.13
950	34.075	284.99	11.99	53.59
960	33.905	285.16	12.16	53.90
970	33.617	285.29	12.29	54.11
980	33.632	285.35	12.35	54.22
990	33.619	285.22	12.22	54.00
1000	33.605	285.22	12.22	54.00
1010	33.591	285.40	12.40	54.32
1020	33.334	285.49	12.49	54.49
1030	33.263	285.60	12.60	54.68

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
1040	33.313	285.72	12.72	54.89
1050	33.306	285.77	12.77	54.98
1060	33.298	285.76	12.76	54.97
1070	33.291	285.72	12.72	54.89
1080	33.283	285.66	12.66	54.78
1090	33.276	285.68	12.68	54.82
1100	33.269	285.78	12.78	55.00
1110	33.261	285.85	12.85	55.13
1120	33.101	285.98	12.98	55.36
1130	32.944	286.09	13.09	55.56
1140	32.807	286.22	13.22	55.79
1150	32.651	286.42	13.42	56.15
1160	32.393	286.56	13.56	56.41
1170	32.336	286.70	13.70	56.66
1180	32.372	286.83	13.83	56.89
1190	32.062	286.99	13.99	57.19
1200	31.931	287.04	14.04	57.26
1210	32.088	287.18	14.18	57.52
1220	31.938	287.16	14.15	57.48
1230	31.781	287.32	14.32	57.78
1240	31.624	287.47	14.47	58.05
1250	31.467	287.66	14.66	58.39
1260	31.305	287.82	14.82	58.68
1270	31.190	287.88	14.88	58.78
1280	31.016	288.08	15.08	59.14
1290	30.892	288.34	15.34	59.61
1300	30.771	288.50	15.50	59.90
1310	30.638	288.56	15.56	60.00
1320	30.512	288.72	15.72	60.30
1330	30.194	288.89	15.89	60.59
1340	30.197	289.11	16.11	60.99
1350	30.108	289.19	16.19	61.14
1360	29.979	289.23	16.23	61.22
1370	29.849	289.36	16.36	61.45
1570	27.405	292.83	19.83	67.69
1580	27.304	292.98	19.98	67.97
1590	27.204	293.10	20.10	68.19
1600	27.104	293.26	20.26	68.47
1610	27.004	293.51	20.51	68.92
1620	26.957	293.64	20.64	69.15
1630	26.833	293.89	20.89	69.60
1640	26.777	294.19	21.19	70.14
1650	26.629	294.36	21.36	70.44
1660	26.499	294.61	21.61	70.89
1670	26.364	294.89	21.89	71.40
1680	26.230	295.35	22.35	72.24
1690	26.095	295.48	22.48	72.46
1700	25.960	295.90	22.90	73.22
1710	25.826	295.96	22.96	73.33
1720	25.691	296.06	23.06	73.51
1730	25.629	296.22	23.22	73.80
1740	25.490	296.34	23.34	74.02
1750	25.412	296.61	23.61	74.50
1760	25.268	296.69	23.69	74.65

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
1770	25.203	296.80	23.80	74.83
1780	25.139	296.85	23.85	74.92
1790	25.074	297.08	24.08	75.34
1800	25.010	297.15	24.15	75.46
1810	24.945	297.34	24.34	75.81
1820	24.881	297.45	24.44	76.00
1830	24.816	297.60	24.60	76.29
1840	24.752	297.94	24.94	76.90
1850	24.644	297.92	24.92	76.85
1860	24.397	298.15	25.15	77.27
1870	24.444	298.50	25.50	77.89
1880	24.330	298.65	25.65	78.16
1890	24.171	298.64	25.64	78.14
1900	24.066	298.79	25.79	78.41
1910	23.962	298.92	25.92	78.66
1920	23.858	299.16	26.16	79.08
1930	23.754	299.25	26.25	79.25
1940	23.650	299.64	26.64	79.96
1950	23.546	299.71	26.71	80.07
1960	23.442	299.84	26.84	80.31
1970	23.337	299.94	26.94	80.49
1980	23.233	300.25	27.25	81.05
1990	23.112	300.57	27.57	81.63
2000	22.972	300.90	27.90	82.22
2010	22.879	301.30	28.30	82.93
2020	22.762	301.36	28.36	83.04
2030	22.646	301.61	28.61	83.50
2040	22.529	301.90	28.90	84.01
2050	22.412	302.09	29.09	84.36
2060	22.296	302.36	29.36	84.84
2070	22.179	302.45	29.45	85.01
2080	22.063	302.69	29.69	85.43
2090	21.946	302.66	29.66	85.39
2100	21.811	302.86	29.86	85.74
2110	21.788	303.13	30.13	86.23
2120	21.718	303.15	30.15	86.27
2130	21.634	303.35	30.35	86.64
2140	21.550	303.54	30.54	86.97
2150	21.465	303.58	30.58	87.04
2160	21.381	304.02	31.02	87.84
2170	21.297	303.94	30.94	87.68
2180	21.213	304.14	31.13	88.04
2190	21.129	304.42	31.42	88.55
2200	21.044	304.59	31.59	88.86
2210	20.960	304.69	31.69	89.05
2220	20.876	305.00	32.00	89.59
2230	20.792	305.34	32.33	90.20
2240	20.708	305.29	32.29	90.12
2250	20.624	305.57	32.57	90.62
2260	20.539	305.74	32.74	90.93
2270	20.455	306.03	33.03	91.46
2280	20.371	306.12	33.12	91.62
2290	20.279	306.49	33.49	92.28
2300	20.191	306.74	33.74	92.73

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
2310	20.122	307.11	34.11	93.40
2320	20.052	307.06	34.06	93.30
2330	19.983	307.39	34.39	93.90
2340	19.913	307.31	34.31	93.75
2350	19.844	307.60	34.60	94.27
2360	19.775	307.98	34.98	94.97
2370	19.705	308.02	35.02	95.04
2380	19.636	308.32	35.32	95.57
2390	19.566	308.45	35.45	95.82
2400	19.497	308.73	35.73	96.31
2410	19.428	308.90	35.90	96.62
2420	19.358	309.10	36.10	96.97
2430	19.306	309.29	36.29	97.32
2440	19.079	309.49	36.49	97.68
2450	18.724	309.92	36.92	98.46
2460	18.661	310.07	37.07	98.73
2470	18.717	310.30	37.30	99.15
2480	18.641	310.52	37.51	99.53
2490	18.565	310.73	37.73	99.91
2500	18.489	311.00	38.00	100.40
2510	18.414	311.46	38.46	101.23
2520	18.338	311.51	38.51	101.32
2530	18.262	311.77	38.77	101.78
2540	18.186	311.96	38.96	102.14
2550	18.110	312.14	39.14	102.46
2560	18.035	312.41	39.41	102.94
2570	17.959	312.56	39.56	103.21
2580	17.883	312.76	39.76	103.56
2590	17.807	312.99	39.99	103.98
2600	17.732	313.18	40.18	104.32
2610	17.656	313.38	40.38	104.68
2620	17.580	313.53	40.53	104.95
2630	17.504	313.73	40.73	105.31
2640	17.429	313.90	40.90	105.61
2650	17.353	314.10	41.10	105.97
2660	17.277	314.29	41.29	106.33
2670	17.199	314.53	41.53	106.75
2680	17.212	314.74	41.74	107.13
2690	17.154	314.98	41.98	107.56
2700	17.093	315.21	42.21	107.97
2710	17.032	315.39	42.39	108.30
2720	16.971	315.59	42.59	108.65
2730	16.910	315.83	42.83	109.09
2740	16.849	315.98	42.98	109.36
2750	16.788	316.26	43.26	109.87
2760	16.727	316.39	43.39	110.11
2770	16.666	316.59	43.59	110.47
2780	16.605	316.89	43.89	111.00
2790	16.544	317.15	44.15	111.46
2800	16.483	317.41	44.40	111.93
2810	16.422	317.63	44.63	112.34
2820	16.361	317.87	44.87	112.76
2830	16.300	318.17	45.17	113.31
2840	16.239	318.36	45.36	113.65

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
2850	16.178	318.61	45.61	114.10
2860	16.117	318.78	45.78	114.40
2870	16.055	319.00	46.00	114.79
2880	16.051	319.15	46.15	115.07
2890	15.988	319.36	46.36	115.45
2900	15.924	319.54	46.54	115.78
2910	15.861	319.74	46.74	116.13
2920	15.797	319.94	46.94	116.49
2930	15.734	320.10	47.10	116.77
2940	15.671	320.38	47.38	117.28
2950	15.607	320.55	47.55	117.59
2960	15.544	320.79	47.79	118.03
2970	15.480	321.28	48.28	118.91
2980	15.417	321.56	48.56	119.42
2990	15.354	321.79	48.79	119.81
3000	15.290	321.99	48.99	120.17
3010	15.227	322.22	49.21	120.59
3020	15.163	322.45	49.45	121.00
3030	15.100	322.61	49.61	121.30
3040	15.037	322.76	49.76	121.57
3050	14.973	322.97	49.97	121.94
3060	14.910	323.18	50.18	122.32
3070	14.846	323.39	50.39	122.69
3080	14.783	323.61	50.61	123.10
3090	14.720	323.85	50.85	123.53
3100	14.656	324.07	51.07	123.93
3110	14.593	324.28	51.28	124.30
3120	14.617	324.68	51.68	125.02
3130	14.544	324.94	51.94	125.49
3140	14.505	325.11	52.11	125.80
3150	14.465	325.33	52.33	126.20
3160	14.425	325.52	52.52	126.54
3170	14.386	325.77	52.77	126.98
3180	14.346	326.02	53.01	127.43
3190	14.306	326.23	53.23	127.82
3200	14.267	326.40	53.40	128.12
3210	14.227	326.69	53.69	128.63
3220	14.187	326.93	53.93	129.08
3230	14.148	327.11	54.11	129.41
3240	14.108	327.37	54.37	129.87
3250	14.068	327.55	54.55	130.18
3260	14.029	327.74	54.74	130.53
3270	13.989	328.02	55.02	131.04
3280	13.949	328.07	55.07	131.12
3290	13.910	328.25	55.25	131.44
3300	13.870	328.46	55.46	131.83
3310	13.830	328.63	55.63	132.14
3320	13.791	328.88	55.88	132.59
3330	13.751	328.95	55.95	132.72
3340	13.711	329.05	56.05	132.90
3350	13.672	329.38	56.38	133.48
3360	13.632	329.69	56.69	134.05
3370	13.592	329.95	56.95	134.52
3380	13.552	330.20	57.20	134.97

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
3390	13.513	330.39	57.39	135.30
3400	13.473	330.63	57.63	135.73
3410	13.433	330.82	57.82	136.07
3420	12.953	331.23	58.23	136.81
3430	12.905	331.42	58.42	137.16
3440	12.858	331.59	58.59	137.45
3450	12.811	331.99	58.99	138.18
3460	12.763	332.26	59.26	138.67
3470	12.716	332.61	59.61	139.29
3480	12.668	332.80	59.80	139.64
3490	12.621	333.28	60.28	140.50
3500	12.574	333.37	60.37	140.66
3510	12.526	333.62	60.62	141.11
3520	12.479	334.01	61.01	141.82
3530	12.431	334.04	61.04	141.88
3540	12.384	334.43	61.43	142.58
3550	12.336	334.73	61.73	143.11
3560	12.289	334.77	61.77	143.18
3570	12.242	334.95	61.95	143.52
3580	12.194	335.36	62.36	144.25
3590	12.147	335.56	62.56	144.61
3600	12.099	335.74	62.74	144.92
3610	12.052	336.11	63.11	145.59
3620	12.005	336.39	63.39	146.10
3630	11.957	336.57	63.57	146.43
3640	11.910	336.77	63.76	146.78
3650	11.664	337.04	64.04	147.27
3660	11.512	337.37	64.37	147.86
3670	11.571	337.55	64.55	148.20
3680	11.538	337.84	64.84	148.71
3690	11.504	337.93	64.93	148.88
3700	11.470	338.18	65.18	149.33
3710	11.436	338.41	65.41	149.73
3720	11.402	338.58	65.58	150.04
3730	11.368	338.80	65.80	150.43
3740	11.334	338.99	65.99	150.77
3750	11.300	339.37	66.37	151.47
3760	11.266	339.44	66.44	151.59
3770	11.232	339.62	66.62	151.92
3780	11.199	339.91	66.91	152.44
3790	11.165	340.25	67.25	153.04
3800	11.131	340.37	67.37	153.27
3810	11.097	340.58	67.58	153.65
3820	11.063	341.00	68.00	154.40
3830	11.029	341.19	68.19	154.74
3840	10.995	341.67	68.67	155.60
3850	10.961	341.65	68.65	155.57
3860	10.927	342.18	69.18	156.53
3870	10.893	342.33	69.33	156.80
3880	10.860	342.53	69.53	157.15
3890	10.826	342.81	69.81	157.66
3900	10.792	342.91	69.91	157.84
3910	10.758	343.17	70.17	158.31
3920	10.724	343.42	70.42	158.76

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
3930	10.690	343.86	70.86	159.55
3940	10.656	344.07	71.07	159.92
3950	10.626	344.12	71.12	160.02
3960	10.606	344.28	71.28	160.31
3970	10.587	344.68	71.68	161.02
3980	10.568	344.88	71.88	161.39
3990	10.548	345.01	72.01	161.62
4000	10.529	345.17	72.17	161.90
4010	10.510	345.30	72.30	162.13
4020	10.490	345.51	72.51	162.52
4030	10.471	345.67	72.67	162.81
4040	10.452	345.73	72.73	162.91
4050	10.432	346.02	73.02	163.43
4060	10.413	346.18	73.18	163.73
4070	10.394	346.33	73.33	164.00
4080	10.374	346.63	73.63	164.53
4090	10.355	346.62	73.62	164.52
4100	10.336	346.80	73.80	164.85
4110	10.316	347.00	74.00	165.20
4120	10.297	347.10	74.10	165.39
4130	10.278	347.22	74.22	165.60
4140	10.258	347.39	74.39	165.90
4150	10.239	347.62	74.62	166.31
4160	10.220	347.77	74.77	166.59
4170	10.200	347.96	74.96	166.94
4180	10.181	348.29	75.29	167.52
4190	10.162	348.52	75.52	167.94
4200	10.142	348.74	75.74	168.34
4210	10.123	349.10	76.10	168.97
4220	10.104	349.15	76.15	169.07
4230	10.084	349.87	76.87	170.37
4240	10.065	350.14	77.14	170.85
4250	10.001	350.20	77.20	170.96
4260	9.964	350.50	77.50	171.50
4270	9.940	350.78	77.78	172.00
4280	9.915	351.00	78.00	172.40
4290	9.890	350.40	77.40	171.33
4300	9.866	351.45	78.45	173.21
4310	9.841	351.68	78.68	173.62
4320	9.816	351.95	78.95	174.10
4330	9.791	352.05	79.05	174.28
4340	9.767	352.21	79.21	174.58
4350	9.742	352.40	79.40	174.92
4360	9.717	352.61	79.61	175.29
4370	9.693	352.83	79.82	175.68
4380	9.668	353.01	80.01	176.02
4390	9.643	353.27	80.27	176.49
4400	9.618	353.47	80.47	176.84
4410	9.594	353.54	80.54	176.98
4420	9.569	353.75	80.75	177.34
4430	9.544	353.84	80.84	177.51
4440	9.519	354.05	81.05	177.89
4450	9.495	354.26	81.26	178.28
4460	9.470	354.53	81.53	178.75

DEPTH	F-RES	TEMP-K	TEMP-C	TEMP-F
4470	9.445	354.71	81.71	179.07
4480	9.421	354.89	81.89	179.40
4490	9.396	355.08	82.08	179.75
4500	9.371	355.28	82.28	180.10
4510	9.346	355.54	82.54	180.58
4520	9.322	355.75	82.75	180.95
4530	9.297	355.85	82.85	181.13
4540	9.272	356.01	83.01	181.43
4550	9.248	356.29	83.29	181.92
4560	9.223	356.45	83.45	182.20
4570	9.162	356.61	83.61	182.50
4580	9.107	356.70	83.70	182.67
4590	9.052	356.93	83.93	183.08
4600	8.997	357.10	84.10	183.39
4610	8.942	357.24	84.24	183.64
4620	8.887	357.44	84.44	183.98
4630	8.832	357.67	84.67	184.40
4640	8.777	357.83	84.83	184.69
4650	8.722	358.04	85.04	185.07
4660	8.667	358.30	85.30	185.54
4670	8.612	358.47	85.47	185.84
4680	8.557	358.54	85.54	185.97
4690	8.502	358.67	85.67	186.20
4700	8.447	358.85	85.85	186.53
4710	8.392	359.26	86.26	187.28
4720	8.337	359.37	86.37	187.47
4730	8.282	359.55	86.55	187.79
4740	8.227	359.67	86.67	188.01
4750	8.105	359.86	86.86	188.35

CLACKAMAS GEOTHERMAL TEST WELL #1 (CTGH-1)

DEVIATION SURVEY

SEPTEMBER 5, 1986

COLOG, INC.

GOLDEN, CO

R. BATES R. CROWDER

NOTE: Entire log run inside steel casing. Angle values are valid. Deviation values should NOT be relied upon due to magnetic influence of casing.

DEPTH	ANGLE	DIRECTION
75	1.5	192
100	1.5	197
125	0.8	109
150	0.7	206
175	0.6	292
200	0.9	279
225	0.6	309
250	0.6	128
275	0.1	217
300	0.4	270
325	0.3	318
350	0.6	257
375	0.5	304
400	0.4	262
425	0.6	329
450	1.4	200
475	2.1	12
500	2.3	4
525	2.4	327
550	2.5	359
575	2.5	1
600	2.6	360
625	2.4	2
650	2.3	161
675	2.3	359
700	2.2	4
725	2.2	306
750	2.3	1
775	2.5	6
800	2.4	333
825	2.0	30
850	2.4	265
875	2.1	16
900	2.3	142
925	2.5	121
950	2.8	171
975	3.1	330
1000	2.9	87
1025	3.0	245
1050	3.1	88
1075	2.9	26
1100	2.9	239

1125	2.9	78
1150	2.9	11
1175	3.1	72
1200	3.1	155
1225	2.8	41
1250	2.6	230
1275	2.8	296
1300	2.7	270
1325	2.6	175
1350	2.7	71
1375	2.9	225
1400	2.7	307
1425	2.3	5
1450	1.6	332
1475	1.3	142
1500	1.0	146
1525	0.7	153
1550	0.3	147
1575	0.3	92
1600	0.4	108
1625	0.4	70
1650	0.5	222
1675	0.4	146
1700	0.4	32
1725	0.4	297
1750	0.3	126
1775	0.2	50
1800	0.2	195
1825	0.4	144
1850	0.4	180
1875	0.4	159
1900	0.5	15
1925	0.4	48
1950	0.5	47
1975	0.3	310
2000	0.2	346
2025	0.4	48
2050	0.5	127
2075	0.3	75
2100	0.2	144
2125	0.2	169
2150	0.4	203
2175	0.5	183
2200	0.6	228
2225	0.8	176
2250	0.6	151
2275	0.8	133
2300	0.6	140
2325	0.5	329
2350	1.1	172
2375	0.7	286
2400	0.6	356
2425	0.6	152
2450	0.8	359
2475	0.7	177
2500	0.6	226

2525	0.8	142
2550	1.0	177
2575	0.7	319
2600	0.6	120
2625	0.8	208
2650	1.0	222
2675	0.6	146
2700	0.6	113
2725	0.7	194
2750	0.8	92
2775	0.6	47
2800	0.7	209
2825	0.9	3
2850	0.9	174
2875	0.8	36
2900	0.8	24
2925	0.9	296
2950	0.9	48
2975	1.1	271
3000	1.1	59
3025	1.2	318
3050	1.1	334
3075	1.2	325
3100	1.2	341
3125	1.3	107
3150	1.0	206
3175	0.9	263
3200	0.6	68
3225	0.8	329
3250	0.7	359
3275	0.8	38
3300	0.6	287
3325	0.8	274
3350	0.8	324
3375	0.7	64
3400	0.6	316
3425	0.6	272
3450	0.7	126
3475	0.7	335
3500	0.6	0
3525	0.7	168
3550	0.7	158
3575	0.4	95
3600	0.7	153
3625	0.7	244
3650	0.7	159
3675	0.7	202
3700	0.5	111
3725	0.3	147
3750	0.5	156
3775	0.5	327
3800	0.3	89
3825	0.4	99
3850	0.4	91
3875	0.4	65
3900	0.4	325

3925	0.7	161
3950	0.4	315
3975	0.3	270
4000	0.3	60
4025	0.6	163
4050	0.6	292
4075	0.4	14
4100	0.6	204
4125	0.3	136
4150	0.3	296
4175	0.7	109
4200	0.3	297
4225	0.5	99
4250	0.7	128
4275	0.4	78
4300	0.5	220
4325	0.4	110
4350	0.5	309
4375	0.4	116
4400	0.5	180
4425	0.7	188
4450	0.6	68
4475	0.8	173
4500	0.9	70
4525	0.9	80
4550	1.0	152
4575	0.8	235
4600	0.9	221
4625	1.0	149
4650	1.1	198
4675	1.0	232
4700	0.7	254
4725	1.0	222
4750	0.9	328
4775	0.9	47
4800	1.0	28

PRUETT INDUSTRIES INC
8915 ROSEDALE HWY, BAKERSFIELD, CA. 93308
(805) 589-2768

SUB-SURFACE TEMPERATURE SURVEY

CO. THERMAL POWER		RUN 1A FIELD OREGON	WELL #1-CTGH
EFF DEPTH		WELL STAT STATIC	TOOL HUNG
CASING	-	CASING PRESS	ON BOTTOM 7:15PM
LINER	-	TUBING PRESS	OFF BOTTOM 7:20PM
DATE	082786	ELEMENT RANGE 90 - 426	ZERO POINT
ELEVATION		ZONE	SHUT-IN
MAX TEMP		PICK-UP 4804'	ON-PROD
PERF	-	CAL SER NO. 10419	MPP
TUBING	-		
UNITS	ENGLISH	PURPOSE STATIC TEMPERATURE TRAVERSE	

SURVEY DATA

CO. THERMAL POWER — RUN 1A FIELD OREGON — WELL #1-CTGH

TIME	DEPTH	P/T	GRAD	TIME	DEPTH	P/T	GRAD
1:00	100	90.1	0.000	1:00	2900	109.9	0.000
1:00	500	90.1	0.000	1:00	2920	110.7	0.000
1:00	1000	90.1	0.000	1:00	2940	111.6	0.000
1:00	1500	90.1	0.000	1:00	2960	112.6	0.000
1:00	2000	90.1	0.000	1:00	2980	113.8	0.000
1:00	2400	90.1	0.000	1:00	3000	115.2	0.000
1:00	2420	90.1	0.000	1:00	3020	116.5	0.000
1:00	2440	91.2	0.000	1:00	3040	117.7	0.000
1:00	2460	92.3	0.000	1:00	3060	118.4	0.000
1:00	2480	92.9	0.000	1:00	3080	119.0	0.000
1:00	2500	93.5	0.000	1:00	3100	119.8	0.000
1:00	2520	94.0	0.000	1:00	3120	120.7	0.000
1:00	2540	94.6	0.000	1:00	3140	121.7	0.000
1:00	2560	95.2	0.000	1:00	3160	122.8	0.000
1:00	2580	95.6	0.000	1:00	3180	123.9	0.000
1:00	2600	96.3	0.000	1:00	3200	124.7	0.000
1:00	2620	97.1	0.000	1:00	3220	125.8	0.000
1:00	2640	97.9	0.000	1:00	3240	126.7	0.000
1:00	2660	98.6	0.000	1:00	3260	127.7	0.000
1:00	2680	99.4	0.000	1:00	3280	128.2	0.000
1:00	2700	99.8	0.000	1:00	3300	129.3	0.000
1:00	2720	100.6	0.000	1:00	3320	130.3	0.000
1:00	2740	101.2	0.000	1:00	3340	131.4	0.000
1:00	2760	102.2	0.000	1:00	3360	132.3	0.000
1:00	2780	103.1	0.000	1:00	3380	133.0	0.000
1:00	2800	104.7	0.000	1:00	3400	134.1	0.000
1:00	2820	105.9	0.000	1:00	3420	135.2	0.000
1:00	2840	107.1	0.000	1:00	3440	136.1	0.000
1:00	2860	108.1	0.000	1:00	3460	137.4	0.000
1:00	2880	109.1	0.000	1:00	3480	138.8	0.000

SURVEY DATA

CO. THERMAL POWER RUN 1A FIELD OREGON WELL #1-CTGH

TIME	DEPTH	P/T	GRAD	TIME	DEPTH	P/T	GRAD
1:00	3500	140.4	0.000	1:00	4180	176.9	0.000
1:00	3520	141.5	0.000	1:00	4200	177.8	0.000
1:00	3540	142.9	0.000	1:00	4220	178.6	0.000
1:00	3560	144.4	0.000	1:00	4240	179.8	0.000
1:00	3580	145.3	0.000	1:00	4260	180.6	0.000
1:00	3600	146.5	0.000	1:00	4280	181.3	0.000
1:00	3620	147.6	0.000	1:00	4300	182.3	0.000
1:00	3640	148.4	0.000	1:00	4320	183.2	0.000
1:00	3660	149.5	0.000	1:00	4340	183.9	0.000
1:00	3680	150.7	0.000	1:00	4360	184.7	0.000
1:00	3700	152.0	0.000	1:00	4380	185.7	0.000
1:00	3720	153.0	0.000	1:00	4400	186.7	0.000
1:00	3740	154.1	0.000	1:00	4420	187.7	0.000
1:00	3760	155.1	0.000	1:00	4440	188.6	0.000
1:00	3780	155.8	0.000	1:00	4460	189.6	0.000
1:00	3800	157.0	0.000	1:00	4480	190.4	0.000
1:00	3820	158.1	0.000	1:00	4500	191.3	0.000
1:00	3840	159.1	0.000	1:00	4520	192.3	0.000
1:00	3860	160.3	0.000	1:00	4540	193.3	0.000
1:00	3880	161.0	0.000	1:00	4560	194.3	0.000
1:00	3900	162.2	0.000	1:00	4580	195.1	0.000
1:00	3920	163.2	0.000	1:00	4600	196.1	0.000
1:00	3940	164.3	0.000	1:00	4620	197.3	0.000
1:00	3960	165.1	0.000	1:00	4640	198.2	0.000
1:00	3980	166.2	0.000	1:00	4660	199.4	0.000
1:00	4000	168.4	0.000	1:00	4680	200.4	0.000
1:00	4020	169.4	0.000	1:00	4700	201.7	0.000
1:00	4040	170.3	0.000	1:00	4720	202.9	0.000
1:00	4060	171.3	0.000	1:00	4740	203.7	0.000
1:00	4080	172.2	0.000	1:00	4760	204.6	0.000
1:00	4100	173.2	0.000	1:00	4780	205.6	0.000
1:00	4120	174.0	0.000	1:00	4804	208.2	0.000
1:00	4140	174.9	0.000	1:00	4804	208.2	0.000
1:00	4160	175.9	0.000	0:00	0	0.0	0.000

TEMPERATURE READINGS TO 2420 FT. WERE BELOW THE MINIMUM RANGE OF THE TOOL

BY P.E. AND E.D. PRUETT