17-303

GEO-HEAT CENTER

Oregon Institute of Technology Klamath Falls, Oregon 97601 541/885-1750 FAX 541/885-1754

John W. Lund, Director
Tonya "Toni" Boyd

February 19, 2010

Herb Mosgar
Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271

Dear Herb,

Subject: G-17703 – Water Rights Application for Oregon Institute of Technology

The original water rights application for the deep well OIT#7 was asking for the rights to use 2000 gpm of our geothermal water. After consulting with various individuals (Doug Adkins and Tom Del Santo, both Water Rights Examiners) it was determined that OIT should ask for 2500 gpm on the water rights application instead of 2000 gpm. This was also agreed upon by David Ebsen and myself. To change the application from 2000 gpm to 2500 gpm a letter is required asking to change the application and an additional cost of $250.

This letter is asking to change our application from the requested flow rate of 2000 gpm to 2500 gpm. Attached you will find the check for the additional fee of $250.

If there are any questions please contact me at your earliest convenience.

Thank you

Tonya "Toni" Boyd
Geo-Heat Center
Oregon Institute of Technology
3201 Campus Drive
Klamath Falls, OR 97601
Phone: (541) 885-1750
Email: toni.boyd@oit.edu

Cc: Joel Plahn

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WATER RESOURCES DEPT
SALEM, OREGON

Oregon Water Resources Department 725
Summer Street NE, Suite A
Salem Oregon 97301-1271
(503) 986-0900
www.wrd.state.or.us

Application for a Permit to Use Ground Water

Please type or print in dark ink. If your application is found to be incomplete or inaccurate, we will return it to you. If any requested information does not apply to your application, insert "n/a." Please read and refer to the instructions when completing your application. A summary of review criteria and procedures that are generally applicable to these applications is available at www.wrd.state.or.us/OWRD/PUBS/forms.shtml.

1. APPLICANT INFORMATION

A. Individuals

Applicant: _____ (First) _____ (Last)

Mailing Address: _____

_____ (City) _____ (State) _____ (Zip)

Phone: _____ (Home) _____ (Work) _____ (Other)

*Fax: _____ *Email Address: _____

B. Organizations

(Corporations, associations, firms, partnerships, joint stock companies, cooperatives, public and municipal corporations)

Name of Organization: OREGON INSTITUTE OF TECHNOLOGY

Name and Title of Person Applying: TONYA BOYD, ASSISTANT DIRECTOR GEO-HEAT CENTER
TONT

Mailing Address or Organization: 3201 CAMPUS DR

KLAMATH FALLS (City) OREGON (State) 97601 (Zip)

Phone: 541-885-1751 (Day) 541-891-2571 (Evening)

*Fax: 541-885-1754 *Email Address: toni.boyd@oit.edu

Optional

For Department Use

App. No. _____ Permit No. _____ Date _____

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2. PROPERTY OWNERSHIP

○ Yes *(Please check appropriate box below then skip to section 3 'Ground Water Development')*

☒ There are no encumbrances

☐ This land is encumbered by easements, rights of way, roads or other encumbrances *(please provide a copy of the recorded deed(s))*

○ No *(Please check the appropriate box below)*

☐ I have a recorded easement or written authorization permitting access.

☐ I do not currently have written authorization or easement permitting access.

☐ Written authorization or an easement is not necessary, because the only affected lands I do not own are state-owned submersible lands, and this application is for irrigated and/or domestic use only (ORS 274.040).

You must provide the legal description of: (1) the property from which the water is to be diverted, (2) any property crossed by the proposed ditch, canal or other work, and (3) any property on which the water is to be used as depicted on the map. SEE ATTACHMENT

List the names and mailing addresses of all affected landowners.

3. GROUND WATER DEVELOPMENT

A. Well Information

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Number of well(s): 1

Name of nearest surface water body: UPPER KLAMATH LAKE

Distance from well(s) to nearest stream or lake:

1) 8000 ft 2) _____ 3) _____ 4) _____

If distance from surface water is less than one mile, indicate elevation difference between nearest surface water and well head:

1) N/A 2) _____ 3) _____ 4) _____

B. Well Characteristics

Wells must be constructed according to standards set by the Department for the construction and maintenance of water wells. If thewell is already constructed, please enclose a copy of the well constructor's log and the well ID number, if available, for each well withthis application. Identify each well with a number corresponding to the wells designated on the map and proceed to section 4 of the form. If the well has not been constructed, or if you do not have a well log, please complete the following:

Well(s) will be constructed by: SEE ATTACHMENT

Mailing Address: _____

City _____ State _____ Zip _____

Completion Date: _____

Please provide a description of your well development. *(Attach additional sheets if needed.)*

Well No.	Diameter	Type and size of casing	No. of feet of casing	Intervals casing is perforated (in feet)	Seal depth	Est. depth to water	Est. depth to water bearing stratum	Type of access port or measuring device	Total well depth

Note: Well numbers in this listing must correspond to well locations(s) shown on accompanying map.

If well log is not available, or well is not yet constructed, you must provide: proposed total depth, depth of casing and seal, and the anticipated perforation and open intervals.

INJECTION WELL PROPOSED 2000 ft TOTAL DEPTH 900 ft of 12 3/4" CASING CEMENTED TO TOP. 1100 ft of 9 5/8" SLOTTED LINER.

C. Artesian Flows

If your water well is flowing artesian, describe your water control and conservation works:

N/A

4. WATER USE

Please read the instruction booklet for more details on "type of use" definitions, how to express how much water you need and how to identify the water source you propose to use. You must fill out a supplemental form for some uses as they require specific information for that type of use.

A. Type(s) of Use(s)

See list of beneficial uses provided in the instructions.

- If your proposed use is **domestic**, indicate the number of households to be supplied with water: _____
- If your proposed use is **irrigation**, please attach **Form I**
- If your proposed use is **mining**, attach **Form R**
- If your proposed use is **municipal or quasi-municipal**, attach **Form M**
- If your proposed use is **commercial/industrial**, attach **Form Q**

B. Amount of Water

Provide the production rate in gallons per minute (gpm) and the total annual amount of water you need from each well, from each source or aquifer, for each use. You do not need to provide source information if you are submitting a well log with your application.

Well No.	Source or aquifer	Type of use	Total rate of water requested (in gpm)	Total annual quantity (in gallons)	Production rate of well (in gpm)
OIT 7	GEOTHERMAL	POWER DEVELOPMENT INDUSTRIAL	2000	17,520,000	2000
		HEATING COMMERCIAL			

C. Maximum Rate of Use Requested

What is the maximum, instantaneous rate of water that will be used? 2000 gpm

(The fees for your application will be based on this amount.)

D. Period of Use

Indicate the time of year you propose to use the water: YEAR AROUND

(For seasonal uses like irrigation give dates when water use would begin and end, e.g. March 1-October 31.)

E. Acreage

If you will be applying water to land, indicate the total number of acres where water will be applied or used: _____

(This number should be consistent with your application map.)

5. WATER MANAGEMENT

A. Diversion

What method will you use to divert water from the source?

☒ Pump (give horsepower and pump type): 300 HP LINESHAFT PUMP

☐ other means (describe): _____

B. Transport

How will you transport water to your place of use?

☐ Ditch or canal (give average width and depth):

Width _____ Depth _____

Is the ditch or canal to be lined? ○ Yes ○ No

☒ Pipe (give diameter and total length):

Diameter 10 - 12" / 10 - 12" Length 680 ft TO POWERPLANT / 4300 ft TO INJECTION WELL

☐ other, describe: _____

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C. Application/Distribution Method

What equipment will you use to apply water to your place of use? N/A

Irrigation or land application method (check all that apply):

- ☐ Flood
- ☐ High pressure sprinkler
- ☐ Low pressure sprinkler
- ☐ Drip
- ☐ Water Cannons
- ☐ Center pivot system
- ☐ Hand Lines
- ☐ Wheel Lines
- ☐ Siphon tubes or gated pipe with furrows
- ☐ other, describe: _____

Distribution method

- ☒ Direct pipe from source
- ☐ In-line storage (tank or pond)
- ☐ Open Canal

E. Conservation

What methods will you use to conserve water? Why did you choose this distribution or application method? Have you considered other methods to transport, apply, distribute or use water? For example, if you are using sprinkler irrigation rather than drip irrigation, explain. If you need additional space, attach a separate sheet.

DIRECT - BURIED PIPING

6. PROJECT SCHEDULE

Indicate the anticipated dates that the following construction tasks should begin. If construction has already begun, or is completed,please indicate that date.

Proposed date construction will begin: PROD. WELL COMPLETED 3/09 PROD PIPELINE 2/10 INJECTION WELL 9/10 INJ PIPELINE 10/10 PROD PIPELINE 3/10

Proposed date construction will be completed: INJECTION WELL 12/10 INJECTION PIPELINE 3/11

Proposed date beneficial water use will begin: POWER PLANT COMPLETED 6/11

Is this project fully or partially funded by the American Recovery and Reinvestment Act? (Federal stimulus dollars) ○ Yes ☒ No

7. REMARKS

If you would like to clarify any information you have provided in the application, please do so here and reference the specific application question you are addressing.

8. MAP REQUIREMENTS

The Department cannot process your application without accurate information showing the source of water and location of water use. You must include a map with this application form that clearly indicates the township, range, section, and quarter/quarter section of the proposed well location and place of use. The map must provide tax lot numbers. See the map guidelines sheet for detailed map specifications.

9. SIGNATURE

By my signature below I confirm that I understand:

- I am asking to use water specifically as described in this application.
- Evaluation of this application will be based on information provided in the application packet.
- I cannot legally use water until the Water Resources Department issues a permit to me.
- If I get a permit, I must not waste water.
- If development of the water use is not according to the terms of the permit, the permit can be canceled.
- The water use must be compatible with local comprehensive land use plans.
- Even if the Department issues a permit, I may have to stop using water to allow senior water right holders to get water to which they are entitled.

I swear that all information provided in this application is true and correct to the best of my knowledge:

Signature of Applicant *(If more than one applicant, all must sign.)* 1/28/10 Date

Before you submit your application be sure you have:

- Answered each question completely.
- Attached a legible map which includes township, range, section, quarter/quarter and tax lot number.
- Included a Land Use Information Form or receipt stub signed by a local official.
- Included the legal description of all the property involved with this application. You may supply a copy of the deed, land sales contract, or title insurance policy, to meet this requirement.
- Included a check payable to the Oregon Water Resources Department for the appropriate amount. The Department's fee schedule can be found at www.wrd.state.or.us or call (503) 986-0900.

WRD on the web:
www.wrd.state.or.us

Oregon Water Resources Department

FORM Q

FOR COMMERCIAL AND INDUSTRIAL WATER USES

1. Describe the goods and services you plan to provide:

POWER PRODUCTION (1 MW GROSS)

HEATING

2. How will the water be used?

THE WATER WILL BE PUMPED TO A POWER PLANT ON CAMPUS TO GENERATE POWER (800 KW NET) THEN DIVERTED AROUND THE CAMPUS FOR POSSIBLE HEATING APPLICATIONS AT OTHER LOCATIONS THEN REINJECTED IN THE NW CORNER OF CAMPUS

3. What is the maximum amount of water that will be used on any given day:

2000 ☐ cfs ☒ gpm

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4. Are there periods of the day, week, month, or year that the water will not be used? *(e.g. no use December–March)*

☒ No ☐ Yes If so, when?_____

5. Is there a particular time or period of day, week, month, or year when the use of water is absolutely essential for the project to continue? *(e.g. vegetable processing, Oct. 15-Nov. 15)*

☐ No ☒ Yes If so, when? YEAR AROUND POWER PRODUCTION

6. Are there periods of the day week, month, or year where the amount of water used will be less than at peak times?

☒ No ☐ Yes If so, when?_____

Oregon Water Resources Department
Land Use Information Form

THIS FORM IS NOT REQUIRED IF: 1) water is to be diverted, conveyed, and/or used only on federal lands; or 2) the application is for a water-right transfer, allocation of conserved water, exchange, permit amendment, or ground water registration modification, and all of the following apply: a) only the place of use is proposed for change, b) there are no structural changes, c) the use of water is for irrigation, and d) the use is located in an irrigation district or exclusive farm-use zone.

Applicant Name: OREGON INSTITUTE OF TECHNOLOGY

Mailing Address: 3201 CAMPUS DR.

City: KLAMATH FALLS State: OR Zip: 97601 Day Phone: 541-885-1751

A. Land and Location

Please include the following information for all tax lots where water will be diverted (taken from its source), conveyed (transported), or used. Applicants for municipal use, or irrigation uses within irrigation districts may substitute existing and proposed service-area boundaries for the tax-lot information requested below. SEE ATTACHMENT

Township	Range	Section	¼ ¼	Tax Lot #	Plan Designation (e.g. Rural Residential/RR-5)	Water to be:	Proposed Land Use:
						☐ Diverted ☐ Conveyed ☐ Used	
						☐ Diverted ☐ Conveyed ☐ Used	
						☐ Diverted ☐ Conveyed ☐ Used	
						☐ Diverted ☐ Conveyed ☐ Used	

List all counties and cities where water is proposed to be diverted, conveyed, or used.

KLAMATH COUNTY, KLAMATH FALLS

B. Description of Proposed Use

Type of application to be filed with the Water Resources Department:

☒ Permit to Use or Store Water ☐ Water-Right Transfer ☐ Exchange of Water
☐ Allocation of Conserved Water ☐ Limited Water Use License
☐ Permit Amendment or Ground Water Registration Modification

Source of water: Reservoir/Pond ☒ Ground Water ☐ Surface Water (name)

Estimated quantity of water needed: 2000 ☐ cubic feet per second ☒ gallons per minute ☐ acre-feet

Intended use of water: ☐ Irrigation ☐ Commercial ☒ Industrial ☐ Domestic for ____ household(s)
☐ Municipal ☐ Quasi-municipal ☐ Instream ☐ Other

Briefly describe: THE WATER WILL BE PUMP TO A POWER PLANT TO GENERATE POWER THEN DIVERTED AROUND CAMPUS FOR POSSIBLE USE AT OTHER LOCATIONS THEN REINJECTED IN THE NW CORNER OF CAMPUS

Note to applicant: *If the Land Use Information Form cannot be completed while you wait, please have a local government representative sign the receipt below and include it with the application filed with the Water Resources Department.*

Receipt for Request for Land Use Information

State of Oregon Water
Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301-1266

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SALEM, OREGON

For Local Government Use Only

The following section must be completed by a planning official from each county and city listed unless the project will be located entirely within the city limits. In that case, only the city planning agency must complete this form.
This deals only with the local land-use plan. Do not include approval for activities such as building or grading permits.

Please check the appropriate box below and provide the requested information

X Land uses to be served by proposed water uses (including proposed construction) are allowed outright or are not regulated by your comprehensive plan. Cite applicable ordinance section(s): _____.

Land uses to be served by proposed water uses (including proposed construction) involve discretionary land-use approvals as listed in the table below. (Please attach documentation of applicable land-use approvals which have already been obtained. Record of Action/land-use decision and accompanying findings are sufficient.)
If approvals have been obtained but all appeal periods have not ended, check "Being pursued".

Type of Land-Use Approval Needed (e.g. plan amendments, rezones, conditional-use permits, etc.)	Cite Most Significant, Applicable Plan Policies & Ordinance Section References	Land-Use Approval:	
		☐ Obtained ☐ Denied	☐ Being pursued ☐ Not being pursued
		☐ Obtained ☐ Denied	☐ Being pursued ☐ Not being pursued
		☐ Obtained ☐ Denied	☐ Being pursued ☐ Not being pursued
		☐ Obtained ☐ Denied	☐ Being pursued ☐ Not being pursued
		☐ Obtained ☐ Denied	☐ Being pursued ☐ Not being pursued

Local governments are invited to express special land-use concerns or make recommendations to the Water Resources Department regarding this proposed use of water below, or on a separate sheet.

Name: Erik Nobel Title: Planning Manager

Signature: [signature] Phone: 541-883-5254 Date: 1-7-10

Government Entity: City of Klamath Falls.

Note to local government representative: *Please complete this form or sign the receipt below and return it to the applicant. If you sign the receipt, you will have 30 days from the Water Resources Department's notice date to return the completed Land Use Information Form or WRD may presume the land use associated with the proposed use of water is compatible with local comprehensive plans.*

Receipt for Request for Land Use Information

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SALEM, OREGON

Applicant name: _____

City or County: _____ Staff contact: _____

Signature: _____ Phone: _____ Date: _____

Oregon Institute of Technology Application for a Permit to Use Ground Water

Section 2. Property Ownership
The well OIT #7 is located 438 ft N 56° 03' 09" from the SE corner of the NW 1/4 of the NE 1/4 of Section 20, T 38 S, R 9 E, WM

The well (OIT #7) is located in the NW 1/4 NE 1/4 Section 20, T 38 S, R 9 E, WM;
It is located in the Klamath River Basin in Klamath County

A description of the place of use under this right is

SE 1/4, Section 17, T 38 S, R 9 E, WM
SE 1/4 SW 1/4, Section 17, T 38 S, R 9 E, WM;
NE 1/4 SW 1/4, Section 17, T 38 S, R 9 E, WM;

NE 1/4 NE 1/4, Section 20, T 38 S, R 9 E, WM;
NW 1/4 NE 1/4, Section 20, T 38 S, R 9 E, WM;
NE 1/4 NW 1/4 Section 20, T 38 S, R 9 E, WM;

Section 3. Ground Water Development
B. Well Characteristics
Well Log is attached for OIT 7. This well was drilled by ThermaSource and was originally permitted by DOGAMI.
The Injection Well has not been drilled at this time. The proposed location for the Injection Well is at 42°15'40.42"N and 121°47'19.83"W. We are proposing the well be 2000 ft deep with a 12 ¾" casing cemented from 900 feet to the top of casing and then 1100 ft of 9-5/8" slotted liner hung from 900 ft. This well will be completed to the specifications outlined in the applicable rules in OAR 690-200-0005 to 690-225-0110. We will be working with Oregon Department of Environmental Quality and Oregon Water Resources Department on the construction and permitting of this well.

Section 5. Water Management
The pipeline design from the Well #7 to the proposed location for the Power Plant is complete. The pipeline from the power plant to the injection well has not been designed yet but we have a tentative location for the pipeline.

Land Use Information Form
Land and Location

Township	Range	Section	1/4 1/4	Tax Lot #	Plan Designation	Water to Be:	Proposed Land use:
38 S	9 E	20 & 17		3809-00000-04900-000	PUD	Diverted & Used	Power Prod. And Heating
38 S	9 E	17		3809-017C0-00101-000	PUD	Used	Heating
38 S	9 E	17		3809-01700-00900-000	RH	Used	Heating
38 S	9 E	17		3809-01700-00901-000	RH	Used	Heating
38 S	9 E	17		3809-01700-01001-000	RH	Used	Heating
38 S	9 E	20		3809-02000-00100-000	RH	Used	Power Prod.

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							and Heating
38 S	9 E	20		3809-02000-00101-000	RH	Used	Heating

TECTON GEOLOGIC

COMPANY	Oregon Institute of Technology
WELL	#7
FIELD	
COUNTY/STATE	Klamath Falls Oregon
WELL HEAD COORDINATES	
42 15'15.97"N/121 46'59.92"W	
ELEVATION	4390'
SPUD DATE	1/23/2009
TD DATE	2/26/2009
TOTAL DEPTH	5310'
TRUE VERTICAL DEPTH	5215'
TD LOCATION	51.57' S, 594.99'W
CONTRACTOR/RIG	Thermasource Rig 105
COMPANY REPRESENTATIVE	Bill Doubleday

LOG INTERVAL

DATE LOGGED	1/23/2009	TO	2/26/2009
DEPTH LOGGED	52'	TO	5310'
MUD DRILLING	52'	TO	5310'
AIR DRILLING		TO	
LOG SCALE	1:600	UNIT NO.	WC
LOGGING GEOLOGISTS			

HOLE

26"	TO	322'
17.5"	TO	2500'
12.25"	TO	5310'
	TO	
	TO	
	TO	

CASING

20"	FROM	0'	TO	322'
13.375"	FROM	0'	TO	2476'
9.625"	FROM	2070'	TO	5008'
	FROM		TO	
	FROM		TO	

ABBREVIATIONS

NB	New Bit	**BHT**	Bottom Hole Temp
RRB	Re-run Bit	**C**	Carbide Test
CB	Core Bit	**NR**	No Returns
WOB	Weight On Bit	**LAT**	Logged After Trip
SPM	Strokes per Minute	**CFM**	Cubic Feet per Min
PP	Pump Pressure	**BUT**	Bottoms Up Temp
RPM	Revolutions per Min		

SYMBOLS

- Wireline Log
- Casing Shoe
- Steam/Water Entry
- Flow Test
- Deviation Survey
- Cored Interval / No Recovery

LITHOLOGY

- Clay
- Sand
- Gravel
- Sandstone
- Siltstone
- Argillite
- Phyllite
- Schist
- Veining
- Silicic Breccia
- Quartzite
- Tuff Seds
- Tuff
- Basalt
- Andesite
- Hornfels
- Basaltic Andesite
- Altered Zone

REMARKS

All depths from KB
KB = 22.0' (4412')
Aerated mud F/3286'

SECONDARY MINERALS

Q	= Quartz	Rare	<< 1%
C	= Calcite	Trace	< 1%
P	= Pyrite	Minor	1% to 4%
Pr	= Pyrrhotite	Common	4% to 7%
H	= Hematite		

AIR DRILLING TO

LOG SCALE 1:600 UNIT NO. WC

LOGGING GEOLOGISTS

Mike McLaughlin, Eric Booker

Darrick Boschmann, Tim Blazina

Schist

Veining

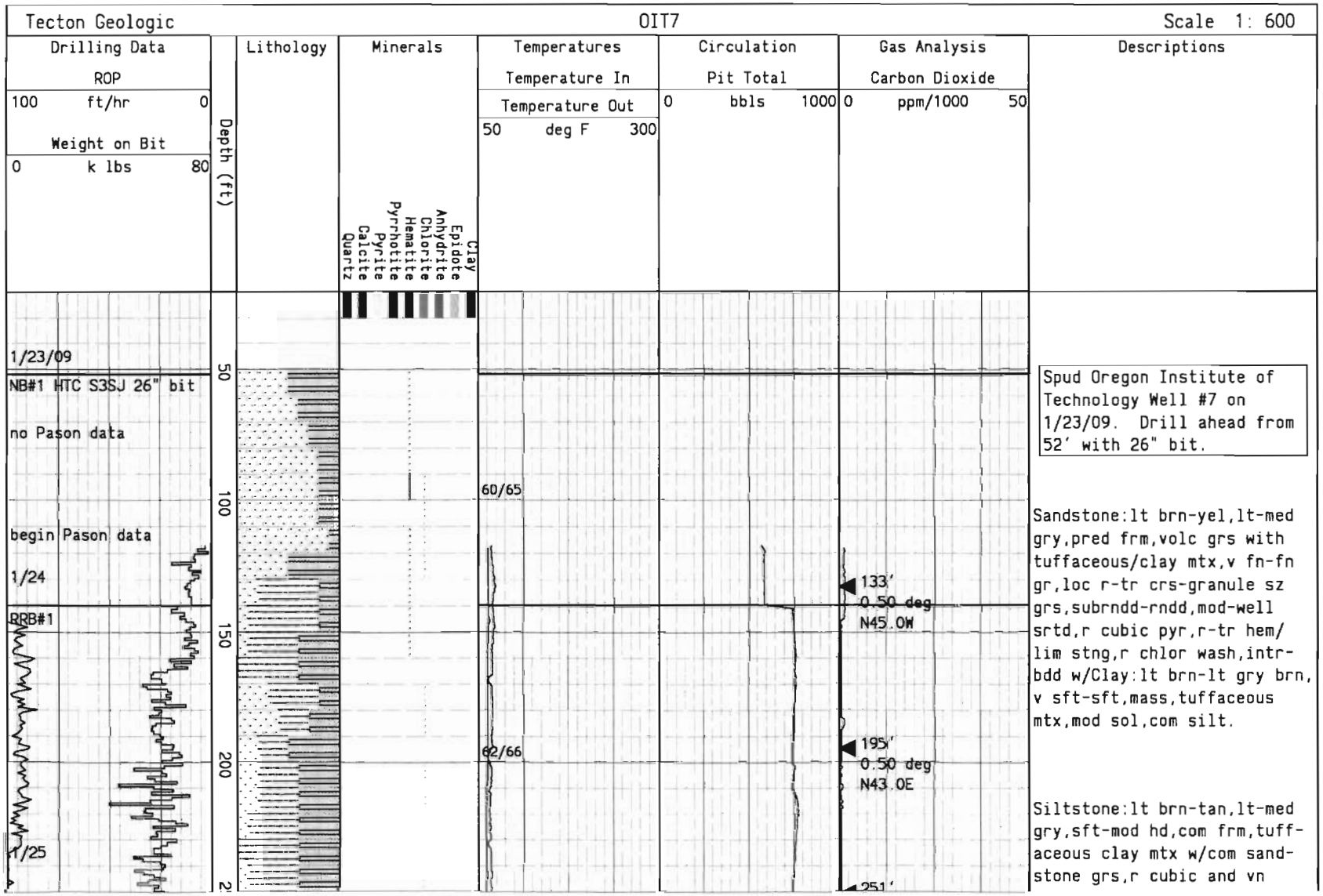
Dike

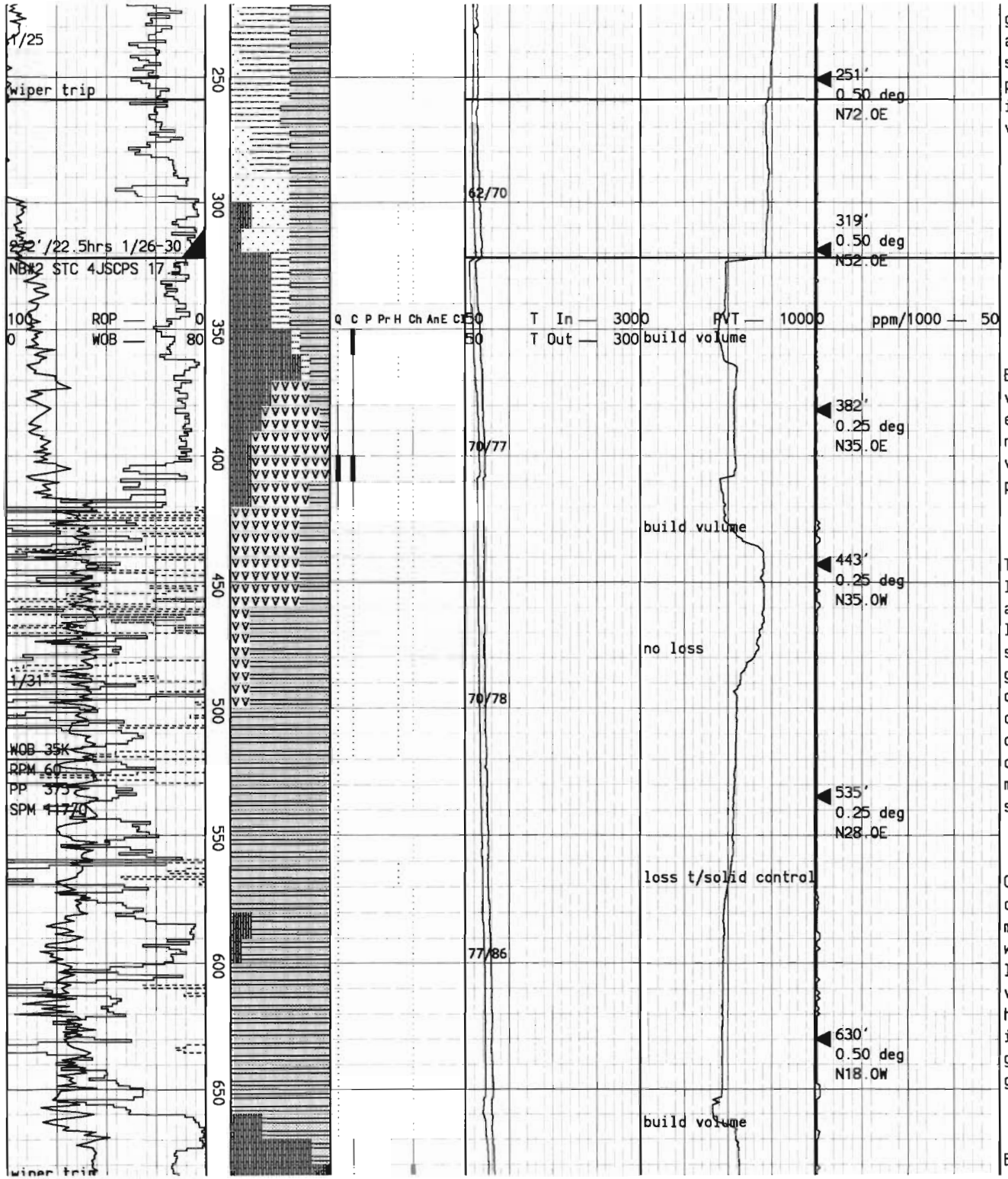
Basaltic Andesite

Altered Zone

C = Calcite
P = Pyrite
Pr = Pyrrhotite
H = Hematite
Ch = Chlorite
An = Anhydrite
E = Epidote
Cl = Clay

Rare << 1%
Trace < 1%
Minor 1% to 4%
Common 4% to 7%
Abundant 7% to 10%
> 10%





gry,sft-mod hd,com frm,tuff-aceous clay mtx w/com sand-stone grs,r cubic and vn pyr,r hem stng,r chlor wash, intrbdd w/Clay:lt brn,lt gry, v sft,tuffaceous.

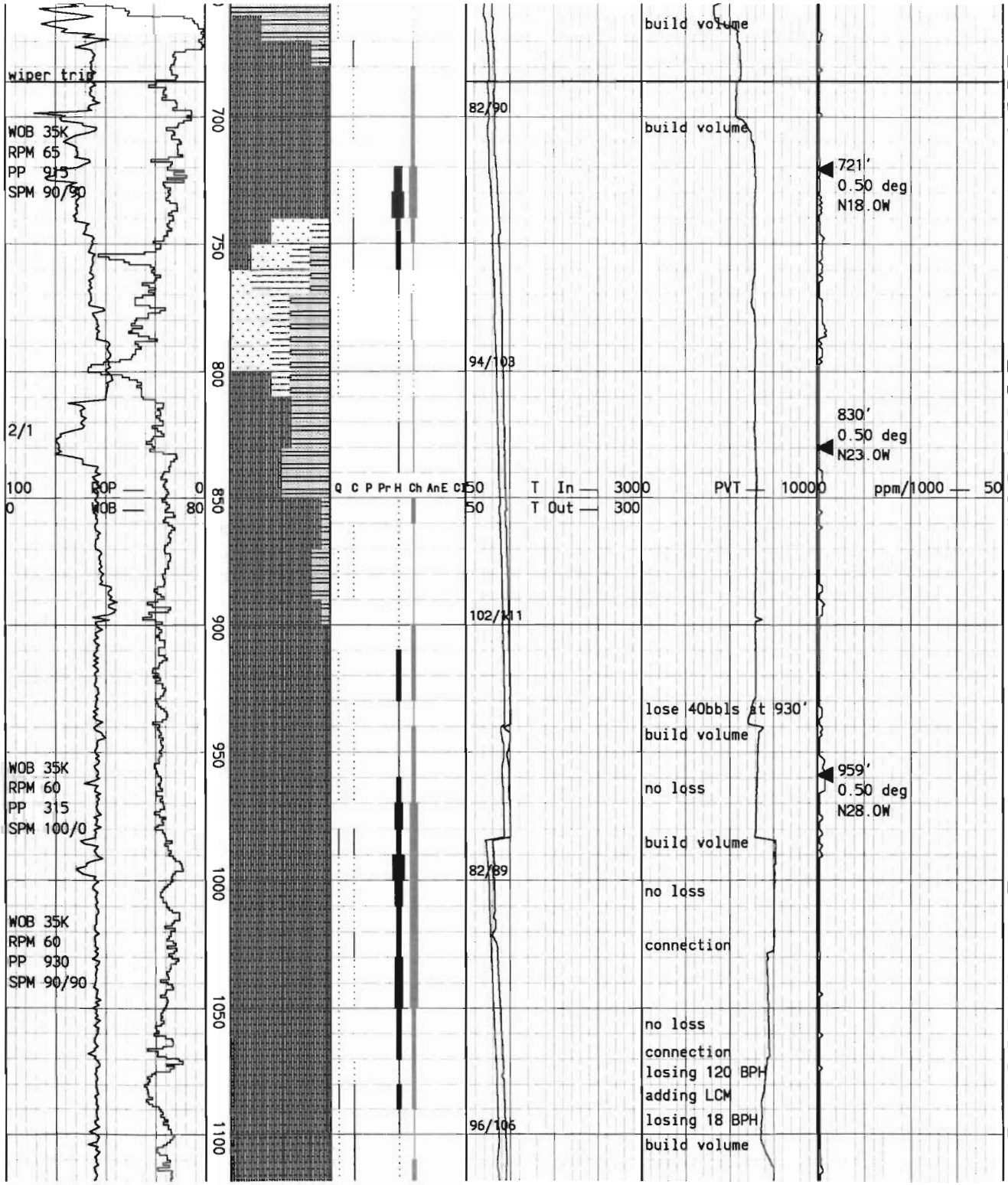
Drill 26" hole to 322'. Run 7 jnts of 20",94#,grade K-55,buttress casing to a depth of 322'. Drill ahead with 17.5" bit.

Basalt:tan-lt brn,lt gry,hd-v hd,fresh,aphan,microxln,r euhed phenos,occ brecc appr, r qtz amygds,r-tr inststit & vn calc,r-tr disem/vn/cube pyr,loc r hem,r chlor.

Tuff:tan,wht,v lt brn,frm-loc hd,pred microxln tuff-aceous mtx w/microxln-v fn lithic frags,loc tr xtl tuff, sl-occ mod calc,loc mnr devit glass,mnr brecc appr,loc mnr orng siliceous sinter/agate,r chalcedony amygds,loc r euhed qtz xtls,r-mnr intrstit & occ clr/wht calc vn frags,r-loc mnr disem/vn/cube pyr,r hem stng,r-tr chlortzd grs.

Clay:lt brn,lt-med gry,v sft, occ firm,sl sticky,sl-pred mod sol,tuffaceous(sediments) w/com-abun silt/sandstone/ lithic grs/frags,r qtz,r calc vng,r-tr disem/vn/cube pyr,r hem stng,r chlor wash,occ intrbdd w/Basalt:tan,lt-med gry,hd-v hd,aphan microxln grndmass,r cube pyr,r chlor.

Basalt:med gry,med-dk grn,



Basalt:med gry,med-dk grn, med brn,microxln grndmass w/tr-mnr serptnzd olivine & chlortzd mafic phenos, pred fresh v fn felds xtls, r qtz,r wht calc vng/vn frags,r-tr disem & vn pyr, tr-mnr chlortzd mafics,bcmg fri & mod-loc str altrd f/730' w/com-abun hem/chlor altrn.

Basalt:med-dk gry,occ grn, microxln grndmass,tr serptnzd olivine,r-mnr chlortzd mafic phenos,r qtz vng,r wht calc vng,r disem & vn pyr,tr-mnr chlortzd mafics,r-mnr hem & chlor altrn,intrbdd w/Siltstone & Sandstone:lt brn-tan, lt-med gry,sft,com frm, tuffaceous clay mtx.

Note:lose 40 bbls at 930'. Spotty returns after svy & cnx @982'. Add saw dust LCM & build volume. No or small loss while drilling, begin losing mud with occ spotty returns when pick up off bottom.

Basalt:dk gry brn,red brn, orng,pred hd,pred mod-incr str hem/chlor altrn,microxln grndmass w/tr-occ mnr serpntzd oliv w/loc serp vng & mnr-com chlortzd mafic phenos,sl incr grndmass/felds clay altrn,r-loc tr clr/wht qtz amygds,r wht qtz vng,r-tr wht calc vng,r disem & vn pyr,mnr-abun hem altrn, mnr-com chlortzd mafics, loc r sft wht anhyd,r red iddingsite altrn rims on

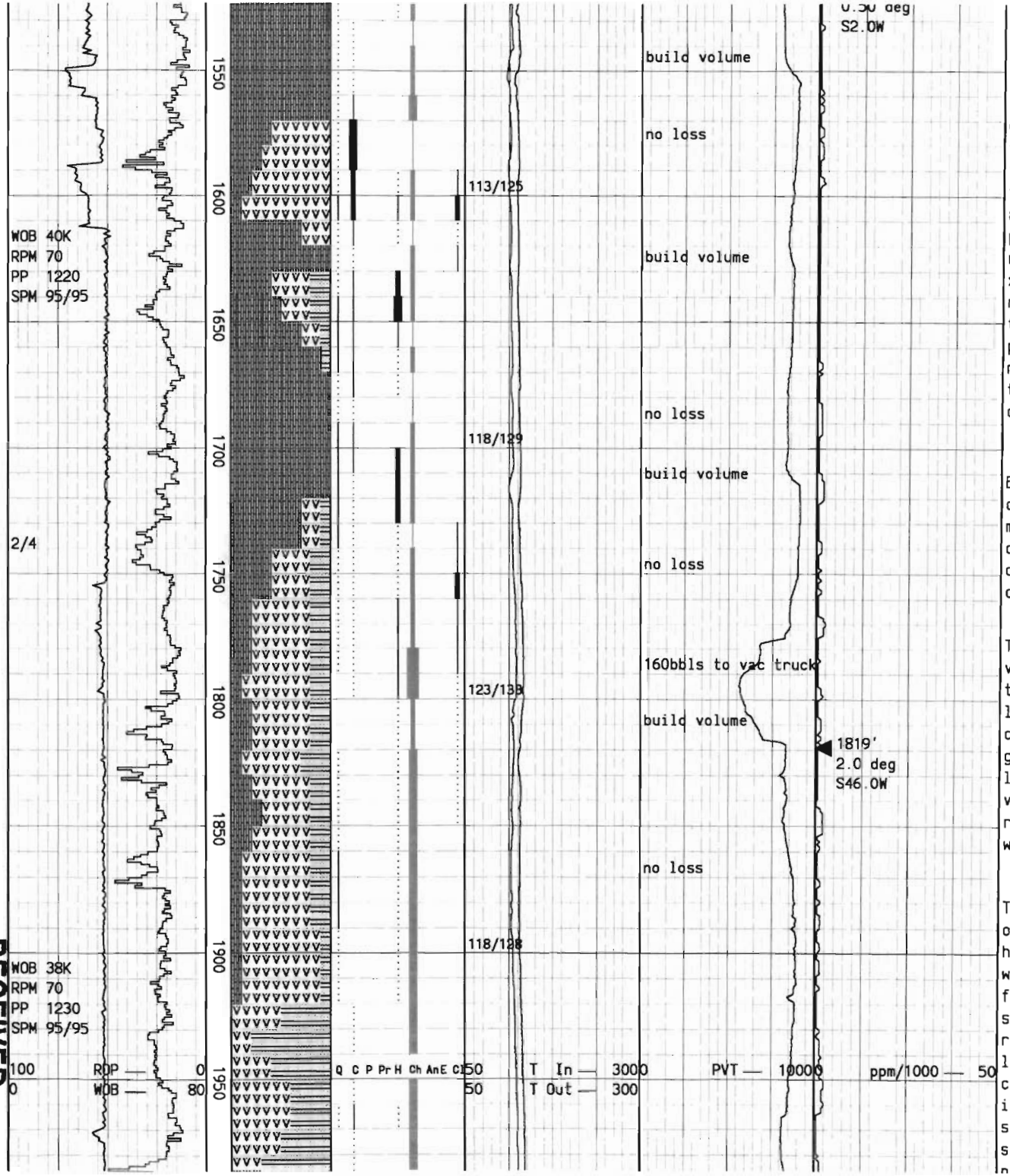
vn pyr,mnr-abun hem altrn, mnr-com chlortzd mafics, loc r sft wht anhyd,r red iddingsite altrn rims on chlortzd oliv xtls.

Basalt:lt-dk gry,grn,brn,mod hd-v hd,com britt,microxln grndmass,r-abun serptnzd olivine,tr lath & acic shaped felds,r-mnr chlortzd mafic min,r-tr qtz vng & vn frags,r wht calc vng,r disem pyr,tr-mnr chlortzd mafics,r-mnr hem & chlor altrn.

Tuff:red,pink,red orng,hd-v hd,brit,str-v str silicic, crypto-microxln w/tr-com microxln felds/lithic frags, r-loc mnr clr qtz vng,r euhed clr qtz xtls,r disem/vn/agg pyr,mod hem stained mtx,r-tr euhed clr anhyd vng & xtl clusters,loc r sinter appr.

Basalt:dk gry-dk gry brn,hd, sl-mod altrd,microxln-v fn gr gran grndmass w/r-mnr serptnzd/chlortzd oliv & chlortzd mafic phenos,r clr qtz vng,r wht calc vng,r disem pyr,tr-mnr chlortzd mafics,r-tr wht clay altrd felds,tr serp.

Basalt:lt-dk gry,grn,brn,mod hd-v hd,microxln-fn gr grnd-mass,r-abun serpentine,r-mnr chlortzd mafic xtls,r-tr qtz vng & vn frags,r wht calc vng r disem/agg pyr,r hem altrn, r-abun chlorite altrn,intrbdd w/Siltstone:gry,lt brn,w/ tuffaceous clay matrix.



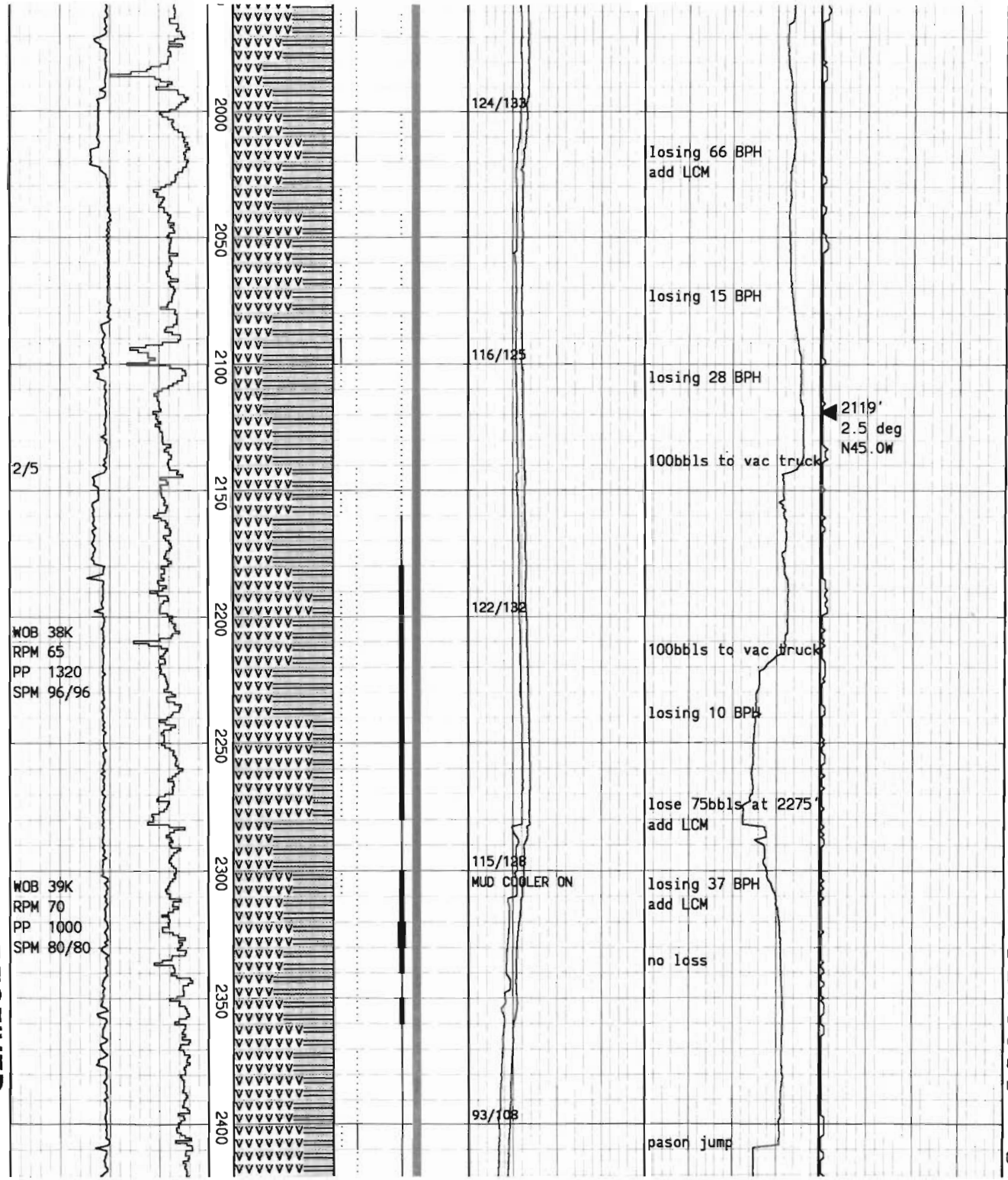
w/Siltstone:gry,lt brn,w/ tuffaceous clay matrix.

Tuff:tan,lt-occ med brn,off wht,lt-med grn,red,mod hd-hd, frm,occ sl silic,microxln tuffaceous mtx w/microxln-v fn lithic frags,bcmg mod-str altrd w/str chlortzd mtx & perv clay altrd felds(prob reworked by water),loc mnr xtl tuff,com-abun brecc appr, r qtz vng,r-tr intrstit calc, tr-mnr wht calc vng,r disem pyr,r-mnr chlortzd mtx,r-loc mnr hem,r sft wht anhyd & r-tr euhed clr anhyd,w/str hem clay f/1640'.

Basalt:lt gry,brn,grn,mnr-com chlortzd mafic xtls & grnd-mass,absnt relic text,r-tr qtz vng,r wht calc vng,r disem pyr,r-tr hem altrn,abun chlor altrn.

Tuff:med-dk grn,occ brn,tan, v sft-frm,occ mod hd, tuffaceous clay mtx w/fn gr lithic frags,sticky,v str chlorite altrn w/str chlortzd grs & mtx,perv divit,loc mnr lt brn tuff brecc,r-tr qtz vng,r-tr calc vng & vn frags, r disem pyr,r-tr hem,r sft wht anhyd.

Tuff:lt-med grn,occ dk grn, occ grn brn,sft-frm,occ mod hd,microxln tuffaceous mtx w/microxln-fn gr devit glass frags & lithic frags,str-v str chlortzd mtx,r wht qtz, r-tr wht calc vng & vn frags, loc r disem & occ cube pyr, com chlor,r sft wht anhyd, intrbdd w/Clay:lt-med grn,v sft-sft,mod sticky,mod-v sol, sl-mod plastic,str chlortzd, prob reworked devit ash tuff



intrbdd w/Clay:lt-med grn,v sft-sft,mod sticky,mod-v sol, sl-mod plastic,str chlortzd, prob reworked devit ash tuff.

Tuff:lt-med grn,frm-mod hd, microxln tuffaceous mtx w/ silt-v fn gr sz devit ash/ lith frags,str chlortzd mtx, loc r qtz,r-tr wht calc vng & vn frags,loc r disem pyr, loc hem altrn,com perv chlor altrn,r wht anhyd.

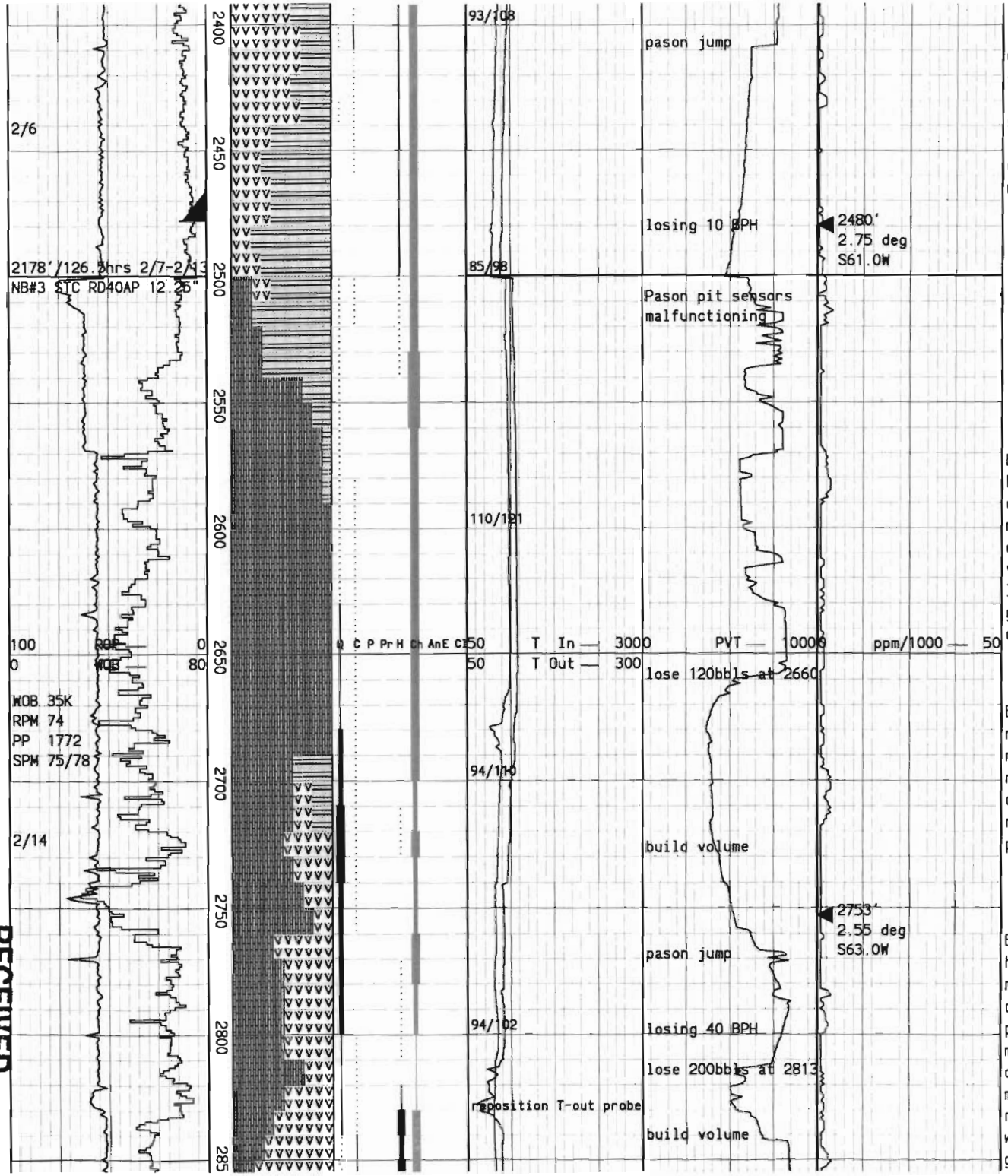
Clay:lt-med grn,lt-med gry, com red brn,v sft-sft,occ firm,sticky,tuffaceous seds, com glass shards,r qtz,r calc vng,r-mnr hem stng,r-mnr hem stng,com chlortzd mtx/abun chlor wash.

Tuff:med-dk grn,red brn,frm-mod hd,lithic frags & divit glass,v str chlorite altrn w/str chlortzd grs & mtx,loc mnr lt brn tuff brecc,r qtz vng,r calc vng & vn frags, r-mnr hem stng,com chlortzd mtx/abun chlor wash,r sft wht anhyd.

Mud Cooler on at 2305'.

Tuff:lt-med grn,occ dk grn, med red brn,frm-mod hd,loc hd/sl silicic,microxln tuff-aceous mtx w/lithic & devit glass/ash frags,str chlortzd mtx w/occ str hem staining, perv chlor altrd grs/mtx,loc tr-mnr hem altrd grs,loc r clr/wht qtz amygds,r wht calc vng,occ sl calc mtx,tr-mnr hem stng,com chlortzd mtx/chlor wash,r wht anhyd.

Clay:lt-med grn,lt gry,v sft-



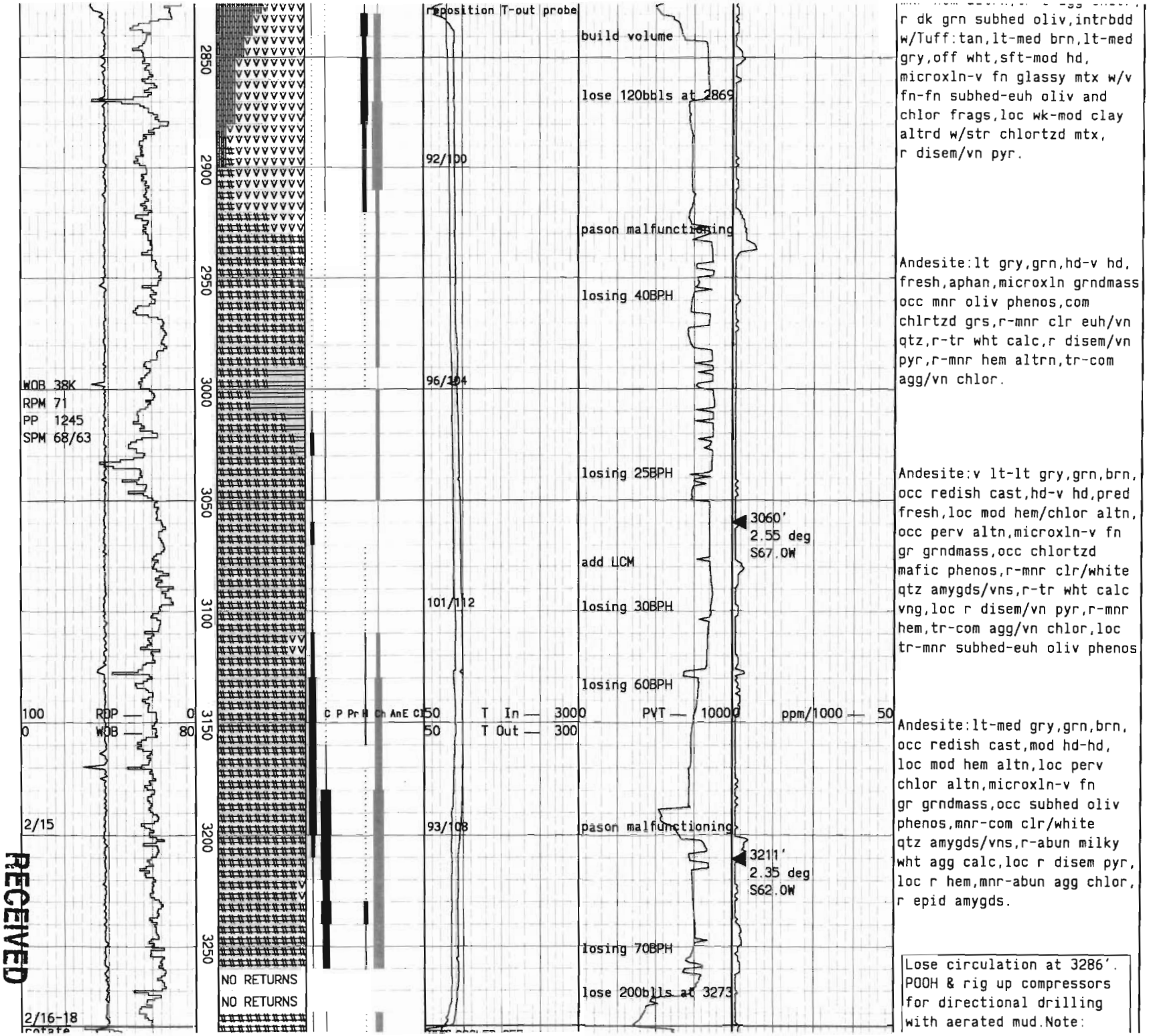
Clay:lt-med grn,lt gry,v sft-sft,occ firm,lt-mod sticky, tuffaceous seds w/com-abund silt & sand sized grs,occ glass shards,com devit grs,r qtz,r calc vng,r-mnr hem stng mod chlortzn.

Drill 17.5" hole to 2500'. Run 67 jnts of 13-3/8" 68# K-55 buttress casing to a total depth of 2476'. Clean out cement and drill ahead w/12.25" bit.

Basalt:med-dk gry,med brn,grn hd-v hd,microxln grndmass,com chlortzd grs,r-mnr chlortzd mafic phenos,r-tr qtz vng,r euh qtz,r calc vng,r dissem/vn pyr,loc perv chlor altrn, loc perv altd to Clay:lt-med grn,med gry,sft-v sft,r-tr calc vng,com-abun chlor.

Basalt:dk gry-blk,dk brn,grn, mod hd-vhd,pred fresh, microxln-v fn grn grndmass, mnr-com chlrotzd xtls, mnr-c clr euh qtz,r-tr clr qtz vng, r milky wht calc,r-tr disem pyr,mnr-c chlortzd mafic min.

Basalt:lt gry-blk,brn,grn, hd-vhd,fresh,aphan,friable, microxln grndmass w/r chlortzd mafic and oliv phenos,com chlortzd grs,tr-mnr clr euh/vn qtz,r wht calc,r-tr disem/vn pyr,r-mnr hem altrn,tr-c agg chlor, r dk grn subhed oliv,intrbdd w/Tuff:tan,lt-med brn,lt-med gry,off wht,sft-mod hd,



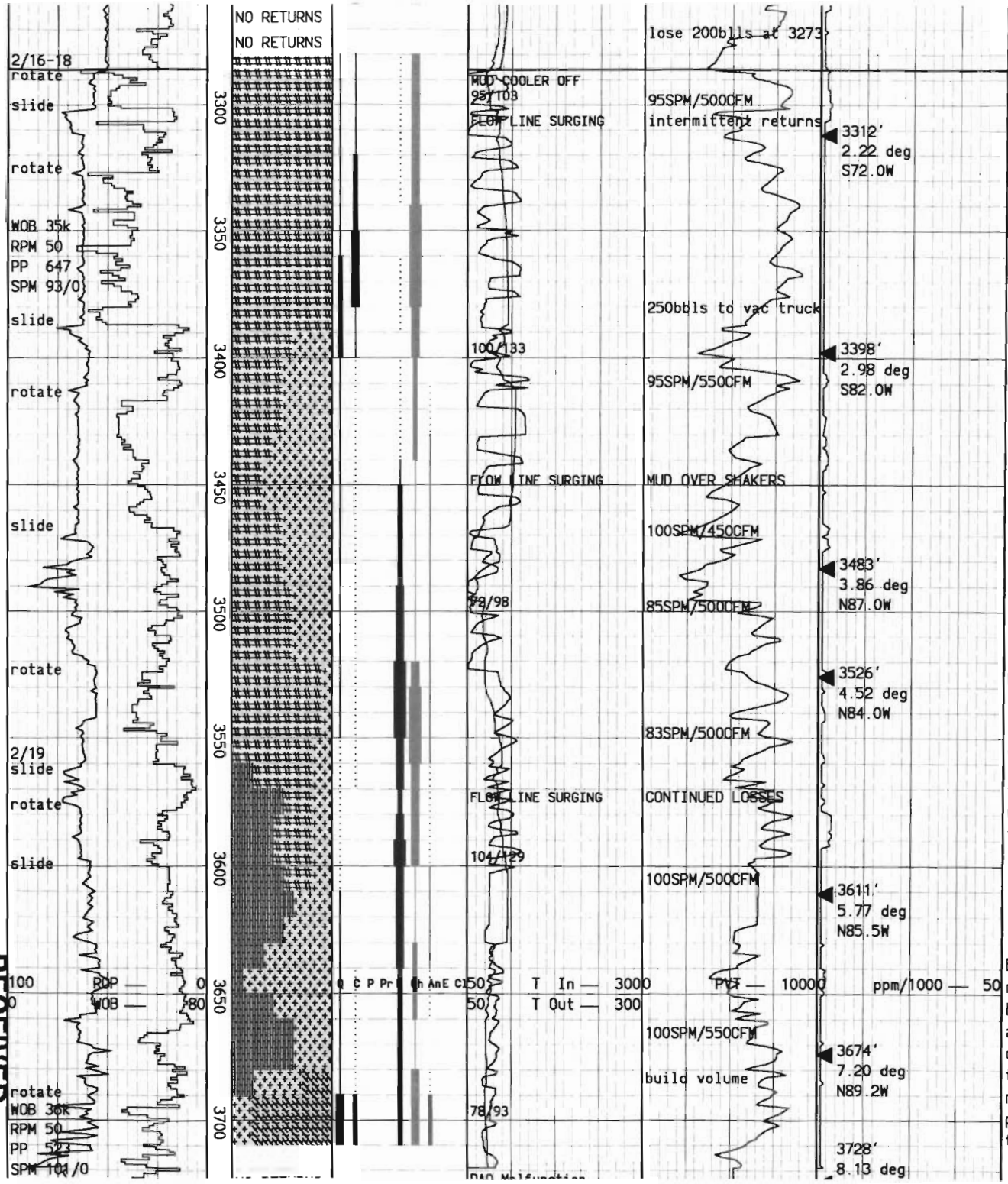
r dk grn subhed oliv,intrbdd w/Tuff:tan,lt-med brn,lt-med gry,off wht,sft-mod hd, microxln-v fn glassy mtx w/v fn-fn subhed-euh oliv and chlor frags,loc wk-mod clay altrd w/str chlortzd mtx, r disem/vn pyr.

Andesite:lt gry,grn,hd-v hd, fresh,aphan,microxln grndmass occ mnr oliv phenos,com chlrtzd grs,r-mnr clr euh/vn qtz,r-tr wht calc,r disem/vn pyr,r-mnr hem altrn,tr-com agg/vn chlor.

Andesite:v lt-lt gry,grn,brn, occ redish cast,hd-v hd,pred fresh,loc mod hem/chlor altn, occ perv altn,microxln-v fn gr grndmass,occ chlortzd mafic phenos,r-mnr clr/white qtz amygds/vns,r-tr wht calc vng,loc r disem/vn pyr,r-mnr hem,tr-com agg/vn chlor,loc tr-mnr subhed-euh oliv phenos

Andesite:lt-med gry,grn,brn, occ redish cast,mod hd-hd, loc mod hem altn,loc perv chlor altn,microxln-v fn gr grndmass,occ subhed oliv phenos,mnr-com clr/white qtz amygds/vns,r-abun milky wht agg calc,loc r disem pyr, loc r hem,mnr-abun agg chlor, r epid amygds.

Lose circulation at 3286'. POOH & rig up compressors for directional drilling with aerated mud.Note:

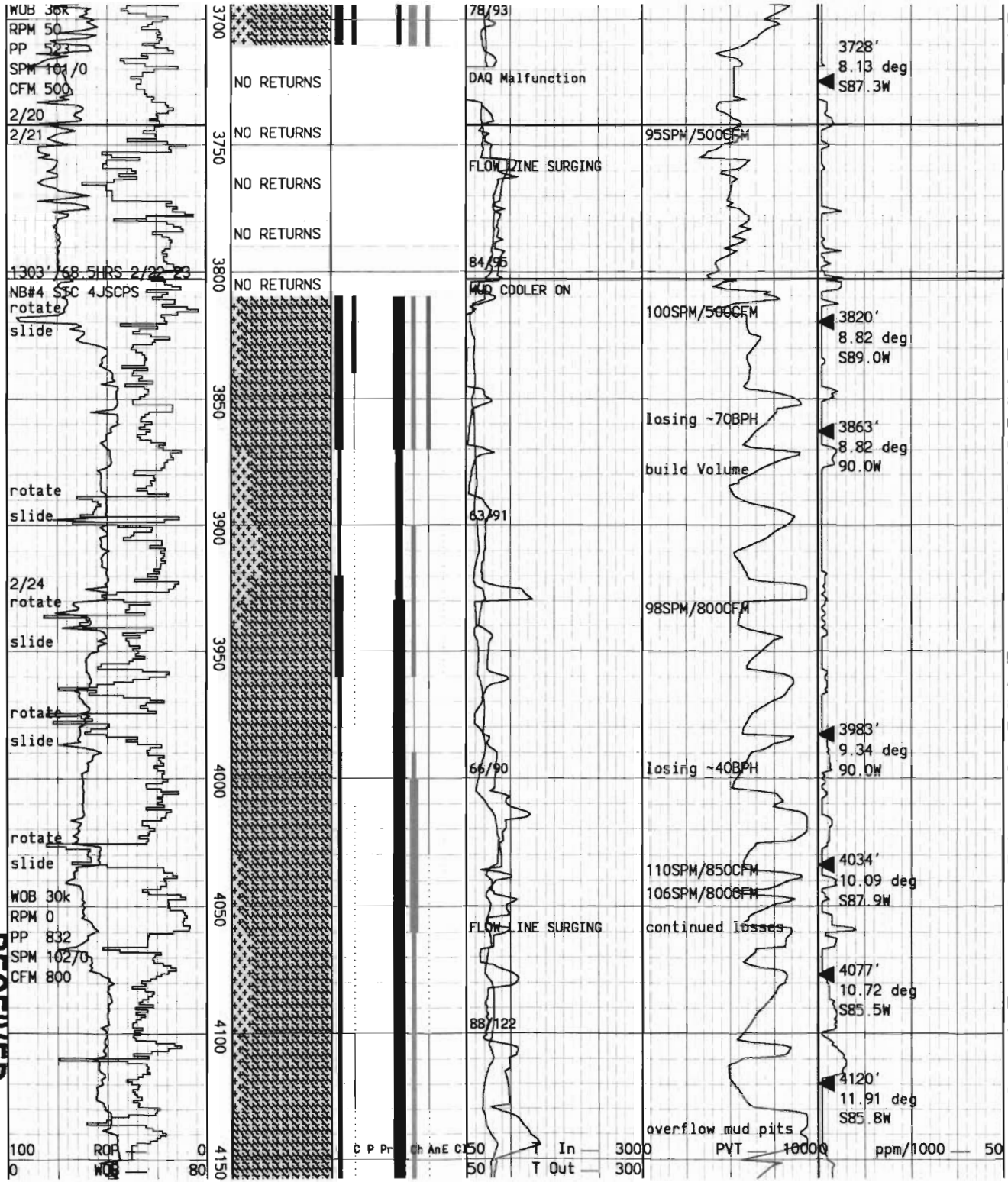


POOH & rig up compressors for directional drilling with aerated mud.Note: difficulty establishing circulation.POOH to install jet sub.

Andesite:lt-dk gry,grn, occ redish cast,occ porphy andesite,firm-hd,loc perv chlor altn,microx ln-v fn gr grndmass,occ subhed dk grn oliv phenos,tr-mnr clr/wht agg qtz & qtz vng,com-abun milky wht agg calc,r disem/vn pyr & agg pyr,loc r hem,com-abun agg chlor.

Andesite: lt-med gry,grn,occ redish cast,mod hd-v hd,mod-perv hem altn,loc mod-perv chlor altn,microxln-v fn gr grndmass,occ subhed oliv phenos,r-mnr clr/milky wht qtz vns/vugs,r-tr wht calc vng,r-mnr hem,tr-com agg/vn chlor,r-tr anhy xls w/subord Basaltic Andesite:med-dk gry, grn,occ redish cast,mod hd-v hd,mod-perv hem altn,occ mod-perv chlor altn,v fn-fn gr grndmass,tr-mnr clr/wht qtz vng,mnr-com milky wht calc, r-mnr hem,tr-com vn chlor,r-tr anhy.

Basalt:dk gry-blk,grn,occ red,mod hd-v hd,mod-perv hem stng/altn,occ mod chlor altn,v fn-fn gr grndmass,occ chlortzd subhed oliv phenos, tr-mnr qtz vng,r euh qtz xls, r-mnr calc vugs/vns,r disem pyr,c-mnr hem,t-com agg chlor t-m anhy vng.



pyr,c-mnr hem,t-com agg chlor t-m anhy vng.

Short trip to reposition jet sub & clean hole.Note: Tight spot at 3730'.

POOH to inspect bit/MWD tools.Bit/BHA packed off w/fines from mud pits.Note: remove jet sub.

Perv Mineralization/ Alteration Zone:perv hem altn/stng,perv chlrtzn,com micrxln qtz vns/vugs,com clr euh qtz,tr-mnr clr/wht calc vng,r disem pyr,mnr-abun disem hem,mnr-com vn/agg chlor,mnr dissem/vn anhyd,r disem yel epid,com iron oxidzd mafic phenos & grndmass.

Perv Mineralization/ Alteration Zone:perv hem altn/stng,occ chlrtzn,com micrxln qtz vns/vugs,mnr-com clr subhed qtz, r milky wht agg calc,r dissem pyr, com-abun disem hem,tr-mnr vn/agg chlor,tr disem/vn anhyd,r blue-grn agg anhyd, r dissem yel epid,com-abun iron oxidzd mafic phenos & grndmass.

Perv Mineralization/ Alteration Zone:perv hem altn/stng,com chlrtzn,com perv silicification,milky wht qtz vns/amygd,mnr-com clr subhed-euhed qtz xls, r-tr milky wht vn/agg calc, r clr calc,r disem/agg pyr,

clr subhed-euhed qtz xls, r-tr milky wht vn/agg calc, r clr calc,r disem/agg pyr, com-abun disem/agg hem,tr-mnr vn/agg chlor,r-tr agg/ vn anhyd,occ r disem yel epid,loc r brn-blk biot mica,abun iron oxidzd mafic phenos & grndmass.

Perv Mineralization/ Alteration Zone:perv hem altn /stng,tr-com chlrtzn,occ perv silicification,mnr-com wht qtz vng,mnr-com clr subhed qtz xls,r-tr wht vn/agg calc, occ r disem pyr,com-abun dissem hem,tr-mnr chlor,r-tr vn anhyd,abun iron oxidzd grndmass,grading into Basaltic Andesite:lt-med gry, grn,red,mottled,mod hd-v hd, mod-perv hem stng/altn,com perv silicification,occ mod chlor altn,v fn-fn gr grndmass,tr-mnr qtz vng,r euh qtz xls,r-mnr calc vugs/vns,r disem pyr,c-mnr hem,t-com agg chlor,t-m anhy vng.

Basaltic Andesite:lt-dk gry, brn,grn,mod hd-hd,mod-perv hem altn,occ mod-perv chlor altn,occ-perv silicification, v fn-fn gr grndmass,subhed mafic and oliv phenos,tr-mnr clr/wht qtz vng,r-tr milky wht calc,mnr-abun hem,tr-com vn chlor,r-tr anhy,r yel agg/ vn epid.

Basaltic Andesite:lt-med gry, brn,grn,red,occ dk gry-blk, hd-v hd,mod-perv hem altn,com chlrtzn,occ silicification,v fn-fn gr grndmass,subhed oliv

hd-v hd,mod-perv hem altn,com chlrtzn,occ silicification,v fn-fn gr grndmass,subhed oliv phenos,tr clr/wht vn qtz, r clr qtz xls,r-tr calc vns/ vugs,loc r agg pyr,com disem hem,tr blu/grn agg chlor,r clr anhy,grading into Perv Mineralization/Alteration Zones:perv hem altn/stng,tr-com chlrtzn,loc perv silicification,mnr-com wht qtz vng,mnr-com clr subhed qtz xls,r-tr wht vn/agg calc, occ r disem pyr,com-abun disem hem,tr-mnr chlor,r-tr vn anhyd,abun iron oxidzd grndmass.

Basaltic Andesite:lt-dk gry, brn,grn,occ blk,mod hd-v hd, mod-perv hem altn,com chlrtzn,occ silicification, microxln-fn gr grndmass,r subhed oliv phenos,tr subhed mafic phenos,tr clr/wht vn qtz,r clr qtz xls,r disem pyr,com disem hem,tr blu/grn agg chlor,r yel/grn epid amygds.

Perv Mineralization/ Alteration Zones:perv hem altn/stng,tr-com chlrtzn,loc perv silicification,tr wht qtz vng,tr clr subhed qtz xls occ r disem pyr,tr-mnr chlor grading into Basalt: black,hd-v hd,microxln,v fn grndmass subhed oliv phenos,r clr/wht qtz vning,r-tr hem stng.

Basaltic Andesite:lt-med gry, grn,brn, occ tan,mod hd-v hd, mod-perv hem stng/altn,occ mod chlor altn,microxln-fn gr grndmass,tr-mnr clr/wht qtz vng,com clr/wht agg qtz, tr-com lt-dk blue/grn agg

grndmass,tr-mnr clr/wht qtz vng,com clr/wht agg qtz, tr-com lt-dk blue/grn agg chlor,r disem/agg epid, grading into Perv Mineralization/Alteration Zone:perv hem altn/stng,mnr-com chlrtzn,occ mod silicification,mnr-com wht qtz vng,r clr/wht qtz amygds, r-tr chlor vng,r dk grn chlor amygds.

Basaltic Andesite:lt-med gry, grn,brn,red,org,mod hd-hd, mod-perv hem stng/altn,occ mod chlortzn,microxln-fn gr grndmass,com clr/wht vn/agg qtz,r clr/wht calc vng/amygd, com disem hem,tr disem/agg chlor,r clr anhy,grading into Perv Mineralization/ Alteration Zones:perv hem altn/stng,occ mod chlortzn, com clr/wht vn qtz,r-tr calc, com disem hem,tr disem/agg chlor,r clr anhy,r disem yel epid.

Drill 12.25" hole to 5310'. Run wireline log.Run 73 jnts of 9-5/8" 40ppf K-55 BTC perforated liner to a depth of 5008'.Liner hanger at 2070'.Perform flow test. T.D. OIT#7 02/26/09, 5310'.

Bore Hole Schematic Report

ThermaSource

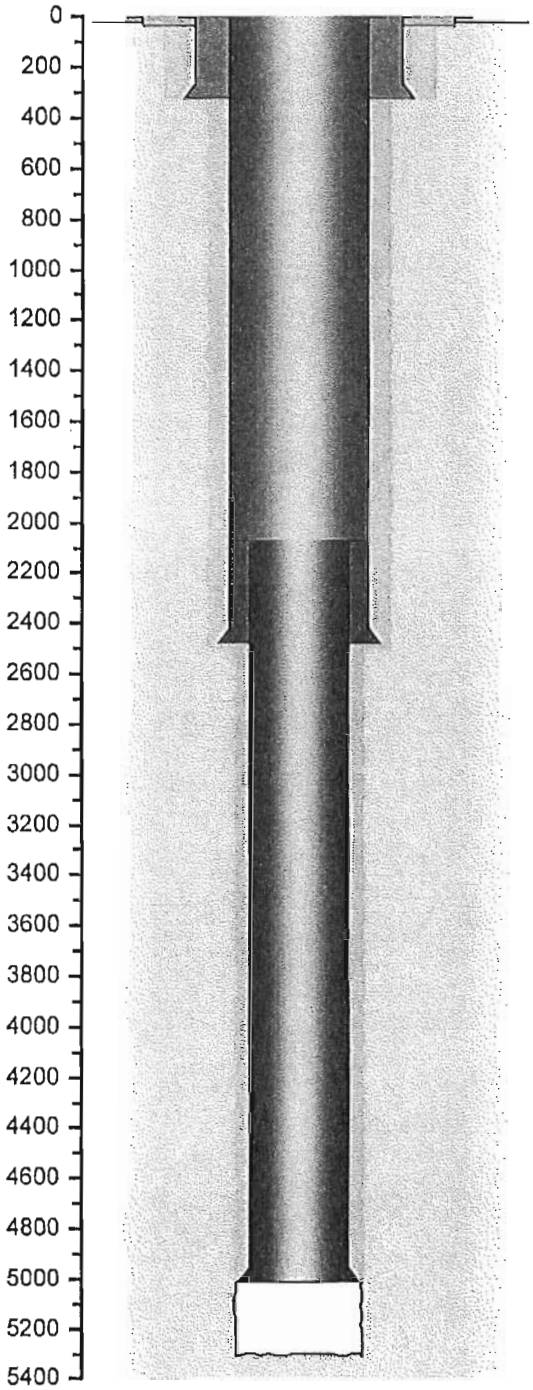
Well ID: OIT #7 - OIT $

Well Name: OIT #7

Field: Oregon

Sect: 20 Town: 38S Rng: 9E County: Klamath State: OR

Actual Data



All Depths are relative to the Original RKB Elevation
Original RKB Elevation at 22ft above Ground Level
Ground Level
30.000ins Casing set at 38ft on 09-Jan-09

20.000ins Casing set at 322ft on 26-Jan-09

9.625ins LINER, Top set at 2,070ft

13.375ins Casing set at 2478.28ft on 07-Feb-09

9.625ins Liner set at 5008.75ft on 03-Mar-09

Open Hole Diameter 12.250ins
Total Depth 5,310ft