



July 7, 1982

INTER-OFFICE CORRESPONDENCE / SUBJECT:

Medicine Lake Strat Test #3

Well 44-33

E-741

TO: D.L. Reese

FROM: N.R. Roberts

Approval is requested for the attached drilling program for the Medicine Lake Strat Test #3. This project is planned for the third quarter of 1982. The estimated gross cost for drilling this well is \$558,000. E #0741 has been approved to cover Phillips' estimated net cost of \$279,000. Occidental Geothermal, Incorporated will be responsible for 50% of the actual costs incurred. Federal drilling permits are pending.

D.C. Roll  
Drilling Superintendent

7-14-82  
Date

[Signature]  
Engineering Supervisor  
[Signature]  
Operations & Development  
Director

[Signature]  
Date  
19-1-82

[Signature]  
Exploration Director

7/10/82  
Date

[Signature]  
Manager, Geothermal  
Operations

[Signature]  
Date

jm

Attachment

- cc: D.L. Reese
- O.C. Rolls (2)
- T.A. Turner
- R.C. Lenzer
- T.S. Allen
- J.J. Beall
- G.E. Merrihew
- L.F. Walker
- N.R. Roberts
- File: Medicine Lake Strat Tests

T A B L E   O F   C O N T E N T S

	<u>PAGE</u>
DRILLING PROCEDURE	1-2
ATTACHMENTS	
1. MUD PROGRAM	3
2. GEOLOGIC PROGNOSIS WITH LITHOLOGY LOG	5
3. CASING PROGRAM	9
4. CEMENTING PROGRAM	11

MEDICINE LAKE STRAT TEST #3

Proposed TD = 3000'\*

Locations: NW, SW, Sect. 33 - T44N - R4E, Siskiyou County, California

Elevation: ± 6940' above sea level

Invoice

Charge No.: ~~E1#0742~~ E741

Objective: To obtain stratigraphic and geothermal gradient information in the Medicine Lake area.

Anticipated

Problems: Lost circulation and heavy water influx from surface to TD.

Control

Wells: See attached correspondence: Lithology in Medicine Lake Strat Test #2

Drilling

Superintendent: Ott Rolls, Home Telephone 801/268-0737  
Office Telephone 801/263-3129

Drilling

Engineer: Neale Roberts, Home Telephone 801/268-6880  
Office Telephone 801/263-3129

- Procedure:
1. Clear location and dig reserve pits. Set 13 3/8" conductor at ± 30' and cement to surface. Dig cellar according to BOP-substructure dimensions.
  2. MI & RU rotary drilling rig. Weld on drilling nipple and flow line. Make up flow diverter with stripping rubber.
  3. MU 12 1/4" bit, air hammer and NB 3 point roller reamer and spud in. Pick up float sub with float, 6 1/4" drill collar, string stabilizer at 30' and 60', and 2 more stands of 6 1/4" drill collars while drilling.
  4. Drill 12 1/4" hole to ± 300'. Fill hole with 8.8 ppg mud with +35 sec/qt viscosity. Circulate and condition hole (at least two hole volumes). POOH.
  5. RU and run ± 300' x 9 5/8" casing per attached casing program.
  6. Cement casing per attached cementing program.
  7. Cut off 9 5/8" casing and weld on bradenhead. NU and test double gate BOP with blind and pipe rams (500 psi x 15 min) and rotating head (100 psi x 15 min).

\*NOTE: If flow line temperatures reach 170-175°F before 3000', the well will be completed at that lesser depth.

8. Make up 8 3/4" bit, NB 3 point roller reamer, float sub with float, 6 1/4" drill collar, WB hardface string stab, 6 1/4" drill collar, stabilizer and 2 stands 6 1/4" drill collars. Drill to ± 2000'. Drill with low bit weight (15-20K) and high RPM (70-110) to minimize drill pipe fatigue and deviation. Run single shot surveys on all bit trips.
9. Circulate and condition hole. POOH.
10. RU and run ± 2000' x 7" casing per attached casing program.
11. Cement casing per attached cementing program.
12. Slack off on casing, ND BOPs and cut off 7" casing.
13. Cut off 10" bradenhead and weld on 6" bradenhead. NU and test 6" series 900 double gate BOP with blind and pipe rams (400 psi x 15 min), and rotating head (100 psi x 15 min).
14. MU 6 1/4" bit with NB WB Tungsten hardface stab, float sub with float, one 4"-4 1/2" drill collar or HWDP as available, WB Tungsten hardface stab, drill collars or HWDP as needed for weight (± 30 K). Drill 6 1/4" hole to a maximum of 3000'. Circulate and condition hole. POOH.
15. RU and run 2 7/8" 6.5# J55 EUE tubing with mule shoe and plate welded on bottom to ± 15' off bottom. Fill tubing with water and land in tubing hanger.
16. ND BOP. NU 6" x 2 1/2" EUE adapter, x-0, and full opening valve.
17. RD and MO rig. Clean location and fill pits.
18. Review site restoration with Surface Managing Agency.

ATTACHMENT #1

MEDICINE LAKE STRAT TEST #3

MUD PROGRAM

12 1/4" surface hole: 0 - + 300'  
Mud System: Spud mud - gel, lime\*

Mud Properties: Mud Weight = 8.7 - 9.0 ppg  
Funnel Viscosity = + 35 sec/qt  
PV/YP = 1/1  
Fluid Loss - No Control  
pH = 9+

COMMENTS

Spud with clear water adding lime to flocculate drilled solids and maintain pH. High-viscosity gel sweeps (40-50 sec/qt) to clean hole. Run solids control equipment at all times while circulating.

8 3/4" hole: + 300' - + 2000'  
Mud System: Gel - Lignite

Mud Properties: Mud Weight = 8.8 - 9.1 ppg  
Funnel Viscosity = 30-40 sec/qt  
PV/YP = 1/1  
Fluid Loss = 10-15 cc  
pH = 9.5

COMMENTS

Lower calcium to 150 or less. Mud up with bentonite (viscosity) and lignite (disperse and control fluid loss). Add Drispac to supplement lignite for fluid loss control. Run all solids control equipment continuously. Carbonate contamination, indicated by high gel strengths and a high yield point, may occur as temperatures increase. This should be treated with small additions of lime. Overtreatment can result in high temperature cementation. As lost circulation and water influx become a problem, water mud back and aerate if necessary. Increase corrosion inhibition as air volumes increase. If lost circulation continues to be a problem and water influx is apparent, convert to a relaxed foam to clean hole.

6 1/4" hole: + 2000' - + 3000'  
Mud System: Same as previous interval

Mud Properties: Mud Weight = 8.8 - 9.1 ppg  
Funnel Viscosity = 30-40 sec/qt  
PV/YP = 1/1 - 2/1  
Fluid Loss = 6-12cc  
pH = 9.5

\*To be used only after air/foam drilling has failed.

COMMENTS

Add caustic for pH control. Precipitate calcium with soda ash. Run solids control equipment continuously. For lost circulation and water influx, see previous interval.

ATTACHMENT #2

MEDICINE LAKE STRAT TEST #3

GEOLOGIC PROGNOSIS

PHILLIPS GEOLOGISTS:	Joe Beall	Office: 801-263-3129
		Residence: 801-277-1331
	Kent Smith	Office: 801-263-3129
		Residence: 801-967-0551

MUD LOGGING PROGRAM:

1. Cuttings samples every 10' from surface to total depth. Sample containers to be provided by Phillips' geologist.
2. Monitor drilling rate and flow line temperatures from surface to total depth. (Monitor drilling rate with rig geograph.)



March 16, 1982

INTER-OFFICE CORRESPONDENCE / SUBJECT: Lithology in Medicine Lake Strat Test #2

TO: J.J. Beall  
R.C. Lenzer

FROM: K.W. Smith

During our discussions with Occidental Geothermal, it was suggested that previous drilling results could be used to design a casing/drilling program which could shorten drilling time and lower costs. The purpose of this memo is to present the data as we have it so that you may pass this information to the drilling department for their use.

Two strat tests have been suggested. Strat Test #2, located in SW $\frac{1}{4}$  of SW $\frac{1}{4}$  Section 6, T. 43 N., R. 4 E., has the benefit of two neighboring holes. These previous holes yielded hydrologic and lithologic information which will be helpful. Gradient hole #4304E06-1 was drilled in 1980 and reached a depth of 270 feet. Medicine Lake Strat Test #1 was drilled in 1981 and reached a depth of 560 feet. Locations for these two holes as well as the proposed strat test are found on Figure 1.

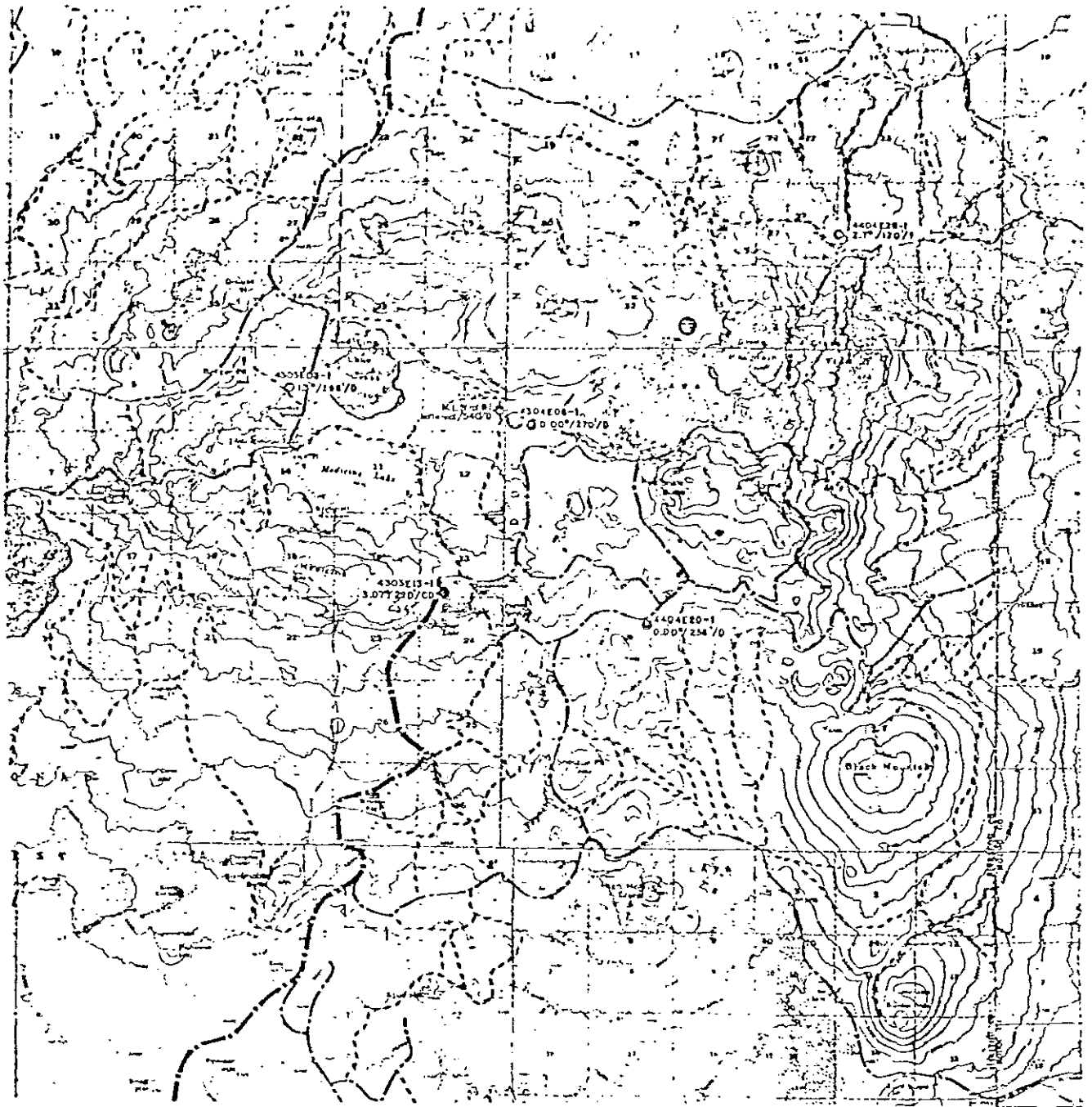
Lithologies for the previous holes are found on Figure 2. Similarities in rock types between these two holes suggest that rock types are correlative for, at least, short distances and predictions can be made with some confidence. The andesites are typical flow-type volcanic rocks with vesicular (sometimes rubbly) upper margins which grade into massive and very hard inner flows. The entire section should be considered as having loss of circulation problems due to jointing and other primary permeability factors. The inner parts of the flows should, however, be considered as the best place to set casing.

Hydrologically, there seems to be a perched aquifer at 90 feet. This aquifer yielded four to five gallons per minute when we drilled it with air. The scoriaceous zone at 243 feet, however, yielded larger volumes (50+ gal/min) of water and proved to be a detrimental factor.

As mentioned above, this information should be used to design a casing program to case off these problems in the upper parts of the hole. As far as below 560 feet, we can expect a similar type of alternating lithology to T.D. (3,000 feet). This is because the Medicine Lake volcano is about 2,500 feet high and rests upon an unknown thickness of Modoc Plateau basalts.

KWS:sdm  
Attachments





○ = proposed strat location



PHILLIPS PETROLEUM COMPANY  
 GEOTHERMAL OPERATIONS  
 655 EAST 4500 SOUTH SALT LAKE CITY, UTAH 84111

MEDICINE LAKE PROSPECT  
 TEMPERATURE GRADIENT MAP  
 SISKIYOU COUNTY, CALIFORNIA

0 1 2 4 Mi. SCALE

GEOLOGIST KENT SMITH DATE NOV. 16, 1981  
 DRAFTSMAN DOYLE OLSON DATE DEC. 9, 1981

-7-  
 FIGURE 1

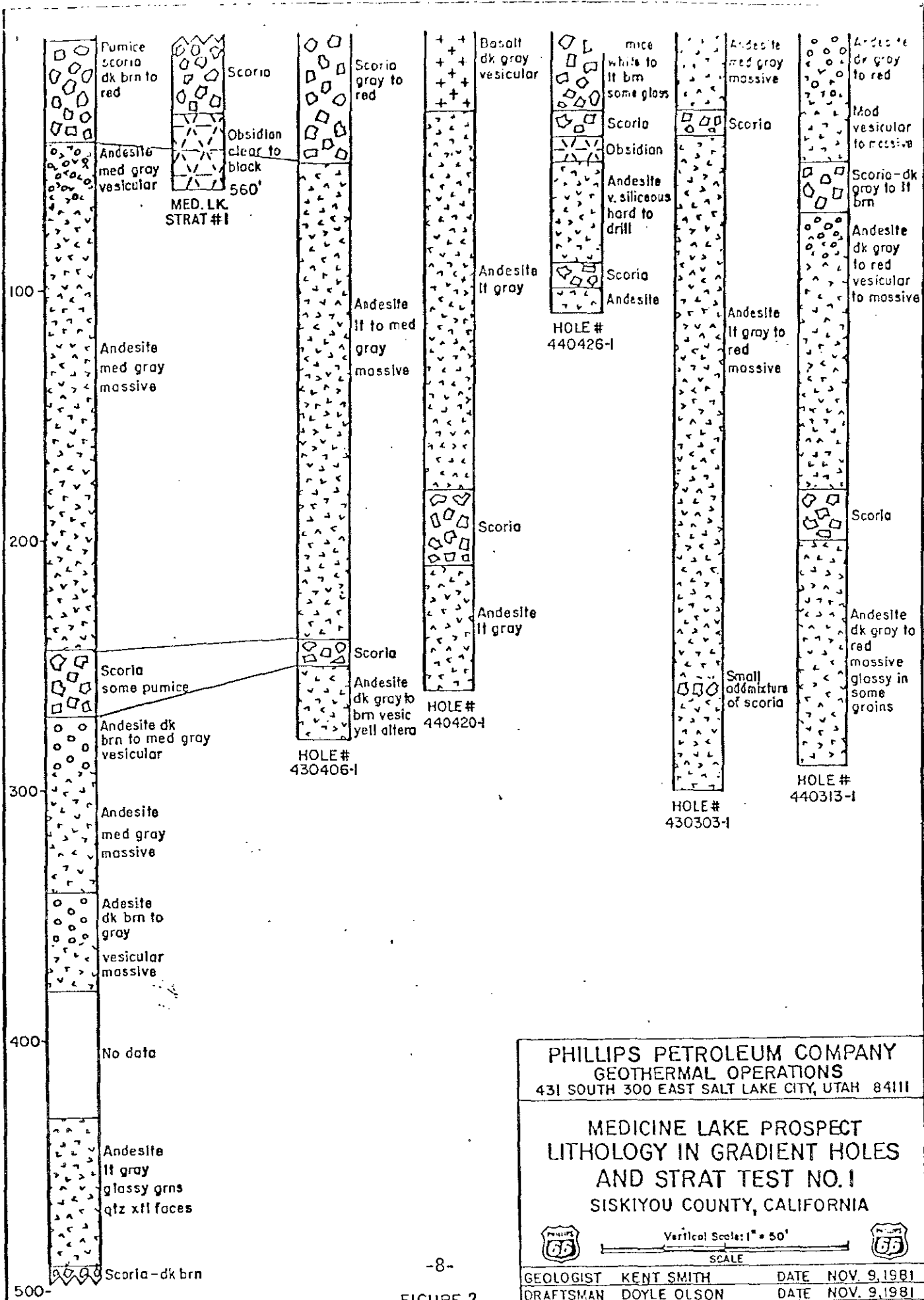


FIGURE 2

ATTACHMENT #3

MEDICINE LAKE STRAT TEST #3

CASING PROGRAM

9 5/8" SURFACE CASING

± 300' x 9 5/8" 36# K55 ST&C R-2

Make-up Torque:

Maximum = 5290 FT-LB  
Optimum = 4230 FT-LB  
Minimum = 3170 FT-LB

PPCo. Strength Ratings

Burst = 3336 psi  
Collapse = 1910 psi  
Tension = 282,000#

Accessories

Float equipment: Guide shoe with insert flapper float one joint up  
Centralizers: One on the shoe and one on the fourth coupling  
Wellhead equipment: 10" series 900 x 9 5/8" weld on bradenhead with  
2 x 2" side outlets  
Tackweld bottom two couplings

NOTE: Avoid sudden starts and stops when running casing. Do not run casing at excessive speeds (less than 30 sec/jt).

7" LONG STRING

± 2000' x 7" 20# K55 ST&C R-2

Make-up Torque:

Maximum = 3180 FT-LB  
Optimum = 2540 FT-LB  
Minimum = 1910 FT-LB

PPCo. Strength Ratings

Burst = 3552 psi  
Collapse = 2145 psi  
Tension = 170,000#

Accessories

Float equipment: Guide shoe and float collar one joint up  
Centralizers: One on first two couplings.

Wellhead equipment: 6" series 900 x 7" weld on bradenhead with 2 x 2"  
flanged side outlets  
Tackweld bottom two couplings

NOTE: Avoid sudden starts and stops when running casing. Do not run casing  
at excessive speeds (less than 30 sec/jt).

2 7/8" TUBING

+ 3000' x 2 7/8" 6.5# J55 EUE R-2 tubing

Make-up Torque:

Maximum = 2060 FT-LB  
Optimum = 1650 FT-LB  
Minimum = 1240 FT-LB

PPCo. Strength Ratings

Burst = 6050 psi  
Collapse = 6675 psi  
Tension = 67,500#

ATTACHMENT #4

MEDICINE LAKE STRAT TEST #3

CEMENTING PROGRAM

+ 300' x 12 1/4" x 9 5/8" Surface Job

PROCEDURE:

1. MU 9 5/8" single plug cementing head. Center casing in hole.
2. Circulate and condition hole (at least two hole volumes).
3. Mix 3% CaCl<sub>2</sub> with redi-mix and pump at maximum practical rate. Figure cement volume with 100% excess. Drop plug and displace with mud. If plug does not bump, do not overdisplace.
4. Check to see that float is holding. If not, shut in and monitor pressure. Bleed off if pressures increase 2-300 psi from initial shut-in pressure.
5. ND cementing head. WOC six hours and N.U.

+ 2000' x 8 3/4" x 7" Long String Job

PROCEDURE:

1. MU 7" single plug cementing head.
2. Dependent on slurry volume and circulating temperatures, mix 1-2% CaCl<sub>2</sub> with redi-mix and pump at maximum practical rate. Figure cement volume to bottom of lower-most major lost circulation zone with 100% excess. If plug does not bump, do not overdisplace.
3. Check to see that float is holding. If not, shut in and monitor pressure. Bleed off if pressure increases 2-300 psi from initial shut-in pressure.
4. With casing still in elevators, push mud sacks as deep as possible (+ 30') with 1" tubing and cement to surface with redi-mix + 3% CaCl<sub>2</sub>.
5. POOH with tubing and WOC six hours minimum.