GL07341

F.E.T. TEST PLAN
Field Change Sheet

Title FET-2-79

WBS No.
FET No. FET-2-79
F.C. No. 1

Requester B. Meyer Time Date 2-15-79

- ☐ Cancellation — Basis
- ☐ Hold — Basis
- ☐ Hours Update Only (Budget Manager's concurrence required for all hours in excess of estimated hours) — Hours / Hours / Hours
- ☐ Due Date Change — Basis

Change Description

1) Step 4.6.1 NOTE: Wells are to be instrumented whenever possible. If work is being done of the well (USGS logging or pump setting) disconnect instrumentation and store. When the work is completed, replace the instruments (place instruments in temporary protection if the well building is off).

(see attached sheet)

Justification

1) Instrumentation will interfere with work and may be broken. Also, data will not be good when well is being worked with.
2) Environmental engineer request

(see attached sheet)

Concurrence

Edward L Dr — Requesting Manager	1607 — Time	2-15-79 — Date
Brenda S Meyer — Budget Manager	1610 — Time	2-15-79 — Date

Approval

Facility/Area Manager	Time	Date

Distribution

Facility/Area Supervisor
Budget Manager
Requester
Job Supervisor
FET Coordinator
Res. Engineer

Change Description (Cont.)

2) Step 4.6.3 - Cancel requirements for level meansurement in USGS-4 and auger hole. Substitute pit monitor well at RRGE-3 and one of the pit monitor wells at RRGP-5 (use the same one at RRGP-5 for all measurements).

3) Step 4.6.4 - For measuring water levels in the irrigation wells use the steel tape. If the wells are inaccessible, record as such on the data sheet. Stewart's and Udy's well should be accessible.

4) Step 5.4.5 - Cancel "during warm-up".

5) Step 5.4.6 - Change to $\pm$ 5% (accuracy).

6) Step 5.7.1 - Valve in digiquartz to Bubbler at RRGE-2 after bubbler pressure is below 400 psia. Verify that it is no longer valved to the annulus before valving to bubbler.

7) Change valve line up per attachment.

Justification (Cont.)

3) Clarification and weather problems.

4) Sample point not installed. Impossible to do.

5) Inconsistency with step 4.10.

6) Protection of instrumentation.

7) Changes and additions to drawings.

Attachment to Field Change

Table 1

VALVE LINEUP FOR RRGE-2 TO RRGI-6

VALVE NUMBER	VALVE CONDITION		RRFO SIGN-OFF, DATE AND TIME
	OPEN	SHUT	
2V4			
2V5			
2V1	X		
2V3 (Throttled)			
6V4			
6V5			
6V1	X		
6V2	X		
6V3 (Open)	X		
2V6	X		
2V7	X		
2V8		X	
2V9		X	
1V-16		X	
1V-17	X		
1V-19	X		
1V-18		X	
1V-13		X	
1V-15	X		
3V-9	X		
3V-6	X		
3V-3		X	
3V-7		X	
6V-12		X	
6V-13	X		
3V-10	X		
3V-11		X	
6V-11	X		
6V-8	X		
6V-10	X		
6V-9	X		
6V-7	X		
6AV-6	X		
6V-14		X	
6V-15	X		
3V-15	X		
3V-17		X	
3V-16		X	
3V-12		X	
6V-17	X		
6V-18	X		
6V-23	X		
6V-24	X		
6V-27	X		
6V-21			
6V-26		X	
6V-25		X	

Table 1

VALVE LINEUP FOR RRGE-2 TO RRGI-6

VALVE NUMBER	VALVE CONDITION		RRFO SIGN-OFF, DATE AND TIME
	OPEN	SHUT	
6V-20	X		
6V-19		X	
1V11		X	
1V9		X	
1V7		X	
3V13		X	

EG&G Idaho

INTEROFFICE CORRESPONDENCE

date January 30, 1979

to RRFO Manager

from Fluids Experiments and Testing

subject RRGE-2 PRODUCTION TEST/RRGI-6 INJECTION TEST - FET-2-79

Approved by:

Reservoir Eng. David W Altman Date 2-13-79

Drilling Eng. J A Bowman Date 2-20-9

Design Eng. Roger R. Pisatello Date 2-12-79

Environmental Eng. S G Spencer Date 2-13-79

Safety Eng. T. H Stickley Date 2-27-79

RRFO Eng. W. M Mullen Date 2-27-79

Chemistry Eng. R E McAtee Date 2-13-79

Authorized for Release

J. E. Driscoll 2/27/79

J. E. Driscoll Date

REV.	RELEASE DATE

FORM EG&G-954
(Rev. 2-77)

RRGE-2 PRODUCTION TEST TO RRGI-6 INJECTION TEST

1.0 PURPOSE OF TEST

The primary purposes of the test are to provide information on the Raft River Known Geothermal Resource Area (KGRA) in terms of expected well performance as well as aquifer hydrologic and thermal characteristics (extra emphasis shall be placed on RRGE-2 data). Also, process instrumentation will be tested for development.

2.0 RESPONSIBILITIES

2.1 Raft River Operations will have overall responsibility for conduction of the test, operational data, data retrieval and transmission, hardware/instrumentation installation, and safety.

2.2 Engineering will have responsibility for design and material procurement for permanent lines and instrumentation.

2.3 Reservoir Engineering will have responsibility for data analysis and reporting for hydrologic and thermal data.

2.4 Fluids Experiments and Testing will have responsibility for test plans, scheduling, construction contracts, and test coordination.

3.0 SAFETY

3.1 All personnel operating experiments at Raft River will be under the cognizance of the Raft River Operations Manager and subject to written site operating rules.

3.2 Any experiment or experimental procedure deemed unsafe will be shut down by the Raft River Operations Manager, the Raft River Experiment Coordinator or the Safety Division representative.

3.3 Raft River Operations is reponsible for all site safety. Any unsafe condition developing through the operation of an experiment shall be reported immediately to the Manager of Raft River Operations.

3.4 Safety Manual uses required:

3.4.1 Hazardous Material Safety No. 6020.

3.4.2 Material Handling Safety No. 6030.

3.4.3 Electrical Safety No. 6040.

3.4.4 High/Pressure/Temperature System Safety No. 6060.

3.4.5 General Protective Clothing and Equipment No. 6070.

4.0 PREREQUISITES

4.1 Raft River Operations will ensure that all water from RRGE-2 and RRGI-6 will be directly injected or transferred to a lined pond with the exception of freeze line flows.

RRFO_____ Date_____

4.2 Raft River Operations will ensure that no site fluid transfer or flow operations will interfere with flow/injection performance.

RRFO_____ Date_____

4.3 Raft River Operations will ensure RRGE-2 to RRGI-6 line warm-up.

RRFO_____ Date_____

4.4 Drilling Support will ensure the Geophysical Measurements Laboratory is available to run temperature logs in RRGI-6 within 48 hours of start of test, during and after testing. The laboratory shall also be used for the downhole (H.P.) probe during testing.

Drilling Support_____ Date_____

4.5 Raft River Operations will ensure the availability of test site living quarters (this will be limited to quarters available) with facilities for Reservoir Engineering.

RRFO_____ Date_____

4.6 Monitor Wells

4.6.1 Raft River Operations will ensure that the following wells are instrumented for pressure or water level data and instrumentation is recording properly on a maximum 1 hour interval at least one week prior to start of testing. If gauges are used, read once a shift. (See Attachment I.) If, during testing, instruments fail, wells are listed in the order of priority for data collection.

4 pressures } found 2
1 temp } have records where

Pressure	Water Level
RRGE-2 ✓	RRGI-7
RRGI-6 ✓	MW-3
(RRGP-5)	MW-4
RRGP-4	MW-5
RRGE-1	MW-6
BLM Offset	MW-7
USGS-3	
RRGE-3	
MW-1	
USGS-1	
MW-2	

RRFO_____ Date_____

4.6.2 Raft River Operations will ensure that the following monitor wells are samples (see Attachment I) at least two weeks prior to long term testing.

MW-1	MW-5
MW-2	MW-6
MW-3	MW-7
MW-4	

RRFO_____Date_____

4.6.3 Manually measure depth to water at least three times weekly on MW-3, MW-4, MW-5, MW-6, MW-7, USGS-4 and auger hole (see attachment 3 - map). Record on charts where applicable or on Data Sheet 7.

4.6.4 Manually measure depth to water in the four irrigation wells on attachment 3 - map, daily at approximately the same time each day. Record on Data Sheet 7.

4.6.5 If the BLM well weir can be repaired or replaced, measure water level daily with either a stage recorder or staff gauge. Record on Data Sheet 7.

4.7 One week prior to start of test, Raft River Operations will control artesian production of RRGE-1 between 200 gpm and 300 gpm held as constant as possible. Continuously record flow or differential pressure. Hand throttling of RRGE-1 by RRFO is permissible. Record data per Data Sheet 1 when this is performed.

RRFO_____Date_____

4.8 RRGE-2 Instrumentation and Hardware

4.8.1 Raft River Operations will install or verify hardware and instrumentation per drawings (411864).

RRFO_____Date_____

4.8.1 Raft River Operations will ensure current calibration, where applicable, and correct operational status of instrumentation on drawings per Table 7.

RRFO_____Date_____

4.8.3 Install sampling point at RRGE-2, complete with condenser coils and cooling bucket.

4.9 RRGI-6 Instrumentation

4.9.1 Raft River Operations will install or verify hardware and instrumentation per drawings (411864, 411404, 411405, 411402).

RRFO_____Date_____

4.9.2 Raft River Operations will ensure current calibration, where applicable, and correct operational status of instrumentation on drawings per Table 7.

RRFO_____Date_____

4.9.3 Raft River Operations will install staging, stripper, and lubricator for RRGI-6 logging by Geophysical Measurement Laboratory.

RRFO_____Date_____

4.10 Continuous temperature (resolution $\pm$ 1°F, use partial range 200°F - 300°F, accuracy $\pm$ 5°F) at both wells and flow (resolution $\pm$ 2 gpm, accuracy $\pm$ 5%) recorders (if possible, use partial range and dampen valve) shall be installed and operating at RRGI-6 prior to step 4.12. (Calibration required.)

RRFO_____Date_____

4.11 Raft River Operations/Design Support will ensure system operability. Any deficiencies will be resolved prior to Step 4.12.

RRFO_____Date_____

4.12 Raft River Operations will perform valve line up per Table 1.

RRFO_____Date_____

4.13 Raft River Operations will allow RRGE-2 and RRGI-6 to warm-up by artesian flowing of 100 gpm from RRGE-2 to RRGI-6 for an estimated fourteen days prior to test start-up. Reservoir Engineering will verify warm-up of RRGI-6 prior to termination of preheat flow.

RRFO_____Date_____

5.0 DETAILED TEST PROCEDURE*

5.1 Within 48 hours prior to testing (step 5.7.3) run a temperature log at RRGI-6 with the Geophysical Measurements Laboratory, if available.

5.2 At least 2 hours prior to step 5.6.3, install downhole pressure/temperature probe, if available, in RRGI-6 at 3700 feet (or as deep as will remain operable).

5.3 Clean strainers at RRGI-6, S6-1, S6-2, and S6-3 per plan on Table 9.

5.4 Set up for sample collection (see Table 4).

5.4.1 During the first 72 hours of flow/injection, collect one liter samples from the RRGE-2 flow line at beginning of test, 0800, 1500, and 2400 hours, and if conductivity change more than 10%. Use premarked bottles.

5.4.2 During the period from 72 hours to 500 hours, collect one sample per day from the RRGI-6 flow line at 0800 hours, and if conductivity changes more than 10%.

5.4.3 All samples will be analyzed for Cl^-, F^-, Na^+, HCO_3^-, Ca^{++}, pH and conductivity. Let samples cool to approximately 25°C before taking conductivity readings.

Chemist on day shift should analyze samples from previous 16 hour period in the order they were samples immediately upon start of day shift. Chemist should complete samples from 0800 and 1500hours by the end of the day shift on which the samples were taken.

5.4.4 If water conductivity changes more than 10%, sample from flow line and mark sample with date, time, and notation "for complete analysis". Deliver to chemistry lab by 0800 hours.

5.4.5 Collect one 20 liter sample at RRGE-2 and RRGI-6 sample point every 24 hours in premarked bottles during warm-up and 500 hour test. Chemist is to clean, if required, and tare 2.0 micron filters prior to taking samples. Connect filters to condenser coils and run a 20 liter sample through the filter. Record time required to take sample and filter number on Data Sheet 6. Chemist will record filter and residue weight. If filter plugs before 20 liters are collected, remove filter and record time of flow. Transport 20 liter bottle to lab and measure and record quantity of water filtered. (See Attachment 2.)

*NOTE: 1) If at any time the testing is interrupted, start collecting recovery data, consult Table 5 and contact Reservoir Engineer.

2) Describe any unusual occurrences on comments sheet.

3) The pump limits for the RRGE-2 production pump are 400 gpm to 1000 gpm.

The pump limits for the RRGI-6 injection pumps are 400 gpm to 1200 gpm.

4) If pump start to test flow exceeds 5 minutes, allow well to recover for 30 minutes and restart test step with approval of on-site Reservoir Engineer.

5) If pH or oxidation reduction probe fails, attempt to repair when time is available. Conductivity probe failure shall be dealt with as soon as possible.

5.5 Perform or verify the valve lineup of Table 1, as required.

5.6 Perform pump maintenance and check.

5.7 10-21 Day Flow and Injection at 600 gpm

5.7.1 Valve out instruments per Table 6. Verify and valve in digiquartz at RRGI-6 and RRGE-2.

5.7.2 Set up for data collection per Table 2 and Data Sheets 2, 3, and 4. Check recorders and mark charts per Figure 2. Take one set of pretest data on Data Sheets 2, 3, and 4. Check and set observation well recorders per Table 3.

5.7.3 Start pumps at RRGE-2 and RRGI-6 per Operating Procedures (maximum start time - 5 min. to test flow).

5.7.4 Valve in instruments per Table 6.

5.7.5 Collect data per Tables 2 and 3 on Data Sheets 2, 3, and 4. Plot data per Figure 1. If digiquartz fails, collect data per Table 8 and Data Sheet 5.

5.7.6 Pump and inject 600 gpm $\pm$ 3% (accuracy) for 10-21 days. Hold flow constant to $\pm$ 1%(precision).

5.7.7 Mark charts, check monitor wells and perform pump maintenance once per shift. Mark charts per example, Figure 2. Measure observation well water level, as required (Steps 4.6.3 to 4.6.5).

5.7.8 After 48 hours of injection, remove the downhole probe at the discretion of the Reservoir Engineer.

5.7.9 After 100 hours into long term pumping and prior to well shut in, run a temperature log in RRGI-6.

5.7.10 Transmit data weekly to FET-UPD.

5.7.11 Reinstall the downhole pressure/temperature probe at RRGI-6 at 3700 feet within 24 hours prior to shut-in.

5.7.12 Within 2 hours prior to shut down, mark all charts, collect one full set of pre-shutdown data, and check observation wells.

5.7.13 After 10-21 days of pumping/injection, shut off pumps per Operating Procedure. (Test will be terminated at time agreed upon by FET and Reservoir Engineer.)

5.7.14 Mark all charts and collect recovery data per Tables 2 and 3 on Data Sheets 2, 3, and 4.

5.7.15 Shut in RRGE-2 and RRGI-6. Wellhead discharge of 20 gpm will begin at RRGE-2 to RRGI-6 as recommended by Reservoir Engineering.

5.7.16 Transmit production/injection data weekly to FET-UPD.

5.7.17 After 48 hours, remove the downhole probe at the discretion of the Reservoir Engineer.

5.7.18 After 100 hours of recovery or as determined by Reservoir Engineer, and prior to the end of the test, run a temperature log in RRGI-6.

5.7.19 Reinstall the downhole pressure/temperature probe in RRGI-6 at 3700 feet for the rest of the recovery period or as determined by Reservoir Engineer.

RRFO Engr._____Date_____

5.8 Transmit all remaining data to FET-UPD.

5.9 Transmit all untested water samples to the chemist.

5.10 Remove, store, and protect all temporary piping and instrumentation.

5.11 Perform area clean up.

RRFO Manager_____
Date_____

TABLE 1

VALVE LINEUP FOR RRGE-2 TO RRGI-6

VALVE NUMBER	VALVE CONDITION		RRFO SIGN-OFF, DATE AND TIME
	OPEN	SHUT	
2V4			
2V5			
2V-1	X		
2V-2	X		
2V-3 (Throttled)			
6V-4			
6V-5			
6V-1	X		
6V-2	X		
6V-3 (Open)	X		
2V-6	X		
2V-7	X		
2V-8		X	
2V-9		X	
1V-16	X		
1V-11		X	
1V-17	X		
1V-19	X		
1V-14		X	
1V-13		X	
1V-15	X		
3V-9	X		
3V-6	X		
3V-3		X	
3V-7		X	
6V-12		X	
6V-13	X		
3V-10	X		
3V-11		X	
6V-11	X		
6V-8	X		
6V-10	X		
6V-9	X		
6V-7	X		
6AV-6	X		
6V-14		X	
6V-15	X		

TABLE 2A

MAXIMUM DATA COLLECTION INTERVALS ON RRGE-2 FOR PULSE AND 10-21 DAY TESTS

TIME FROM TO / INSTRUMENT	0 MIN. 5 MIN.	5 MIN. 60 MIN.	1 HR. 5 HRS.	5 HR. 100 HRS.	100 HRS. 500 HRS.	RECOVERY
BUBBLER	10 SEC. BUBBLER AS QUICKLY AS POSSIBLE	1 MIN.	10 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
DOWNHOLE PUMP PRESSURE	1 Min.	1 MIN.	10 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
TEMPERATURE	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
WELLHEAD PRESS. GAUGE	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
LINE PRESSURE	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	NONE
ANNULUS PRESS.	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
PUMP CURRENT*	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	NONE

*See Attachment 2 for recorder information and maintenance.

TABLE 2B

MAXIMUM DATA COLLECTION INTERVALS ON RRGI-6 FOR PULSE AND 10-21 DAYTESTS

TIME FROM / TO / INSTRUMENT	0 MIN. / 5 MIN.	5 MIN. / 60 MIN.	1 HR. / 5 HRS.	5 HR. / 100 HRS.	100 HRS. / 500 HRS.	RECOVERY
PRESSURE TRANSDUCER	10 SEC.	1 MIN.	10 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
DOWNHOLE PROBE	10 SEC.	1 MIN.	10 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
TEMPERATURE	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
OXIDATION REDUCTION	1 HR.	1 HR.	1 HR.	6 HRS.	6 HRS.	NONE
CONDUCTIVITY	1 HR.	1 HR.	1 HR.	6 HRS.	6 HRS.	NONE
pH	1 HR.	1 HR.	1 HR.	6 HRS.	6 HRS.	NONE
FLOW FR 6-8	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	NONE
STRAINER DP'S PDI 6-11, 6-12, 6-19	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	NONE
PUMP SUCTION PI 6-18	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	NONE
PUMP DISCHARGE PI 6-15	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	NONE
INJECTION PRESSURE GAUGE PI 6-1, PI 6-3	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	REPEAT FROM TIME 0
VALVE POSITION	10 MIN.	10 MIN.	20 MIN.	1 HR.	4 HRS.	NONE

TABLE 3

OBSERVATION WELLS - MAXIMUM DATA COLLECTION INTERVALS FOR PULSE AND 10-21 DAY TESTS
(REPEAT FROM TIME 0 FOR RECOVERY DATA)

TIME: FROM TO	0 MIN. 60 MIN.	1 HR. 5 HRS.	5 HRS. 500 HRS.
Digiquartz Intervals	1 MIN.	10 MIN.	1 HR.

TABLE 4

MAXIMUM SAMPLE INTERVAL FOR FLOW LINE SAMPLES

TIME: FROM / TO	PULSE TESTS AND 0 HRS. / 72 HRS.	72 HRS. / 500 HRS.
RRGE-2 SAMPLE COLLECTION INTERVALS	Collect 1 liter samples at 0800, 1500, and 2400 hours and if a 10% conductivity change occurs. Collect one 20 liter filtered sample every 24 hours.	Collect 1 liter sample at 0800 and if a 10% conductivity change occurs. Collect one 20 liter filtered sample every 24 hours.

Analyze all samples for Cl^-, F^-, Na^+, HCO_3^-, Ca^{++}, pH, and conductivity.

TABLE 5

RESERVOIR ENGINEERING
SCHEDULE OF RECOVERY DATA
FOR INTERRUPTED TESTS

TIME SINCE PUMPING OR INJECTION STARTED	
0 - 2 HOURS	TERMINATE TEST AND START RECOVERY IF ANY INTERRUPTION GREATER THAN 30 SECONDS
2 - 6 HOURS	TERMINATE TEST AND START RECOVERY IF INTERRUPTIONS GREATER THAN 5 MINUTES
6 - 24 HOURS	TERMINATE TEST AND START RECOVERY IF INTERRUPTIONS GREATER THAN 20 MINUTES
1 - 3 DAYS	TERMINATE TEST AND START RECOVERY IF INTERRUPTIONS GREATER THAN 1-1/4 HOUR
3 - 21 DAYS	TERMINATE TEST AND START RECOVERY IF INTERRUPTIONS GREATER THAN 4 HOURS

TABLE 6

VALVE OUT INSTRUMENTS AS FOLLOWS:

INSTRUMENT	VALVE	VALVE POSITION	TIME	DATE	INITIAL
PhT6-20	N/A	SHUT			
O/RT 6-21	N/A	SHUT			
CT 6-22	N/A	SHUT			
CT 6-13	N/A	SHUT			

Valve In Instruments as Follows:

INSTRUMENT	VALVE	VALVE POSITION	TIME	DATE	INITIAL
PhT 6-20	N/A	OPEN			
O/RT	N/A	OPEN			
CT 6-22	N/A	OPEN			
CT 6-13	N/A	OPEN			

TABLE 7

INSTRUMENT CALIBRATION/OPERATION STATUS

INITIALS & DATE	INSTRUMENT	INSTRUMENT NO.	CALIBRATED DATE	OPERATIONAL STATUS
	Press. Gauge	PI-6-1		
	Press. Trans.	PT-6-2		
	Press. Recorder (7132A)	PR-6-3		
	Thermo Couple	TE-6-4		
	Temp. Recorder	TR-6-5		
	Flow Controller	FC-6-6		
	Flow Recorder (7132A)	FR-6-8		
	Flow Trans.	FT-6-9		
	Flow Indicator	FI-6-10		
	Pres. Dif. Ind.	PDI-6-11		
	Pres. Dif. Ind.	PDI-6-12		
	Cond. Meter	CIT-6-13		
	High Pres. Ind.	PI-6-15		
	Low Pres. Ind.	PI-6-18		
	Pres. Dif. Ind.	PDI-6-19		
	PH Meter	PHIT-6-20		
	Digiquartz Pres Trans.	At RRGI-6		
	Pressure Comp.	"		
	Pres. Printer	"		
	Freeze Line Pre. Ind.	"		
	Manometer	"		
	Digi. Pres. Trans.	At RRGE-2		
	Pres. Computer	"		
	Pres. Printer	"		
	Pres. Ind.	PI-2-1		
	Pres. Ind.	PI-2-2		
	Head Pres. Ind.	PI-2-3		
	Head Pres. Ind.	PI-2-4		

TABLE 8

DATA COLLECTION INTERVALS ON PI 6-1 AND PI

FOR USE ON RRGE-2 AND RRGI-6 WELLHEAD PRESSURE GAUGES IF DIGIQUARTZ FAILS. (Digiquartz pressures shall be limited to below 400 psi or they shall be valved out.)
TO BE USED FOR FLOW/INJECTION AND RECOVERY DATA

TIME: FROM TO	0 1 MIN.	1 MIN. 5 MIN.	5 MIN. 10 MIN.	10 MIN. 30 MIN.	30 MIN. 60 MIN.
DATA COLLECTION INTERVAL	15 SECS. OR AS RAPIDLY AS POSSIBLE	30 SECS.	1 MIN.	5 MIN.	10 MIN.

TIME: FROM TO	60 MIN. 5 HRS.	5 HRS. 500 HRS.	200 HRS. 500 HRS.			
	20 MIN.	1 HR.	4 HRS.			

TABLE 9

TO CLEAN STRAINERS AT RRGI-6

Clean S6-1 if PDI-6-19 reads greater than 4.5.
Clean S6-2 if PDI 6-11 reads greater than 2.0.
Clean S6-3 if PDI 6-12 reads greater than 2.0.

Pump Suction Strainer S6-1.

1) Hook-up hose to connection at the bottom of the strainer.

2) Run hose into tank and anchor securely to prevent hose from coming out of tank.

3) Open valve on bottom of strainer (above hose connection).

4) Allow to drain and depressurize to clean strainer.

5) Close connection valve below strainer.

6) Drain, disconnect, and store hose.

7) Dispose of water in tank into a lined pond.

Pump Discharge Strainers S6-2 and S6-3.

1) Valve out strainer (shut 6V8 and 6V7, for S-2 and 6V10 and 6V9 for S-3) (if water is flowing in the line, valve out and clean each strainer individually).

2) Unbolt strainer cover - allow to depressurize before removing.

3) Remove cover. Take caution with heat and escaping steam. Wear protective clothing.

4) Allow basket to cool.

5) Pull out basket.

6) Hose down basket to remove grit in filter.

7) Reinsert clean basket. If filter clothe or basket is broken, replace with a new one.

8) Cover and tighten down.

9) Valve in strainer (open 6V8 and 6V7 for S-2, 6V0 and 6V9 for S-3).

DATA SHEET 1

RRGE-1 FLOW RATE CHANGE

DATE	TIME	INITIALS	RATE CHANGE (gpm)

Collect at: 10 Min intervals 0-1 Hr
(Bubbler - as rapidly as possible)

20 Min intervals 1-5 Hr
(Bubbler - 10 Min intervals)

1 Hr intervals 5-100 Hr

4 Hr intervals 100-500 Hr

DATA SHEET 2
RRGE-2

TIME	DATE	INITIALS	DOWNHOLE PUMP PRESSURE	BUBBLER PRESSURE	N_2 SUPPLY	FLOW	TEMPERATURE			LINE PRES.	ANNULUS PRES.	PUMP DISCHARGE/ WELLHEAD PRESSURE	PUMP CURR
							WELLHEAD		DOWNHOLE				
							DIGI-MITE	THERMO-METER					
						FRC							

DATA SHEET 3

COLLECT AT: 1 Hr. intervals from 0 to 5 Hours
6 Hr. intervals from 5 to 500 Hrs.

DATE & INITIALS	TIME	CONDUCTIVITY CI6-13	pH PHI 6-20	OXIDATION REDUCTION O/RT 6-21	CONDUCTIVITY CI 6-22

Collect at: 10 Min intervals 0-1 Hr
20 Min intervals 1-5 Hr
1 Hr intervals 5-100 Hr
4 Hr intervals 100-500 Hr

DATA SHEET 4
RRGI-6

TIME	DATE	INITIALS	TEMPERATURE		FLOW	VALVE POSITION	STRAINER DP			PUMP SUCTION	PUMP DISCHARGE	INJECTION PRESSURE	
			DIGI-MITE	THERMO-METER	FR 6-8	% 6AV6	PDI 6-11	PDI 6-12	PDI 6-19	PI 6-18	PI 6-15	PI 6-1	PI 6-3

DATA SHEET 5

Date_____ Name_____

Wellhead
Pressure
(Heise gauges)

Gauge #	Time	Interval	Gauge Reading

DATA SHEET 6

FILTER NUMBER	SAMPLE QUANTITY LITERS	SAMPLE TIME HRS. AND MIN.	FILTER WEIGHT GRAMS	RESIDUE WEIGHT GRAMS	DATE AND TIME

DATA SHEET 7

Observation Well Depth to Water

If water level changes by more than 4" between checks measure water level twice on that well.

Date	USGS-4	AUGER HOLE	WELL S-23-NE	WELL S-24-NWNE	WELL S-24-NWSW	WELL S-24-SW	BLM (Water Depth in weir)

FIGURE 1

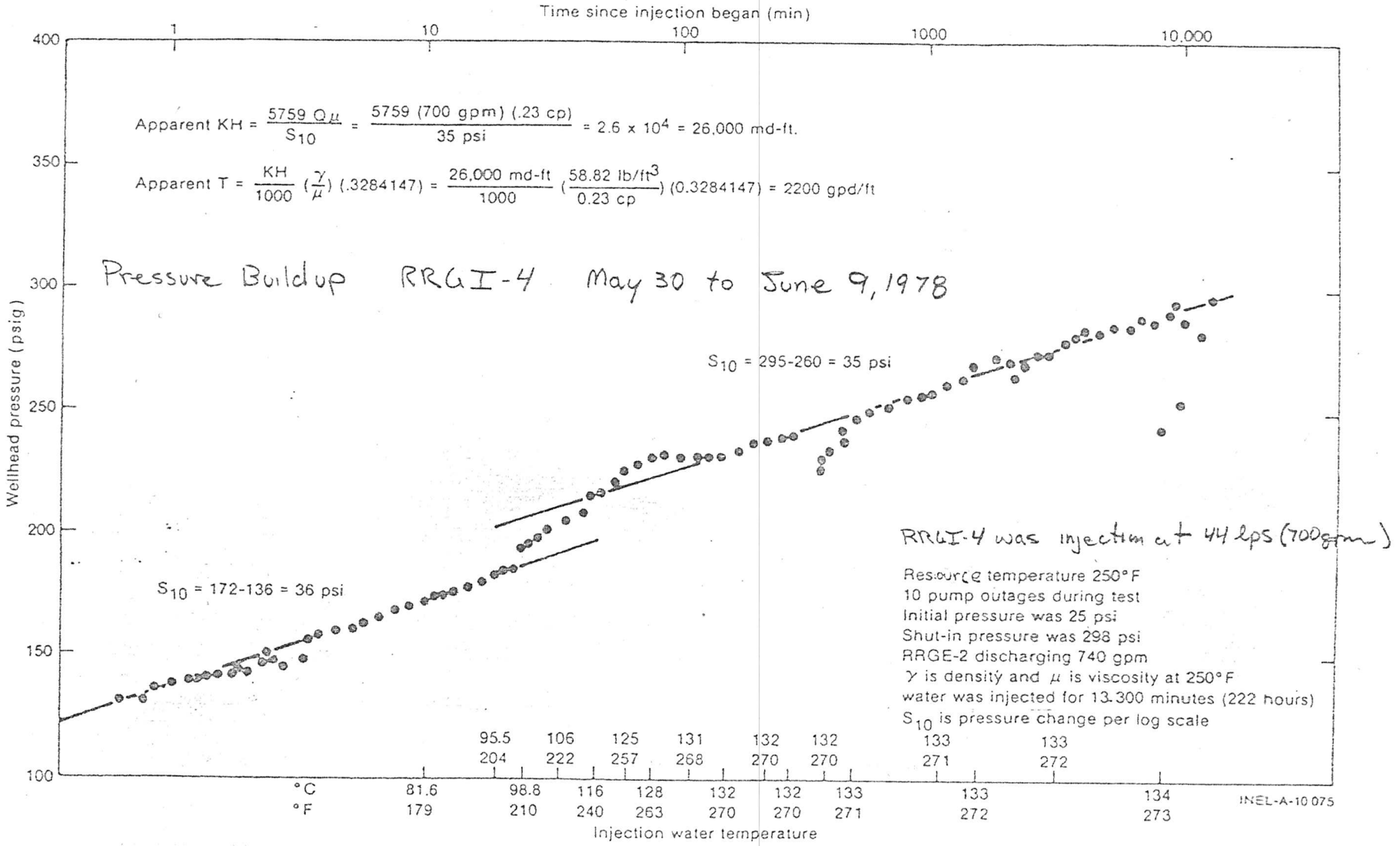
Time since injection began (min)
1
10
100
1000
10,000
400
350
300
250
200
150
100
Wellhead pressure (psig)
Apparent KH = 5759 Qμ / S10 = 5759 (700 gpm) (.23 cp) / 35 psi = 2.6 x 10^4 = 26,000 md-ft.
Apparent T = KH/1000 (γ/μ) (.3284147) = 26,000 md-ft/1000 (58.82 lb/ft^3 / 0.23 cp) (0.3284147) = 2200 gpd/ft
Pressure Buildup RRGI-4 May 30 to June 9, 1978
S10 = 295-260 = 35 psi
S10 = 172-136 = 36 psi
RRGI-4 was injection at 44 lps (700gpm)
Resource temperature 250°F
10 pump outages during test
Initial pressure was 25 psi
Shut-in pressure was 298 psi
RRGE-2 discharging 740 gpm
γ is density and μ is viscosity at 250°F
water was injected for 13,300 minutes (222 hours)
S10 is pressure change per log scale
95.5 106 125 131 132 132 133 133
204 222 257 268 270 270 271 272
°C 81.6 98.8 116 128 132 132 133 133 134
°F 179 210 240 263 270 270 271 272 273
Injection water temperature
INEL-A-10 075

FIGURE 2

TEST NO.

WELL NO.

DATE /TIME

INITIALS

DATA BEING COLLECTED

INSTRUMENT

DATA UNITS

CHART SCALE

DATA INTERVALS

COMMENTS

DATE _____ TIME _____

NAME _____

TEST STEP _____

INSTRUMENT LIST

ITEM	NOMENCLATURE	NAME	MODEL	MANUFACTURER	SERIAL NUMBER	ACCURACY	RANGE
1	PI-6-1	Press. Gauge		Heise		1 PSI	PSI 0-1000
2	PT-6-2	Press. Transmitter		Rosemont	78819		PSI 0-1000
3	PR-6-2	Press. Recorder	7132A	Hewlett Packard	106118		Multi-Range
4	TE-6-4	Thermo Couple	Type K			$1^{o}F$	
5	TR-6-5	Temperature Recorder		Soltec			$0-300^{o}$
6	FC-6-6	Flow Controller		Fisher			
7	FR-6-8	Flow Recorder	7132A	Hewlett Packard	106118		Multi-Range
8	FT-6-9	Flow Transmitter		Rosemont			PSID 0-27
9	FI-6-10	Flow Indicator	125	Midwest			PSI 0-15
10	PDI-6-11	Press. Diff. Indicator	120	Midwest			PSI 0-5
11	PDI-6-12	Press. Diff. Indicator	120	Midwest			PSI 0-5
12	CIT-6-13	Conductivity Meter	900	Balsbaugh			
13	PI-6-15	High Press. Indicator		Ashcroft			
14	PI-6-18	Low Press. Indicator		Ashcroft			
15	PDI-6-19	Press. Diff. Indicator	125	Midwest			PSI 0-15
16	PHIT-6-20	Ph Meter	2200	Balsbaugh			
17	O/RIT-6-21	Oxidation Reduction Meter	2200	Balsbaugh			
18		Digiquartz Press. Transducer	2200A	Parascientific	3411		
19		Pressure Computer	600	Parascientific	509		