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WATER COMPATIBILITY TEST CONDUCTED ON THE GEOTHERMAL WELLS AT THE RAFT RIVER GEOTHERMAL SITE

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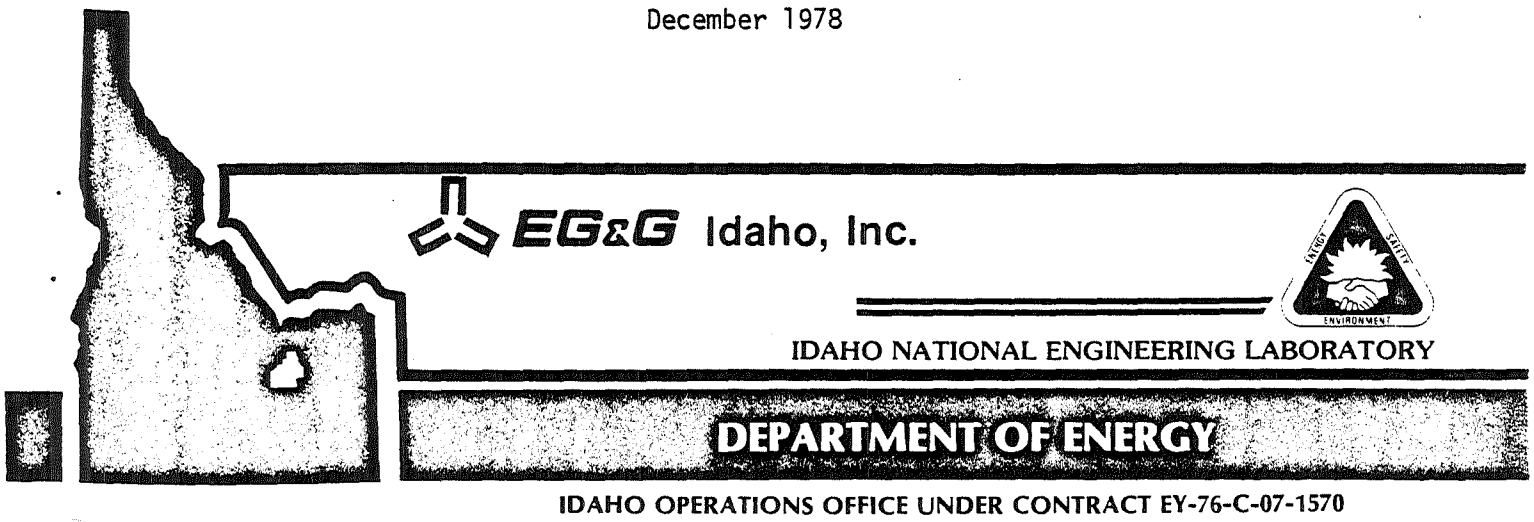

IDAHO OPERATIONS OFFICE UNDER CONTRACT EY-76-C-07-1570

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Reviewed by:

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Approved by:

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1. SUMMARY

The water compatibility test was conducted on all available geothermal wells at the Raft River Geothermal Site. The test was successfully completed by the cooperative efforts of Test Planning and Coordination, Raft River Operations of the Geothermal Electric Division, and the Biological and Earth Sciences Branch of the Advanced Programs Division of EG&G Idaho, Inc. The purpose of the test was to determine the chemical compatibility of water from the geothermal wells. Chemical compatibility is determined by measuring changes in deposition resulting from mixing water from two or more wells. If there is a large increase in deposition resulting from the mixing of water from two or more wells, the wells are considered to be chemically incompatible. This report describes the procedures, results, and evaluation of this test. The test plan is included in the appendix.

Water samples were collected from wells RRGE-1, RRGE-2, RRGE-3, RRGP-5, and RRGI-6. Samples of water from each well were mixed with water from every other well. Two sets of samples were prepared. One set was kept at ≈ 25 °C. The other set was kept at 70 °C. The samples were stored at these temperatures for 24 hours before they were analyzed. The purpose of the two sample sets was to evaluate the following conditions:

(1) Water samples taken from the cooling ponds.
(2) Water samples taken from a geothermal power plant's waste water.

Evaluation of the analysis of the water mixture samples revealed that for the five wells involved in the test, no chemical incompatibility existed. The test actually showed a decrease in chemical deposition in mixed water samples compared to the amount of deposition that would exist in the individual well water components of the sample. This effect was more significant in the sample set kept at 70 °C. This indicates that direct injection of the warm pressurized geothermal water from a power plant would reduce the amount of solids being pumped into the injection well compared to the same water being injected from a cooling pond.

2. RESULTS OF WATER COMPATIBILITY TESTS FOR WELLS RRGE-1, RRGE-2, RRGE-3, RRGP-5, and RRGI-6

2.1 Purpose

The water compatibility test is a chemical determination of the synergistic effects from mixing water from two or more geothermal wells. The applicable measure of this effect is the change in the quantity of undissolved solids in the mixtures. Increases in the undissolved solids due to mixing is an important criteria for determining well use feasibility. For example, when water from a production well is mixed with water from an injection well and this results in a large increase in the quantity of undissolved solids, injection of the production well water into the injection well could cause serious plugging problems. As the increase in undissolved solids would take place in the formation, filtration would be ineffective.

The water compatibility test was determined to be necessary after studying the results of a similar test conducted by Dr. Harold Papazian on the wells at the U. S. Bureau of Reclamation's East Mesa Geothermal Site. As a result of this test, it was determined that water from the USBR geothermal well 6-1 when mixed with water from the other geothermal wells at East Mesa caused a large increase in deposition. For this reason, water mixtures which included well 6-1 were not directly injected.[1]

2.2 Experimental Procedure

2.2.1 Test Procedure. The water compatibility test was planned, set up, and carried out through the cooperative efforts of the Testing Planning and Coordination, Raft River Operations of the Geothermal Electric Division, and the Biological and Earth Sciences Branch of the Advanced Programs Division of EG&G Idaho. The Planning and Coordination Branch, with technical support from the Biological and Earth Sciences Branch, designed, planned, and purchased materials for the

test. The Raft River Operations Branch prepared the wells and installed the equipment used in the test. The Biological and Earth Sciences and the Raft River Operations Branches collected samples and performed the analysis. In general, it was a cooperative effort that resulted in a successful test.

2.2.2 Description of Experimental Procedures. The water compatibility test was designed to determine the increases in the quantity of undissolved solids caused by mixing water from the geothermal wells. This requires filtering the water from all geothermal wells before preparing the mixed samples. Two sets of samples were prepared. One set was allowed to cool to room temperature (≈ 25 °C) during a 24-hour holding period to simulate the conditions where injection water was taken from cooling ponds. The other set was kept at ≈ 70 °C for 24 hours which is the approximate temperature of the injection water from the 5 MW power facility. At the end of 24 hours, the samples were filtered, dried, and weighed. This test was designed to be similar to the water compatibility test described in a private communication.[2] Geothermal wells 1, 2, 3, and 4 were tested at that time.

The sample water was collected at the wellhead through a stainless steel condensor and filtered through a 0.45 micron membrane filter housed in a high pressure stainless steel filter holder. The filter diameter was 47 mm. The filtered water was mixed in one-liter plastic bottles such that the total volume was one liter. The volume of sample water per well is as follows:

(1) One well sample - one liter
(2) Two well sample - 500 ml each
(3) Three well sample - 333 ml each
(4) Four well sample - 250 ml each
(5) Five well sample - 200 ml each

The mixing arrangements are shown in Table I. This arrangement includes mixing water from every geothermal well with water from every other geothermal well. Geothermal wells #4 and #7 were not available for the test and they were the only exceptions in the mixing arrangements.

TABLE I

WATER COMPATIBILITY FOR GEOTHERMAL
WELLS 1, 2, 3, 5, AND 6

Sample Mixtures	Samples Collected Through a Condensor Temp. 20 °C		Temp. 70 °C	
	Calc.	Actual	Calc.	Actual
1		0.6		0.0
2		1.2		0.0
3		2.4		0.5
5		0.1		0.0
6		4.1		2.4
1-2	0.9	0.1	0.0	0.0
1-3	1.5	1.1	0.3	0.0
1-5	0.4	1.1	0.0	0.0
1-6	2.4	0.9	1.2	0.0
2-3	1.8	0.5	0.3	0.0
2-5	0.7	0.2	0.0	0.0
2-6	2.7	2.6	1.2	1.2
3-5	1.3	0.1	0.3	0.0
3-6	3.3	3.6	1.5	CF
5-6	2.1	2.3	1.2	0.6
1-2-3	1.4	1.9	0.2	0.0
1-2-5	0.6	0.7	0.0	0.0
1-2-6	2.0	1.2	0.8	0.0
1-3-5	1.0	0.7	0.2	0.0
1-3-6	2.4	1.6	1.0	0.0
1-5-6	1.6	1.6	0.8	0.0
2-3-5	1.2	5.8 A	0.2	0.0
2-3-6	2.6	0.0	1.0	0.0
2-5-6	1.8	1.1	0.8	1.2
3-5-6	2.3	1.5	1.0	1.0
2-3-5-6	2.0	2.5	0.7	0.2
1-3-5-6	1.8	0.9	0.7	0.0
1-2-5-6	1.5	2.6	0.6	0.0
1-2-3-6	2.1	1.7	0.7	0.5
1-2-3-5	1.1	0.0	0.1	0.0
1-2-3-5-6	1.7	0.7	0.6	0.0

A - not relative to other data
CF - contaminated filter

After the samples had set for 24 hours, they were filtered through tared 0.45 micron membrane filters. The filters were dried at 95 °C for one hour. The residue and filter were weighed on an analytical balance and the sample residue weight was calculated.

3. DATA EVALUATION

3.1 Data Interpretation

The data in Table I is divided into four columns with two columns for each set of samples. The two columns are identified by the headings "calc." and "actual." The calc. column is the weights of deposition calculated from the unmixed samples for each well. This is calculated by taking the fraction of a liter each well contributes to a mixed sample.

Example: Mixture 1-3-5-6-cold

Well 1 - (0.6 mg/L × 0.25 L) = 0.15 mg
Well 3 - (2.4 mg/L × 0.25 L) = 0.60 mg
Well 5 - (0.1 mg/L × 0.25 L) = 0.03 mg
Well 6 - (4.1 mg/L × 0.25 L) = 1.03 mg
Total represents calculated value for sample mixture
1-3-5-6 = 1.8 mg/L.

The column marked "actual" designates the weights of deposition determined from filtering and weighing the undissolved solids for each sample. This determination allows a comparison to be made of a mixed water sample where mixing had no effect on deposition to the actual weight of the deposition resulting from mixing.

This comparison will indicate one of the following situations:

Actual > calculated:	water mixing caused deposition
Actual < calculated:	water mixing caused reduced deposition
Actual = calculated:	water mixing did not increase or decrease undissolved solids.

3.2 Data Evaluation for Samples Kept at Room Temperature (≈ 25 °C)

Comparing the actual values of the deposition weights to the calculated values of the deposition weights of the water mixtures kept at ≈ 25 °C, reveals that seven water mixtures had increases in the actual values of deposition weight. These mixtures are shown in Table II.

TABLE II

Well Nos.	Calc. mg/L	Actual mg/L
1-5	0.4	1.1
3-6	3.3	3.6
5-6	2.1	2.3
1-2-3	1.4	1.9
1-2-5	0.6	0.7
2-3-5-6	2.0	2.5
1-2-5-6	1.5	2.6

The difference between the calculated value and the actual value for samples 5-6 and 1-2-5 are within the reading error of the analytical balance, which is ±0.1 mg, and for practical purposes are considered to be equal values. The other five mixtures were compared to other mixtures having common components. An example of this would be comparing water mixture 3-6 with mixtures 1-3-6, 2-3-6, 3-5-6, etc. There is no apparent trend of increased deposition in water mixtures having components from wells 3 and 6. This procedure, when used to evaluate the other water mixtures, had similar results. Comparison of the calculated values of deposition weight to the actual values of deposition weight for the majority of the water mixtures indicated that mixing reduces deposition. Comparing the average calculated value of deposition weight, which is 1.7 mg/L for all samples, to the average actual value of deposition weight, which is 1.3 mg/L for all samples, indicates that mixed water samples contained less undissolved solids.

3.3 Data Evaluation for Water Samples Kept at 70 °C

Comparing actual deposition weights to calculated deposition weights, only one mixture, 2-5-6, shows increased deposition due to mixing. This is not supported by any other similar mixtures, so is considered to be erroneous. The trend in the direct comparison of individual mixtures indicates that mixing reduces deposition. Comparison of the average values shows that actual deposition weight (0.2 mg/L) is less than the calculated deposition weight (0.6 mg/L). The general trend would indicate mixing reduces the amount of deposition.

3.4 Data Evaluation Dividing the Geothermal Wells into Two Different Water Types

The chemical differences of the wells tested can be noted by referring to the chemical analysis of these wells shown in Table III. By comparing the deposition of wells #1, #2, and #5 and their mixtures with wells #3 and #6 (see Table IV), it becomes obvious that most of the deposition results from wells #3 and #6.

TABLE IV

Water Type	25 °C	70 °C
1, 2, 5	0.5	0.0
3, 6	3.7	1.5
Mixtures	1.3	0.2

Comparing the calculated values for the weight of deposition of the water mixtures to actual values again shows that mixing water from different wells results in some dissolution of the undissolved solids. This condition is more obvious in the set of samples kept at 70 °C.

TABLE III

AVAILABLE CHEMICAL ANALYSIS OF RAFT RIVER GEOTHERMAL WATER

Chemical Species	Well Number				
	RRGE-1	RRGE-2	RRGE-3	RRGP-5	RRGI-6
Cl^-	776	708	2170	838	3767
F^-	6.32	8.25	4.55	8.16	7.30
Br^-	<1.5	<1.5	<1.5		
I^-	0.036	0.028			
*HCO_3^-	63.9	41.3	44.4	43.6	36.8
$SO_4^=$	60.2	54.1	53.3	28.1	30.7
NO_3^-	<0.2	<0.2	<0.2	0.13	<0.02
Total NH_3	1.56	0.60			
Total P	0.023	0.020			
$S^=$		0.256			
$Si(OH)_4$	182	201	242		
Si	56.6	61.2	74.0	75.6	51.3
Na	445	416	1185		
K	31.3	33.4	97.2		
Sr	1.56	1.03	6.7		
Li	1.48	1.21	3.1		
Ca	53.5	35.3	193	137	157
Mg	2.35	0.58	0.60		
pH	8.4	7.6	7.3	8.2	7.27
TDS	1560	1267	4130		
Conductivity*	3373	2742	9530	2600	10,500

*HCO_3^- concentrations are recorded in µg/ml as $CaCO_3$.

*Conductivity is recorded in µmho/cm.

**Total Hardness as µg/ml $CaCO_3$.

Average values in ppm (µg/ml).

3.5 Conclusions

The water compatibility test for the Raft River Geothermal Wells #1, #2, #3, #5, and #6 resulted in two important disclosures. Within the wells tested there was no evidence of incompatibility. In fact, it indicated in the water mixtures that some of the undissolved solids forming in the unmixed samples were partially dissolved in the mixed samples. The second disclosure was the obvious difference in the weight of undissolved solids between the 25 °C samples and the 70 °C samples. This would indicate that to reduce the quantity of undissolved solids being injected, the geothermal water should be injected directly upon leaving the power plant facility. Another important consideration in injecting water directly from the power plant facility is that the cooled water is still under pressure. This would keep the calcium and the carbonate ions in solution and eliminate calcite deposition.

Results from the previous water compatibility test run on geothermal wells #1, #2, #3, and #4 were less encouraging.[2] Binary mixtures with water from RRGI-4 resulted in increased deposition. The results are scattered. This was probably due to inadequate well flow prior to sampling. The increased deposition with mixtures of water from well #4 and the other wells involved in the test indicated problems in downhole plugging if well #4 was used for injection. RRGI-4 has been drilled deeper since this test, and the aquifer producing the water used in the test has been cased. This eliminated what appeared to be a problem from water incompatibility. The purpose for describing this situation is to point out the need for water compatibility tests whenever new wells are drilled and produced.

REFERENCES

1. Harold Papazian, Chief Chemist, Verbal Communication, U. S. Bureau of Reclamation, East Mesa, CA, June 1977.

2. C. A. Allen, "Interpretation of Precipitation Test for Injection," CAA-608-77, EG&G Idaho, October 1977.

APPENDIX

RAFT RIVER GEOTHERMAL PROGRAM PROCEDURE

FET-6-78

WATER COMPATIBILITY TEST

1.0 PURPOSE

The purpose of this test is to determine if the water from the geothermal wells at the Raft River Geothermal site are compatible to each other. Incapatibility is the chemical change caused by mixing water from two or more wells that increases the amount of undissolved solids in the mixture. During injection, this increased deposition could result in partial and eventually total plugging of the injection well.

2.0 GENERAL DESCRIPTION

The test is designed to estimate the amount of undissolved solids precipitation in a well under the two conditions of hot ($\sim 140^{\circ}F$) and cold ($\sim 70^{\circ}F$) injection. Each of the wells will be produced to obtain a steady state wellhead temperature and will be sampled using a condenser and filter in series to cool the water to $140^{\circ}F \pm 20^{\circ}F$ and filter out entrained solids. Samples from the wells will be combined to form two sets of samples, hot and cold, as shown in table 1. The samples for wells 6 and 7 in combination are not included since it is not planned to mix water from these two wells. One set will be combined and maintained at $140^{\circ}F \pm 20^{\circ}F$. The other set will be allowed to cool to room temperature before combining. After at least 24 hours all samples will be filtered and the filters dried and weighed in the chemistry laboratory. This procedure ends at the beginning of the 24 hour waiting period. Results will be recorded in the Chemistry Lab. Log Book.

3.0 REFERENCES

2.1 Engineering Sketch RS 82378B, RRGI-6 Free Flow Temporary Piping.

2.2 Engineering Sketch, 102078 Hot Sample Storage Table at No. 1 Well House.

2.3 CAA-17-78, Grab Sample Procedure.

4.0 EQUIPMENT

4.1 One-half inch i.p.s. screw-end ball valve sample taps installed on wellhead piping on the wellhead side of the flow control valve. Reference 2.1, Engineering Sketch RS 82378B, illustrates the requirement. Installation by RRFO.

4.2 Seven sample train assemblies consisting of a condenser and filter in series, see Figure 1. Installation by RRFO.

4.3 Three dozen extra filter paper elements - RRFO chemistry lab.

4.4 Plastic sample bottles with screw on caps, 1 liter size, 190 + 14 spares (17 dozen), rinsed and inspected for use in accordance with reference 2.3 - RRFO chemistry lab.

4.5 Two sets of face shields and rubber insulating gloves, furnished by RRFO chemistry lab.

4.6 One pick-up truck with trailer mounted diesel engine driven 115 volt, 15 amp (minimum) electrical power supply, equipped with a ground fault circuit interrupter - RRFO.

4.7 Electrically heated stainless steel chest type oven, with temperature gauge, furnished by the RRFO chemistry lab.

4.8 Two five gallon plastic bottles for condenser cooling water, furnished by RRFO.

4.9 Wrenches for connecting sample train assemblies to sample valves, furnished by RRFO.

4.10 Hot Sample Storage Table at No. 1 Well House for storing hot samples. See Reference 2.2. Constructed by RRFO.

4.11 Calibrated Temperature (for use with standard T/C's at each wellhead) and pressure indicators or recorders at each wellhead by RRFO.

4.12 Plastic graduate, 1 liter capacity - chemistry lab.

4.13 Thermometer, mercury-in-glass, approximately 32^{o} - 200^{o}F range for measuring temperature of sample train effluent.

4.14 Marking pen (permanent ink) for marking sample bottles.

5.0 PREREQUISITES

3,576 PSH

5.1 Geothermal wells No. 2 through No. 7 shall have been produced at their respective artesian or nominal pumped rate for approximately three bore volumes (150,000 gallons) then cut back to 50 to 100 gpm. The objective is to flush the well bore in order to obtain representative samples and to bring the wellhead temperature and pressure to a steady state condition. It shall be the responsibility of RRFO to shift water from pond to pond, if required. Since well No. 1 is normally on-line and at steady state, no flushing is required.

5.2 Sample valves and sample train assemblies installed at each well sample point. See Figure 1.

5.3 Hot Sample Storage Table installed at No. 1 Well House. See Reference 2.2 Table to be positioned relative to wellhead in 140 ± 20^{o}F temperature environment.

5.4 Install ground fault circuit interrupter in outlet box and check out the diesel driven electrical power supply and hitch to the pick-up truck.

5.5 Install the temperature gauge and preheat the stainless steel chest type oven to 140 ± 20°F on commercial power one day (~24 hours) prior to start of sampling.

5.6 Label two sets of sample bottles per instructions of Table 1, using permanent ink marking pen.

5.7 Calibrated wellhead temperature and pressure instrumentation.

5.8 Issue key to wellhouse No. 1 to sampling crew.

6.0 PROCEDURE

Procedure Started: RSHope (Signature) 09:30 (Time) 11-8-78 (Date)

RSH ✓ 6.1 Check that all equipment listed in Section 4.0 is on hand and in place.

RSH ✓ 6.2 Check that prerequisites have been met.

RSH ✓ 6.3 Begin recording wellhead temperatures and pressures in Table 2 at approximately two hour intervals.

RSH ✓ 6.4 Start the diesel electric power supply hitched to the pick-up truck, load the portable stainless steel oven in the pick-up, and plug in to the power supply. Observe that the electrical load has been picked up. Tie down or restrain the oven as required.

RSH ✓ 6.5 Load the remainder of the equipment in the pick-up, equipment items 4.3, 4.4, 4.5, 4.8, 4.9, 4.12, 4.13, and 4.14. Stow securely.

6.6 Proceed to well No's 1, 2, 3, 5, and 6, as required, to makeup samples in accordance with Table 1. All samples shall total 1 liter and shall consist of equal amounts from each well, e.g., a 5 well sample shall be made up of 200 ml. from each well.

6.6.1 Geothermal well water for mixing samples shall be obtained as follows:

CAUTION - Wear face shield and rubber insulating gloves.

6.6.1.1 Pour water from the 5 gallon containers into the condenser bucket if not already in place.

6.6.1.2 Open the 1/2 inch ball valve and flush the sample train, approximately 1 to 2 liters. Adjust flow rate to obtain 140 ± 20°F water as measured by a mercury-in-glass thermometer, then take samples in accordance with steps 2, 3, and 4 in Ref. 2.3.

6.7 Hot samples shall be placed in the oven and subsequently transferred to the Hot Sample Storage Table at No. 1 Well House. Hot samples shall be mixed hot and kept hot 140 ± 20°F for 24 hours.

CAUTION: Keep the No. 1 Well House door locked to avoid inadvertent chilling of samples.

6.7.1 Record the date and time to the nearest hour on the sample bottle and in the space provided in Table 1. Use permanent ink marking pen.

6.8 Cold sample water shall be allowed to cool to room temperature 70° ± 10°F prior to mixing. If the weather is cold these samples shall be transported in the pick-up cab. After mixing at 70 ± 10°F these samples shall be stored in the chemistry lab. for 24 hours.

6.8.1 Record the date and time to the nearest hour on the sample bottle and in the space provided in Table 1. Use permanent ink marking pen.

6.9 On completion of sampling, terminate Table 2 logging, unload the pick-up and return equipment to its normal location.

6.10 Shut down wells 2 through 6 to pretest configuration and drain piping as required for freeze protection.

Procedure Complete: R Bishop 17:45 11-8-78
Signature Time Date

Completed mixing samples at 17:05 RSB

TABLE 1 - SAMPLE IDENTIFICATION

Label each of two sets of bottles with the Test No., FET-6-78, and the well numbers from this table. One set shall also be labeled H and the other C.

Examples:

{ FET-6-78
1-2-5-6
H } Sample Identification, Hot Sample

{ FET-6-78
1-2-5-6
C } Sample Identification, Cold Sample

CAUTION: Leave room for date and time when the samples are made up.

LABELING CHECK-OFF		SAMPLE IDENTIFICATION BY WELL NO'S	SAMPLE CHECK-OFF			
			HOT SAMPLE		COLD SAMPLE	
H	C		TIME	DATE	TIME	DATE
		1	1050	11/8/78	709	11/8/78
		2	1710	"	1645	"
		3	1555	"	1517	"
		5	1841	"	1744	"
		6	1435	"	1300	"

RAFT RIVER GEOTHERMAL
PROGRAM PROCEDURE
FET-6-78
WATER COMPATIBILITY TEST

LABELING CHECK-OFF		SAMPLE IDENTIFICATION BY WELL NO'S	SAMPLE CHECK-OFF			
			HOT SAMPLE		COLD SAMPLE	
H	C		TIME	DATE	TIME	DATE
		1-2	1715	11/8/78	1702	11/8/78
		1-3	1530	"	1525	"
		1-5	1901	"	1822	"
		1-6	1420	"	1345	"
		2-3	1705	"	1705	"
		2-5	1338	"	1800	"
		2-6	1710	"	1700	"
		3-5	1858	"	1816	"
		3-6	1535	"	1511	"
		5-6	1900	"	1820	"

RAFT RIVER GEOTHERMAL
PROGRAM PROCEDURE
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WATER COMPATIBILITY TEST

LABELING CHECK-OFF		SAMPLE IDENTIFICATION BY WELL NO'S	SAMPLE CHECK-OFF			
			HOT SAMPLE		COLD SAMPLE	
H	C		TIME	DATE	TIME	DATE
		1-2-3	1713	11/8/78	1650	11/8/78
		1-2-5	1845	"	1830	11/8/78
		1-2-6	1718	"	1655	"
		1-3-5	1844	"	1819	"
		1-3-6	1525	"	1730	"
		1-5-6	1854	"	1832	"
		2-3-5	1846	"	1748	"
		2-3-6	1720	"	1705	"
		2-5-6	1855	"	1831	"
		3-5-6	1851	"	1835	"

LABELING CHECK-OFF		SAMPLE IDENTIFICATION BY WELL NO'S	SAMPLE CHECK-OFF			
			HOT SAMPLE		COLD SAMPLE	
H	C		TIME	DATE	TIME	DATE
		2-3-5-6	1905	11/8/78	1812	11/8/78
		1-3-5-6	1850	✓	1745	✓
		1-2-5-6	1852	✓	1805	✓
		1-2-3-6	1720	✓	1645	✓
		1-2-3-5	1849	✓	1745	✓

LABELING CHECK-OFF		SAMPLE IDENTIFICATION BY WELL NO'S	SAMPLE CHECK-OFF			
			HOT SAMPLE		COLD SAMPLE	
H	C		TIME	DATE	TIME	DATE
		1-2-3-5-6	1903		1815	

RAFT RIVER GEOTHERMAL PROCEDURE
FET-6-78
WATER COMPATIBILITY TEST

FIGURE 1 - SAMPLE TRAIN ASSEMBLY

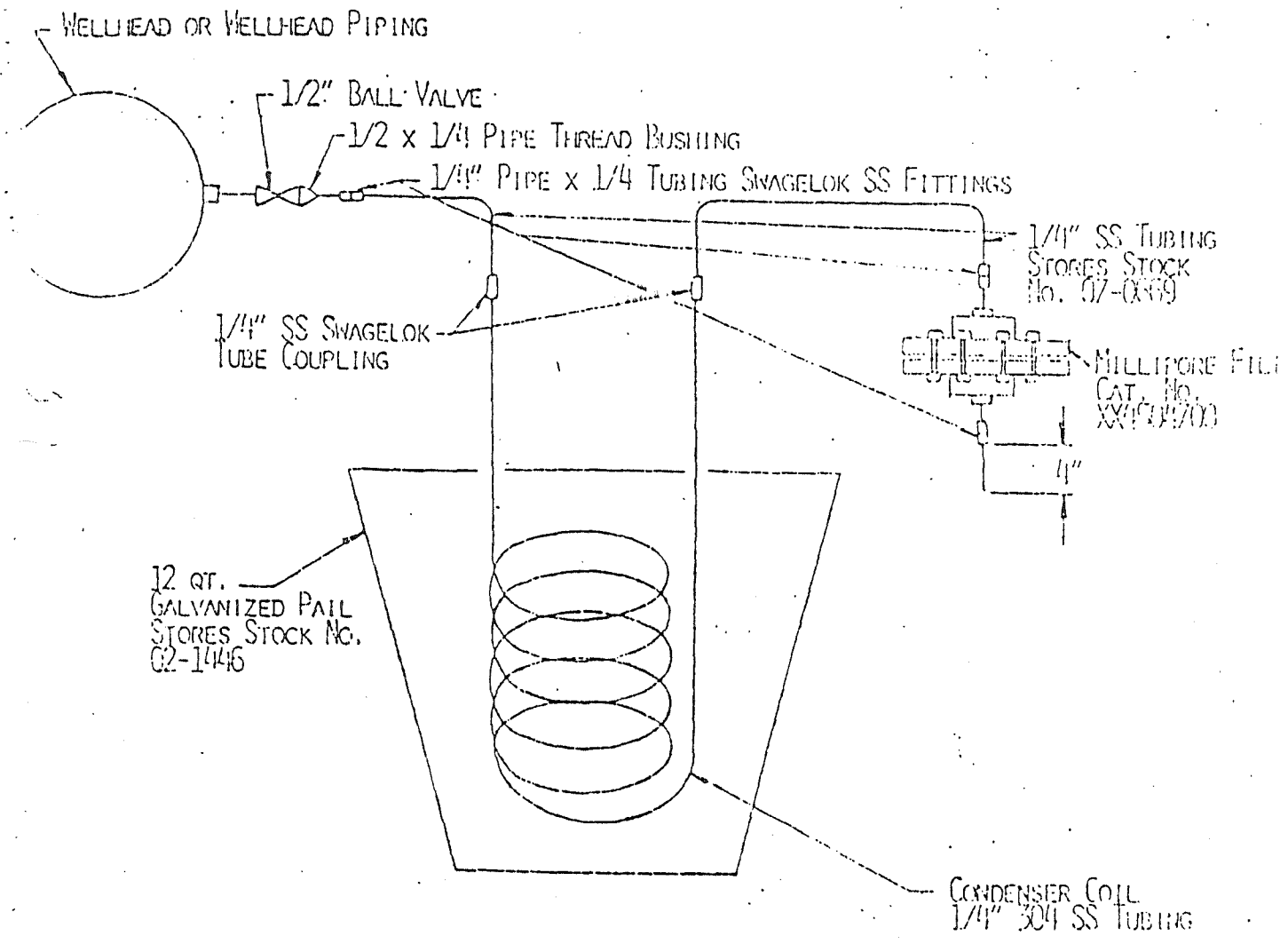

TABLE 2 - WELLHEAD TEMPERATURE & PRESSURE LOG
FET-6-78

DATE	TIME	WELL NO.	TEMP. °F	PRESSURE PSIA	OPERATOR'S INITIALS
11-8-78	10:30	6	155	26.423	RLH - Flow 5 gpm
"	12:00	6	213	23.906	Flow ≈ 200 gpm
11-8-78	13:00	6	216	23.640	Flow ≈ 200 gpm
"	13:10	6	213	35.503	Taking Samples Flow ≈ 10 gpm
	13:30	6	206	36.7095	" "
	13:50	6	208	35.7446	" "
	15:10	6	201	33.200	End of Samples 12
	15:15	3	257.7	144.17 psia	Taking Samples
	16:50	2	260°F	80 psig	Taking Samples
	17:45	5	252°F	43 psig	" "
11-9-78	09:30	1	247.5°F	142.0"	Started Samples on 1
	11:00	1	247.6	142.1	Finished " "
*	Note Time spent at wells 3, 2 and 5 was less than 2 hr.				
	Data taken was at stabilized conditions.				

specimens.

EG&G Idaho

INTEROFFICE CORRESPONDENCE

date October 27, 1978

to RRFO Manager

from Fluids Experiments and Testing

subject WATER COMPATIBILITY TEST - FET-6-78

Approved by:

Exp. & Test Engineer Edward S. Brown Date 10-27-78

Chemistry Engineer Richard McAtee Date 10-27-78

RRFO Engineer Gary M McMillan Date 10-30-78

Environmental Engineer C A Allen Date 11-2-78

Safety Engineer C.A. Shaber Date 10/30/78

Authorized for Release

J E Driscoll Date 10/31/78

REV.	RELEASE DATE
N/C	11-2-78

3rd COPY RRFO

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