# EG&G Idaho

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## INTEROFFICE CORRESPONDENCE

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date    October 9, 1978

to    C. A. Allen

from    D. W. Allman

subject    DECLINE IN WELLHEAD TEMPERATURE WHILE PUMPING RRGE-1
ON 12/10/75 -- DWA-2-78

A decline of as much as 9 °F was observed when the well was pumped
following free flowing of RRGE-1 overnight at a rate of 550 gpm (see
attached sheet for Test 103). After free flowing and prior to injec-
tion, the wellhead temperature was 274 °F, which is the highest
recorded temperature during the test. The well was shut in for 26
minutes prior to pumping. The pump was then turned on and the well-
head temperature declined 2 °F and remained at 272 °F for at least
three hours (11:45) while the discharge declined from 1370+ gpm to
1027 gpm. The next temperature reading indicated a temperature of
268 °F at 1330, a decline of 4 °F below the previously recorded 272 °F.
By 1420, the wellhead temperature declined to 265 °F, a decline of 7 °F
below the 272 °F pump discharge temperature and 9 °F below the free
flow temperature of 274 °F. Bypassing back into the well began at
1430. By 1450 the temperature increased 5 °F to 270 °F. This increase
in temperature following the decrease in discharge from 1010 gpm to
640 gpm lends considerable credence to the supposition that the relative
temperatures observed are valid.

The data suggest that declining wellhead temperatures can be expected
when pumping water levels are at depths less than ~ 586 ft. Drawdowns
of this magnitude are apparently inducing relatively cool water to enter
the wellbore. A test (105) at lower flow rates (953-879 gpm) of 5920
minutes (4.11 d) duration beginning 2/2/76 did not result in a tempera-
ture decline. During this test, the drawdown was 64 psi or 158 ft. less
than in Test 103. During Test 105 the duration and magnitude of the
drawdown were not sufficient to induce cool water to enter the wellbore.
Perhaps in the intervening period between Test 103 and Test 105, suffi-
cient hot water from the major producing zone entered an overlying zone
that yielded cool water during Test 103 such that during Test 105 only
relatively hot water was induced to enter the wellbore from the original

cool water producing zone.  If this is the case, then well RRGE-1 may
yield hot water for several months with pumping water levels approaching
586 ft. before relatively cool water would reach the borehole.

If the anomalous temperature decline during Test 103 is believed to be
worthy of additional investigation, the following techniques are recom-
mended for consideration:

    1.  Temperature, borehole fluid resistivity, and continuous
flowmeter logs should be run with the well shut in and then flowing at
a maximum constant rate without inducing borehole flashing.

    2.  A packer set in the lower reach of the casing below the two
sections of casing milled out could be used to ascertain whether the
casing has developed significant leaks.

    3.  Set an inflatable packer at various positions in the casing and
open borehole and conduct short-term flow tests while temperature logging
in the drill pipe used to set the packer.

    4.  Perhaps a temperature log could be run while pumping the well.
By placing pipe alongside the pump column, entaglement of the logging
cable and the pump column could be prevented.

sw

Attachment:
Data sheet


cc:  D. Goldman
     Central File

Test No. 103
DATE: 12/10/75
START TIME: 0840 (Pump On)

FORM ANC-656 (REV. 12-72)

# AEROJET NUCLEAR COMPANY

| | Flow RATE | PRESS. WELLHEAD | DRAWDOWN TUBE PRESS | lb/ft³ | NPSH WH | PUMP DISCHG PRESS | | TEMP. PUMP. DISCHG. | |
|------|------|------|------|------|------|------|------|------|------|------|
| E.T. | QAP | QF | PWH | PDT | ρW | | PPD | TPI | TPD | AMF |
| HRS | PSIO | GPM | PSIG | PSIG | lb/ft³ | ft | PSIG | °F | °F | AMPS |
| 0810 | 1.6 | 550 | 40 | 225 | — | — | — | — | 274 | — |
| 0814 | SHUT-IN | | | | | | | | | |
| 2830 | 0 | 0 | 160 | 288 (BAD) | — | — | — | — | — | — |
| 0840 | Pump On | | | | | | | | | |
| 0845 | 10 | 1370 | 32 | 60 | 55.18 | 69.3 | 45 | — | 270 | 69 |
| 0850 | 7.6 | 1190 | 30 | 45 | 58.18 | 37.1 | 48 | — | 272 | 68 |
| 0855 | 7.1 | 1153 | 28 | 42 | 58.18 | 34.7 | 48 | — | 272 | 67 |
| 0900 | 6.8 | 1129 | 28 | 40 | 58.18 | 29.7 | 48 | — | 272 | 66.5 |
| 0905 | 6.6 | 1110 | 26 | 40 | 58.18 | 34.6 | 48 | — | 272 | 66.2 |
| 0915 | 6.05 | 1065 | 26 | 42 | 58.18 | 39.6 | 62 | — | 272 | 66.5 |
| 0930 | 5.95 | 1057 | 26 | 42 | 58.18 | 39.6 | 62 | — | 272 | 66.3 |
| 1000 | 5.80 | 1043 | 25 | 41 | 58.18 | 39.6 | 62 | — | 272 | 66.3 |
| 1030 | 5.75 | 1040 | 25 | 41 | 58.18 | 39.6 | 60 | — | 272 | 66.5 |
| 1100 | 5.65 | 1030 | 25 | 41 | 58.18 | 39.6 | 60 | — | 272 | 66.5 |
| 1145 | 5.6 | 1027 | 25 | 42 | 58.18 | 42.1 | 60 | —. | 272 | 66 |
| 1330 | 5.45 | 1012 | 25 | 28 | 58.35 | 32.1 | 60 | — | 268 | 66.3 |
| 1420 | 5.40 | 1010 | 24 | 38 | 58.35 | 34.6 | 60 | — | 265 | 66 |
| 1430 | Begin Bypassing | | | | | | | | | |
| 1450 | 2.2 | 640 | 34 | 103 | 55.22 | 192.9 | 98 | — | 270 | 70 |
| 1520 | 1.5 | 520 | 35 | 250 | 58.22 | 556.5 | 120 | — | 270 | 68 |
| 1700 | 0 | 0 | 150 | 340 | 58.22 | 779.1 | 510 | — | — | — |