Aerojet Nuclear Company

Interoffice Correspondence

GL07318-3

December 29, 1975

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Rogers 326

RRGF #1 PUMP AND WELL TEST SUMMARY THROUGH DECEMBER 24, 1975 - WLG-24-75

Four short-duration tests have been conducted at RRGF #1 to evaluate pump performance and to characterize the well and reservoir. Each test is described in detail, and the data sheets for each is attached.

Test 101

This test was the initial checkout run for the pump and flow loop. The "dead-head" conditions for the pump were established prior to opening the flow control valve. It was determined that the flow control valve was not adequate for throttling the flow and should be changed before the next test.

The test lasted only 20 minutes, and no conclusive data was obtained, however, it was noted that the well drawdown was more than anticipated.

Test 102

Prior to starting the pump, an artesian flow test was conducted to establish a head versus flow curve for RRGF #1. This data is presented graphically in Figure 1.

The pump was started and the initial flowrate was in excess of 2000 gpm. However, after only 20 minutes, the flow and discharge pressure had dropped drastically. The throttle valve was completely opened and the well could not sustain flows in excess of 1055 gpm.

Test 103

The well was left flowing overnight prior to this test. The average flowrate during this period was 550 gpm and the maximum temperature reached was 274°F. The well head pressure was approximately 40 psig.

The initial drawdown occurred very quickly, dropping the water level to 554 feet below the surface in only five minutes. The drawdown seemed to reach semi-stable conditions after five hours of pumping at an average flowrate of 1020 gpm although the trend was still downward. At these conditions, the pump discharge pressure was 60 psig. Assuming this well would stabilize at 1000 gpm, the pump inlet could be lowered to 845 feet to regain the additional discharge pressure.

The 3-inch side valves were opened to bypass part of the flow in an effort to regain sufficient NPSH without decreasing total pump flowrate. The well did recover to produce a pump discharge pressure of 120 psig at a net flowrate from the well of 520 gpm. These conditions may not be an accurate indication of well performance due to the cascading of water back into the well.

Test 104

In an attempt to determine the amount of flow that could be pumped from the well, steady-state conditions from the artesian flow upward were studied. The initial flow condition achieved was 658 gpm. At this flowrate, the water level in the well dropped 66 feet.

The flowrate was then increased to approximately 740 gpm. The water level dropped to 167 feet before semi-steady state conditions were reached. At 818 gpm, the level dropped to 253 feet, and at 917 gpm the level dropped to 370 feet and the pump discharge presssure was 162 psig. The well could not sustain any flowrate above 920 gpm.

It must be emphasized that all points in this test were maintained for a very short time and, in most cases, there continued to be a downward trend in the water level in the well.

The data for this test is shown versus drawdown in Figure 2, and a pump performance comparison is shown in Figure 3. The pump is performing as expected, however, the well performance seems to be much less than predicted. In addition to the lack of capacity, the well is much cooler than predicted averaging only 270°F. There has been no casing expansion detected in any of the above tests.

Recommendations for Further Testing

The next logical test must be of longer duration. The well should be pumped at approximately 900 gpm for several days to determine whether or not this flowrate can be maintained for a significant length of time. If not, lower flowrates should be examined to find the capacity at which the well can be pumped.

Before this longer test can be made, suitable calibrated instrumentation should be installed to monitor discharge temperature and flowrates. Recorders should be avoided unless a controlled atmosphere and recalibration procedures can be maintained. A sketch showing the location of the instrumentation for Tests 101 through 104 is shown in Figure 4.

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Attachments - As stated

Distribution

cc: *HWCampen (r) SCohen
RWGould (r) RBRinger
JFKunze
LSMasson
RSMcPherson
GLMines
JWNeitzel
RDSanders
JFWhitbeck

*With Attachment I only

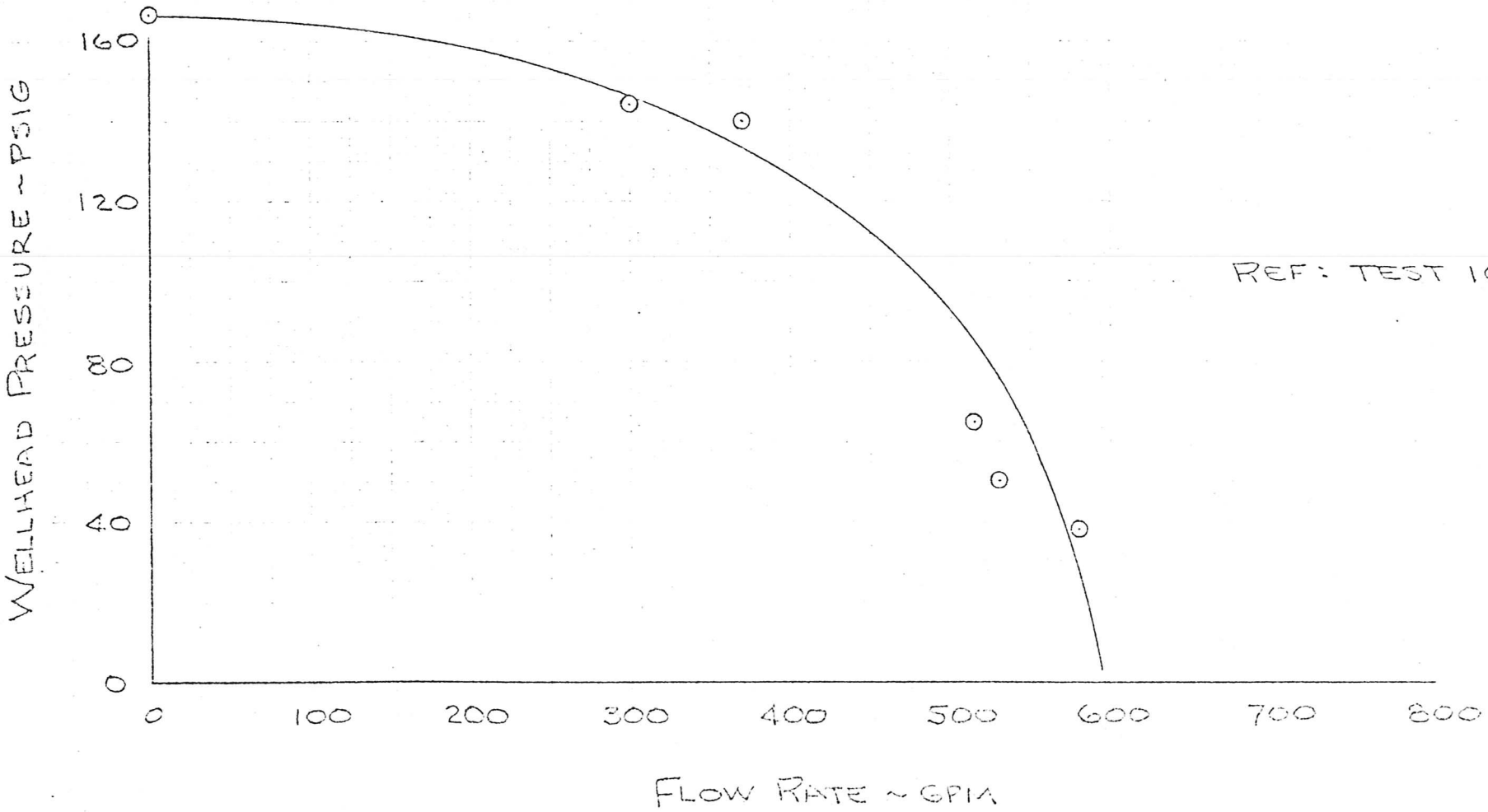
DATA SHEET TERMINOLOGY

E.T.	Time, HRS
QΔP	Orifice Plate ΔP, psid
QF	Flowrate, gpm
PWH	Wellhead Pressure (annulus) psig
PDT	Drawdown Tube Pressure - psig
ρW	Liquid Density - lb/ft^3
NPSH	Net Positive Section Head, ft.
PPD	Pump Discharge Pressure, psig
TPI	Pump Inlet Temperature, ^oF
TPD	Pump Discharge Temperature, ^oF
AMP	Pump Power - amps

FIGURE 1

RRGF WELL NO 1

ARTESIAN HEAD VS FLOW



REF: TEST 102

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FIGURE 2

RRGF WELL NO. 1
DRAWDOWN VS CAPACITY

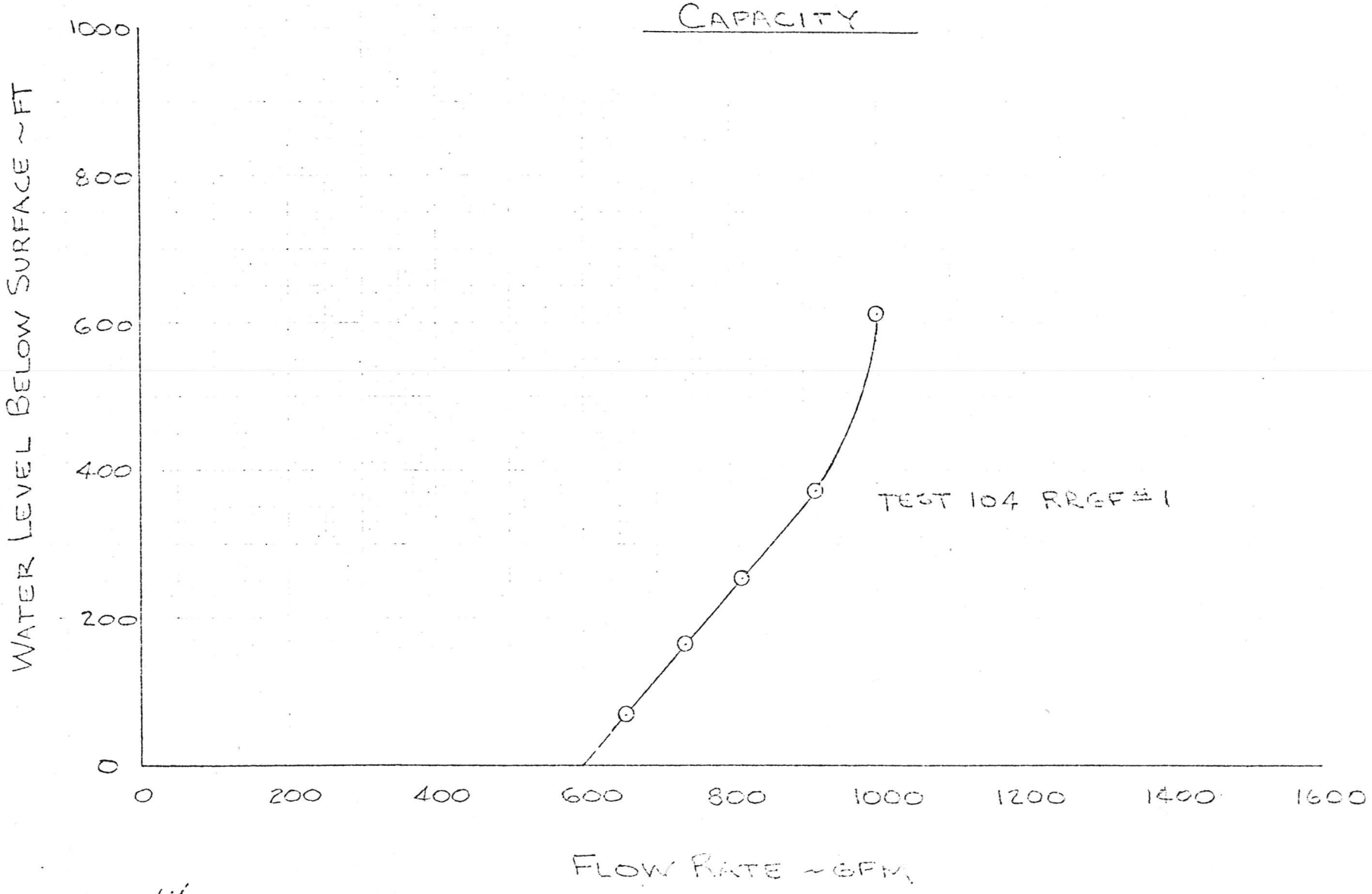

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FIGURE 3

PUMP PERFORMANCE COMPARISON

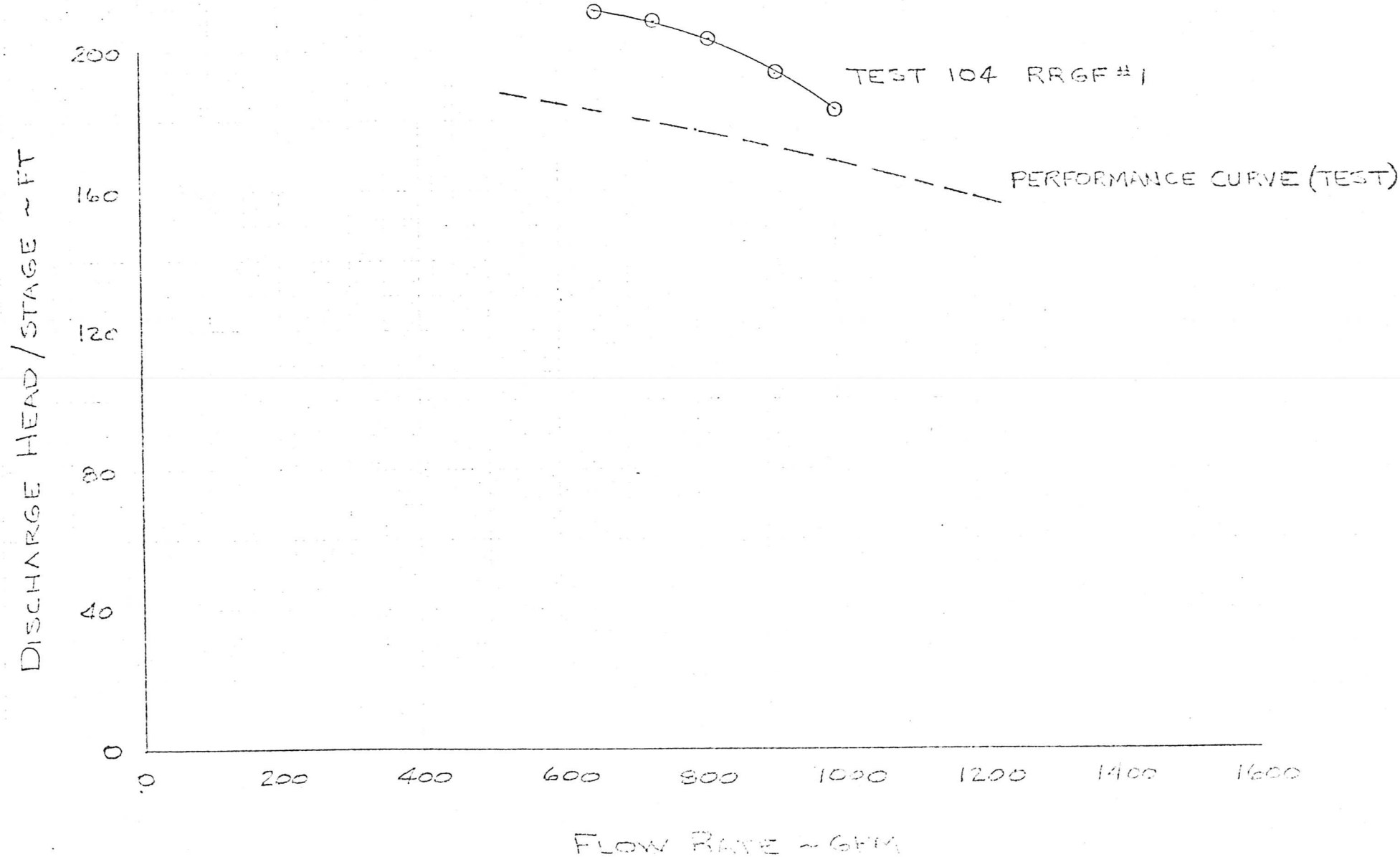

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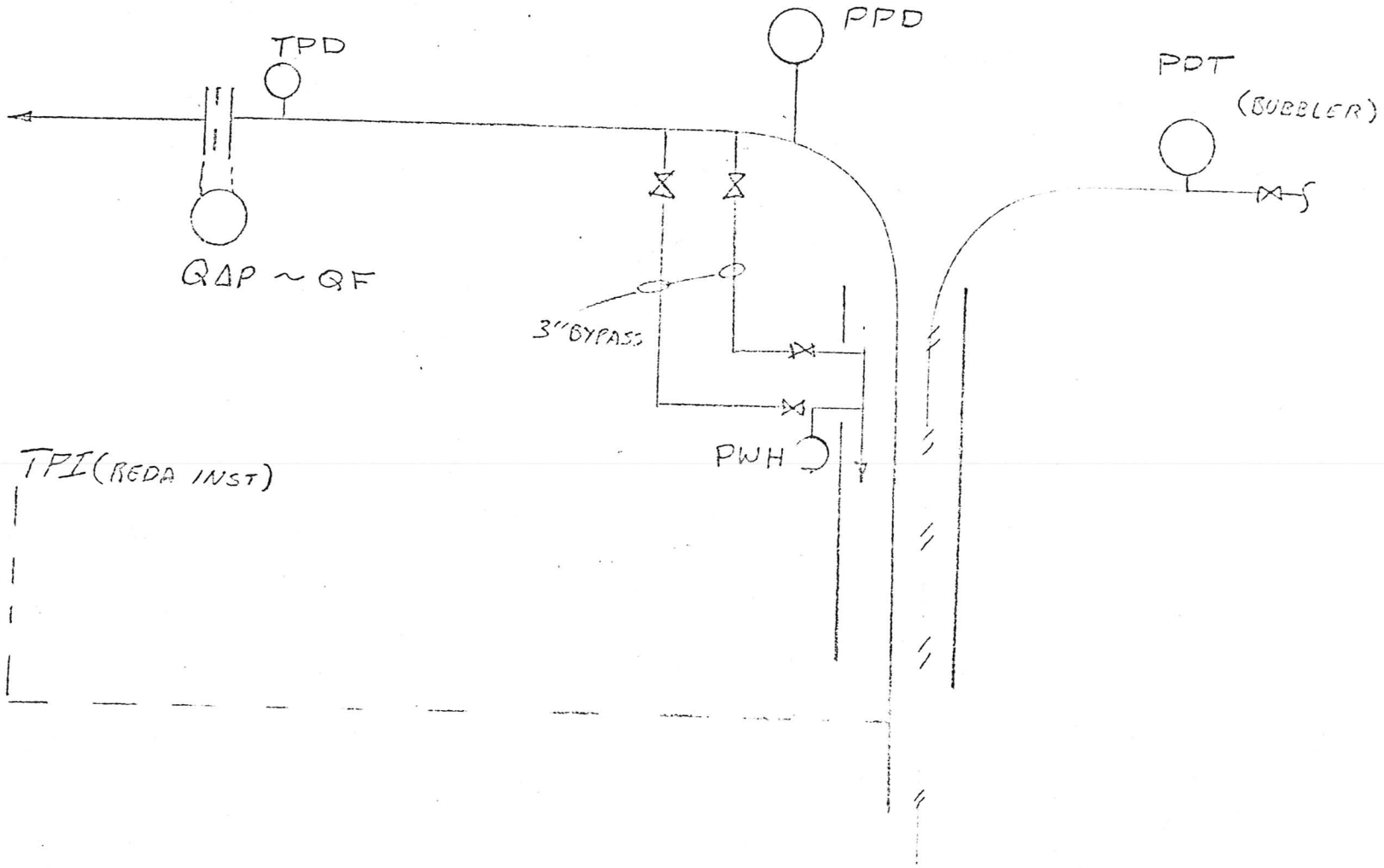
FIGURE 4



RRGF WELL #1 INSTRUMENTATION LOCATIONS