GL07337

Aerojet Nuclear Company

Interoffice Correspondence

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UPD

COMPUTER PREDICTIONS OF RRGE #2 TEMPERATURE RESPONSE AFTER INJECTION AND CURRENT DRILLING OPERATION - WCK-2-76

References: (1) E. C. Lemmon Ltr to J. F. Kunze, Geothermal Well Flow Measurements with Orifice Meter, ECL-5-76, March 25, 1976.

(2) W. C. Kettenacker Ltr to L. G. Miller, Status of Raft River Geothermal Wells and Resevoir Computer Model, WCK-1-76, March 9, 1976.

(3) J. F. Kunze Ltr to File, Raft River Project Information Kun-130-76, March 15, 1976.

After the current drilling operation at RRGE #2, which deepened the hole approximately 500 feet, performance "suffered". "Reduced" flow rates and lower temperatures were observed after redrilling was completed. This letter addresses itself to the decreased temperatures throughout the well. A possible explanation for the lower measured flow rates is found in Reference 1.

To explain the temperature response of the well, the computer heat transfer model, briefly explained in Reference 2, was used. This model was enlarged to handle injection effects more accurately. The transient used in the computer model consisted of cold water injection (100°F) at 500 gpm for 12 days (8.64×10^6 gallons total), shut-in for 5 days, and then outflow of 400 gpm for 27 days. This computer transient does not duplicate the actual conditions at RRGE #2 prior to and after completed redrilling (Reference 3), but merely scopes the actual situation. Precise duplication of RRGE #2 injection-outflow conditions on the computer would have involved much more effort with an insignificant increase in accuracy. The computer transient employed does use the approximate injection temperature, total injected volume, and approximate outflow rates after redrilling.

Computer predicted results at RRGE #2 for a 400 gpm outflow after injection and shut-in period are shown in Figures 1, 2, and 4. For comparison, Figures 1 and 2 give the computer response for an identical 400 gpm outflow which would have resulted if cold water injection had not taken place. Figure 3 shows the computer results of a well log of RRGE #2 taken immediately after the 5 day shut-in period at the outset of flow, and compares this with the computer predicted well log for RRGE #2 prior to any cold water injection.

Results, as shown in Figures 1 through 4, indicate that cold water injection does have a marked effect on the well temperature distribution and response. The fact that the computer results employing only cold water injection as a variable match closely the test data indicates that the present response of RRGE #2 is due in most part to the injection of cold water and not the deepening of the well. If the limitations of computer prediction and extrapolation are kept in mind, the computer model results show that normal RRGE #2 temperatures will be restored to pre-drilling, pre-injection values in approximately 50 to 60 days if a constant 400 gpm outflow is maintained during this period.

WC Kettenacker

W. C. Kettenacker
Thermal Analysis

jr

Attachments

cc: DGoldman
ECLemmon
JLLiebenthal
LGMiller
NEPace
SJPrestwich
RDSanders
RCStoker
JFWhitbeck
WCKettenacker

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

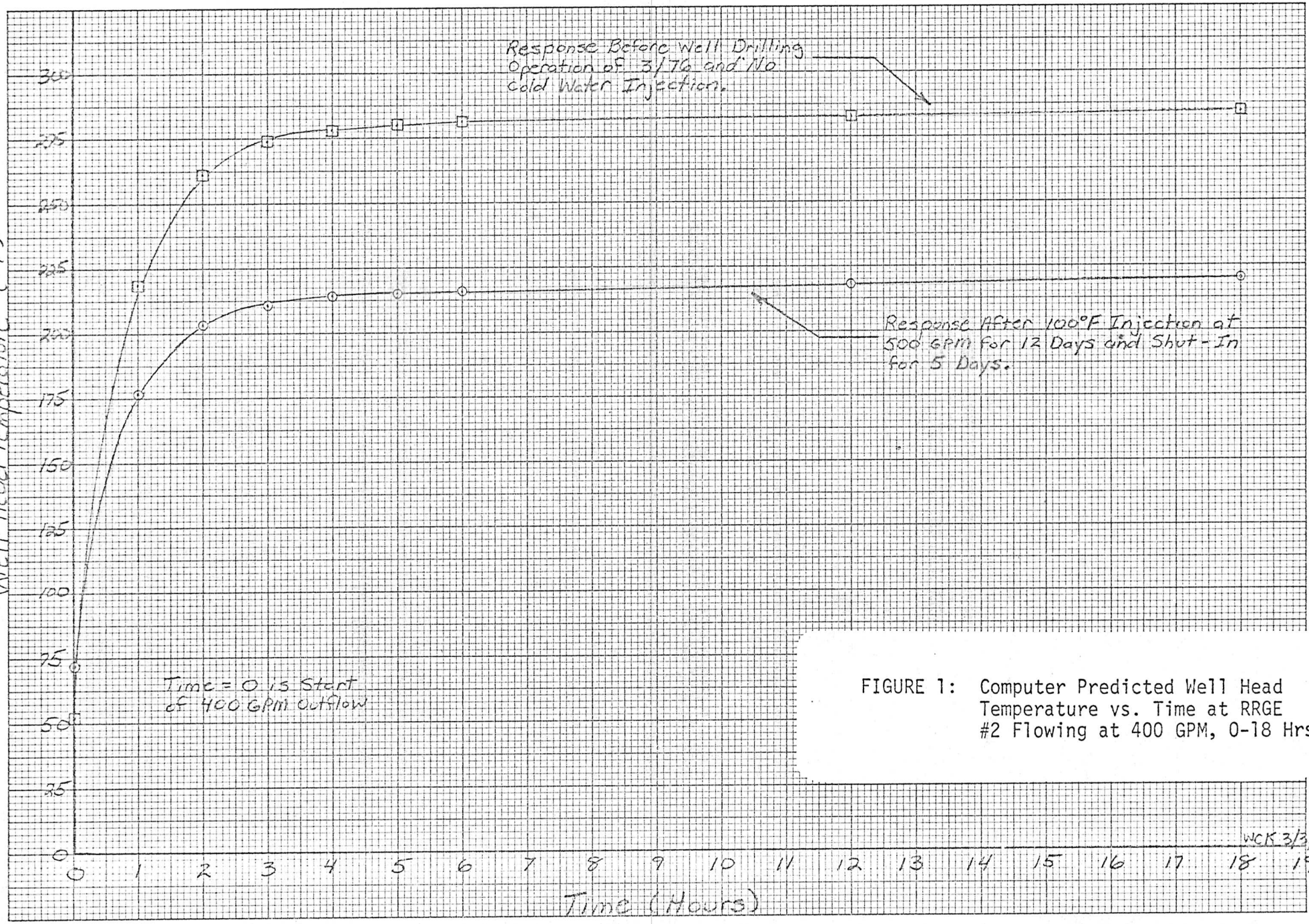

FIGURE 1: Computer Predicted Well Head Temperature vs. Time at RRGE #2 Flowing at 400 GPM, 0-18 Hrs.

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

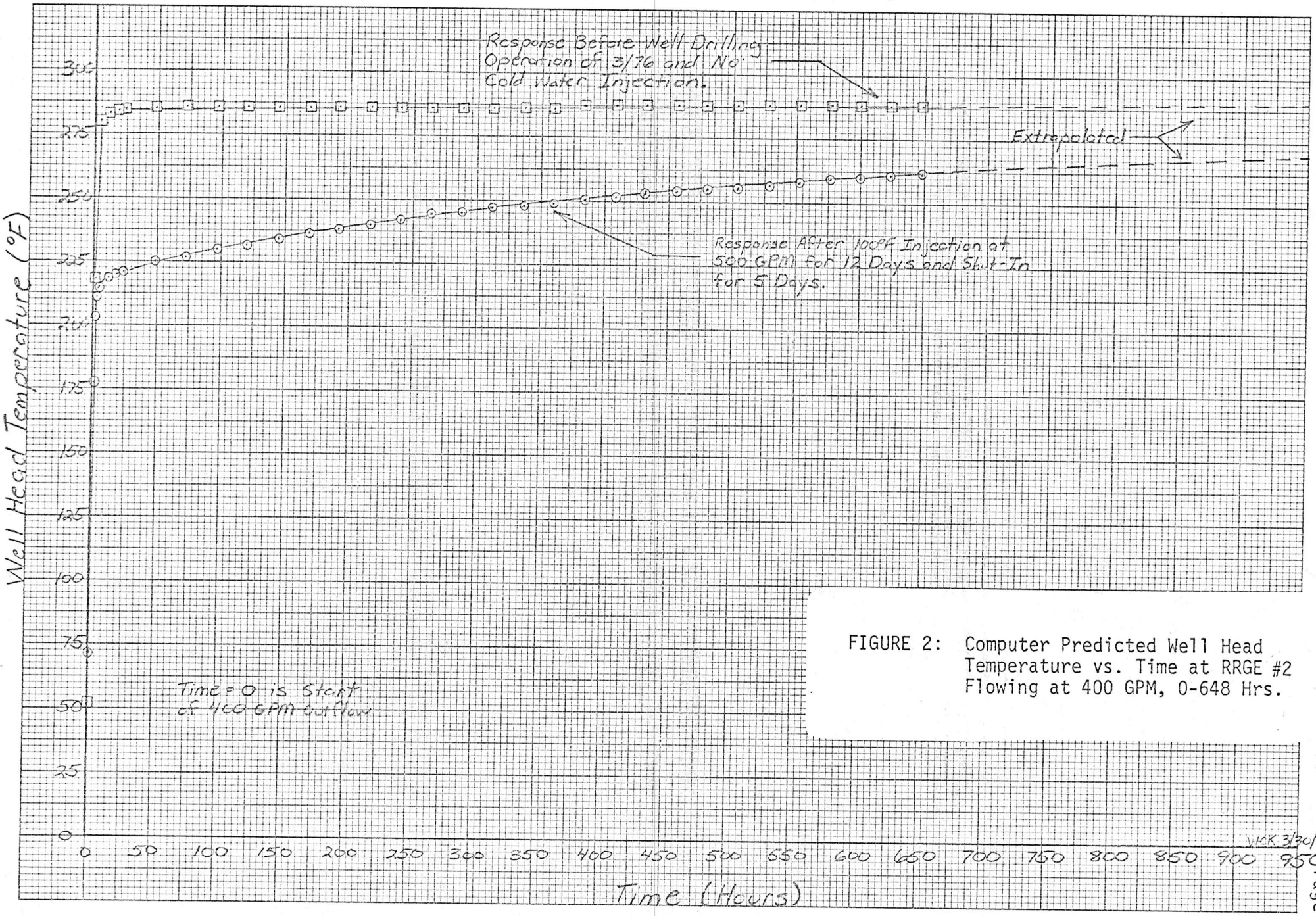

FIGURE 2: Computer Predicted Well Head Temperature vs. Time at RRGE #2 Flowing at 400 GPM, 0-648 Hrs.

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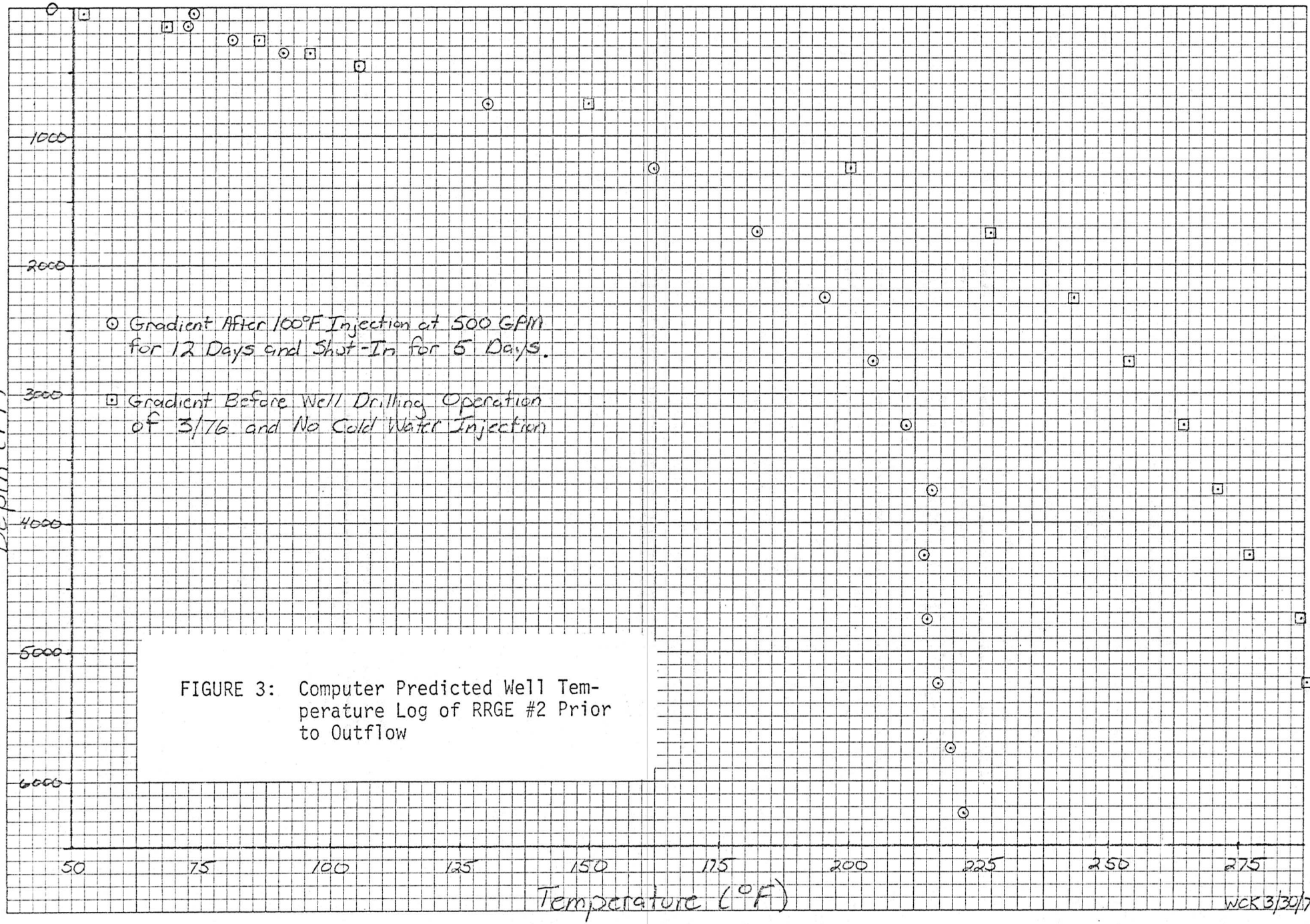

FIGURE 3: Computer Predicted Well Temperature Log of RRGE #2 Prior to Outflow

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.

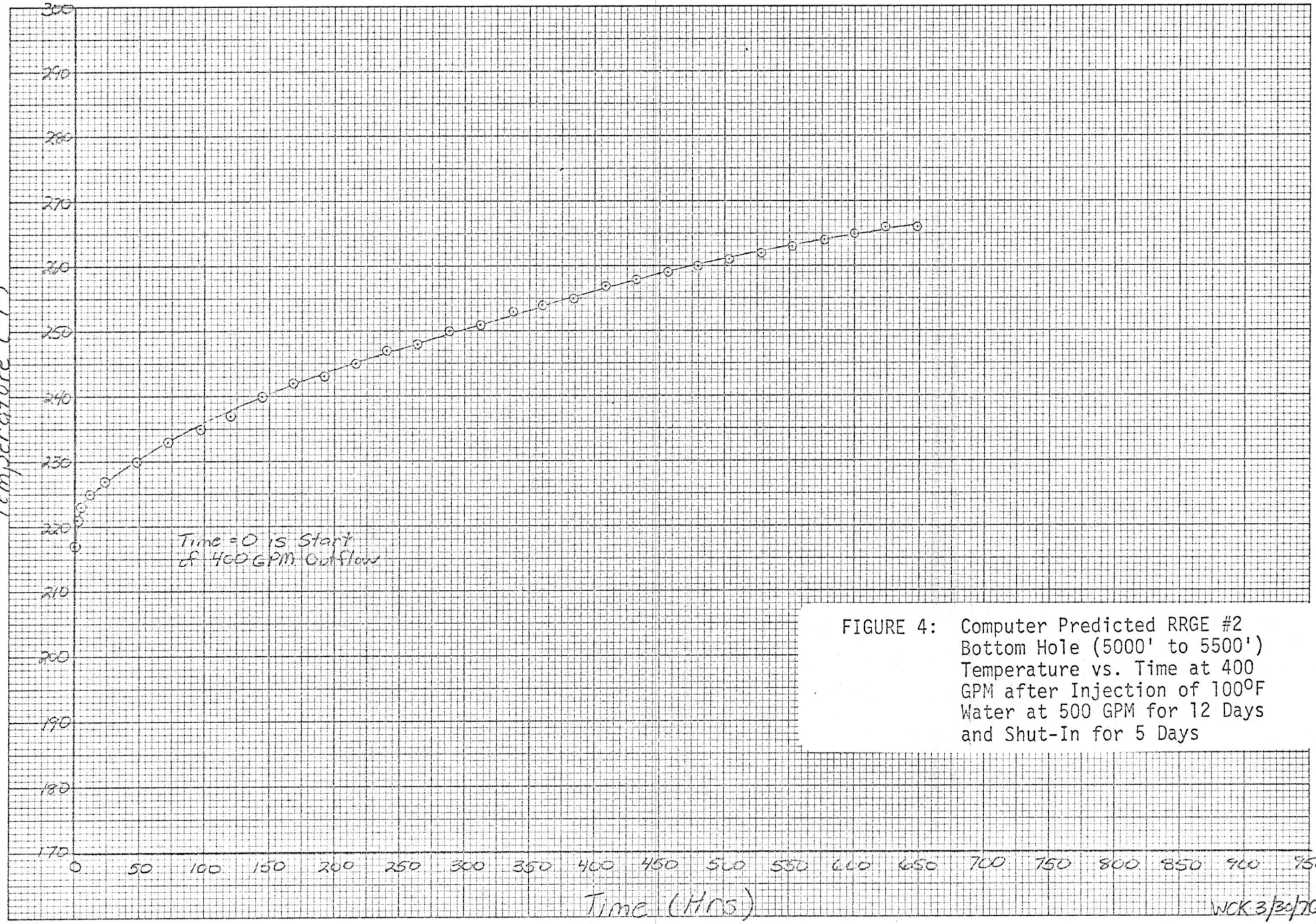

FIGURE 4: Computer Predicted RRGE #2 Bottom Hole (5000' to 5500') Temperature vs. Time at 400 GPM after Injection of 100°F Water at 500 GPM for 12 Days and Shut-In for 5 Days