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REVISED RESPONSE TO COMMENT ON THE SOUTH FIELD INJECTION TEST REPORT

07/08/96

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DOE-FN EPAS
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RESPONSES

Department of Energy

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JUL 0 8 1996

DOE-1089-96

Mr. James A. Saric, Remedial Project Director
U.S. Environmental Protection Agency
Region V - SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

REVISED RESPONSE TO COMMENT ON THE SOUTH FIELD INJECTION TEST REPORT

Reference: Letter from J. Saric, U.S. EPA, to J. Reising, DOE-FN, "Southfield Injection Test Report," dated April 30, 1996.

Enclosed for your review and approval is a revised response to the U.S. Environmental Protection Agency's (U.S. EPA) comment on the South Field Injection Test Report.

If you have any questions concerning this revised response to comments, please contact John Kappa at (513) 648-3149.

Sincerely,

Johnny Reising

Johnny W. Reising
Fernald Remedial Action
Project Manager

FN:Kappa

Enclosure: As Stated

cc w/enc:

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C. Little, FERMCO/2

REVISED RESPONSE TO COMMENT ON
THE SOUTHFIELD INJECTION TEST REPORT

Commenting Organization: U.S. EPA Commentor: Saric
Section#: 8.1 Pg.#: 26 Line#: 18
Original Specific Comment# 4

Comment: The report states that actual field conditions and modeled predictions of the water table rise are in close agreement. The water level rise of 1.0 foot in well 31550 does not seem to match any data presented for well 31550 in the report. The report should clarify where a 1.00 foot water level rise in well 31550 was measured. Additionally, before stating conclusions based on the model's ability to predict aquifer response to injection, the test should present a more rigorous model validation. This validation should use all data from all the wells affected in the test and calibration targets.

Revised Response: The intent of the statement in question was to comment qualitatively on the ability of the SWIFT GMA Model to predict water elevation rises due to injection. The model predicted about 1.5 feet of rise, and the test produced a rise of about one foot in the area of the injection well. Errors on Figure 6.13 kept the figure from properly supporting the statement. It was thought that by revising the figure the meaning of the statement would become clear. By making the statement though, the question has been raised as to the validation and calibration of the SWIFT GMA model under injection conditions. A rigorous presentation of the calibration and validation of the groundwater model under steady state pumping conditions is presented in The SWIFT Great Miami Aquifer Model, Summary of Improvement Report, Volumes I and II, 1994. Each step of the remediation involves constant pumping and/or injection for a period of several years during which time it is expected that steady state flow conditions will be achieved. Because the remediation was designed using steady state modeling it seems appropriate to asses injection under steady state conditions also.

As is explained below, not enough data was collected during the current injection test to conduct a rigorous steady state calibration of the model under injection conditions, but enough data was collected to qualitatively evaluate the performance of the model to injection conditions. Conceptually, the injection test created a mound in the water table that progressively moved outward from the injection well. The mounding did not reach steady state conditions during the injection test, so it was not as large as the model predicted it would be under steady state conditions, but as explained below it was very close and behaved as expected. A section will be added to the report, as described below, that presents this evaluation.

Action: Figure 6-13 will be corrected. The notations for wells 31551 and 31556 will be changed to read 1.109 feet and 0.487 feet respectively. With these corrections, the figure will properly illustrate and support the statement regarding modeling predictions.

The sentence "Actual water level rises produced during the injection test were in close agreement with modeled predictions." will be deleted from the text and replaced with the following sentence, "The predicted water level rise, made by the SWIFT GMA model under steady state injection conditions, for the area immediately surrounding the injection well was approximately 1.45 feet, the actual measured rise was 1.109 feet."

The following text will be added to the report as Section 6.4, titled "Ability of the SWIFT GMA Model to Predict Aquifer Response"

Steady state model simulations have been used at the FEMP to support the remedial design process. Each step of the remediation involves constant pumping and/or injection for a period of several years during which time it is expected that steady state flow conditions will be achieved. Because the remediation was designed using steady state modeling it seems appropriate to assess injection under steady state conditions also. Of interest, is how well the model predicts water level rises created by injection. Water level results measured during this injection test were used to evaluate the predictive capability of the SWIFT GMA model in simulating aquifer responses under steady state groundwater injection conditions. The injection test was conducted for 72 hours. As the test results illustrate, this time period was more than adequate for determining if the injection well would plug, but not ideal for making comparisons to steady state modeling results. Given the possibility that transient water levels measured in the field are being compared to steady state water levels predicted by the groundwater model, the comparison presented below should not be considered a formal validation of the model. It is anticipated that a more formal model validation will be possible during later phases of the injection project.

The SWIFT GMA Groundwater Model was run under steady state conditions to predict what the water level rise would be at an injection rate of 300 gpm. Since each model block is 125 feet by 125 feet, more than one monitoring well is located in some of the blocks. For the purpose of this evaluation the simulated rise was taken from the center of the model block where the monitoring well(s) was located.

When the model was calibrated for pumping conditions (Model Improvement Report), a criteria of one foot was used to calibrate steady state modeled predictions, to measured water levels. This criteria was carried over into this evaluation. Modeled groundwater rises and measured groundwater rises (corrected for background trend), for the wells which were monitored during the injection test, are listed in Table XX together with the horizontal distance from the injection well to each monitoring well. All the elevation differences are within one foot, the measured water levels are consistently lower than the modeled levels, and measured levels near the injection well are closer to modeled levels than measured levels farther away from the injection well. It is felt that the reason that the measured water levels are lower than the predicted water levels is that the injection test was not conducted long enough to produce the steady state rises predicted by the model. Under injection, mounding near the injection well should establish itself first, then slowly progress outward away from the injection well. The fact that measured water levels taken closer to the injection well have a better match to modeled levels than measurements taken farther away from the injection well supports the interpretation that steady state conditions had not yet been achieved.

Based on results of the evaluation summarized above, when run under steady state conditions, the current SWIFT GMA model appears to predict water table rises to within one foot of the actual rise. Results of steady state injection simulations can be used to support the design process of the aquifer remedial system, including the determination of initial operational conditions.

TABLE XX

WELL ID	DISTANCE FROM WELL 31550 (ft)	MEASURED RISE[a] (ft)	MODELED RISE[b] (ft)	DIFFERENCE[c] (ft)
31551	25	1.109	1.45	0.341
31552	50	0.761	1.05	0.289
31553	150	0.423	1.05	0.627
31554	50	0.818	1.45	0.632
31555	50	0.774	1.45	0.676
31556	100	0.487	1.05	0.563
2387	200	0.35	0.88	0.53
2049	325	0.15	0.95	0.80
2390	650	0.03	0.66	0.63
2434	610	0.08	0.67	0.59
2398	1260	0.03	0.59	0.56
AVERAGE DIFFERENCE				0.567

NOTES:
a At elapsed time of 2000 minutes
b Steady-state condition
c Modeled - measured

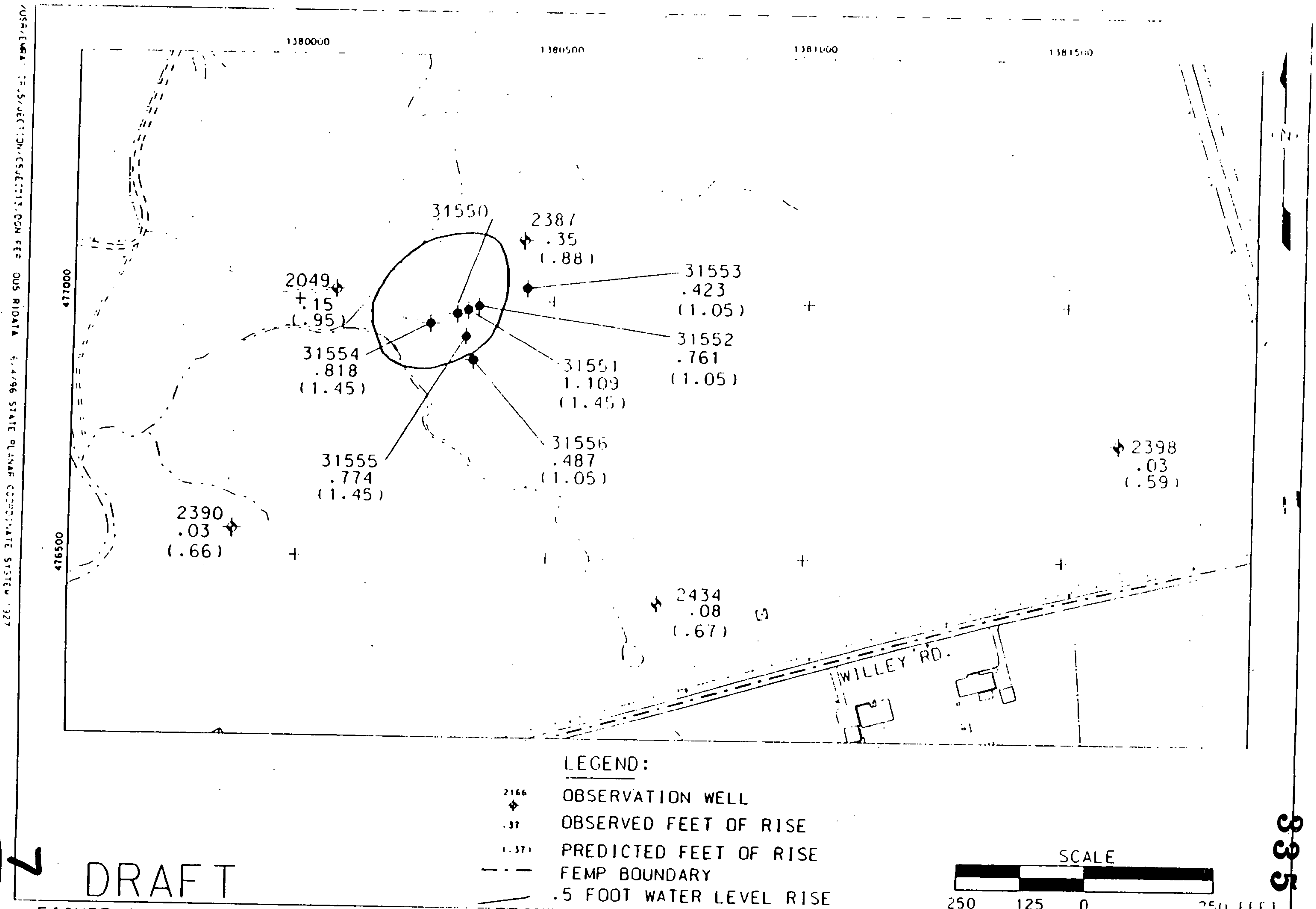

FIGURE 6-13. MOUNDING WHICH RESULTED FROM THE INJECTION TEST AT AN ELAPSED TIME OF 2000 MINUTES

335