4370

RESPONSE TO COMMENTS ON DESIGN MONITORING AND EVALUATION PROGRAM PLAN

02/05/93

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31
LETTER

4370

Department of Energy
Fernald Environmental Management Project
P.O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 738-6357

FEB 0 5 1993

DOE-1068-93

Mr. James A. Saric, Remedial Project Director
U.S. Environment Protection Agency
Region V - 5HRE-8J
77 West Jackson Street
Chicago, Illinois 60604

Mr. Graham E. Mitchell, Project Manager
Ohio Environmental Protection Agency
40 South Main Street
Dayton, Ohio 45402

Dear Mr. Saric and Mr. Mitchell:

RESPONSE TO COMMENTS ON DESIGN MONITORING AND EVALUATION PROGRAM PLAN

This letter transmits responses to United States Environmental Protection Agency (U.S. EPA) comments and Ohio Environmental Protection Agency (OEPA) comments on the Design, Monitoring, and Evaluation Program Plan (DMEPP). This plan was prepared as part of the South Plume Removal Action.

Many of the comments pertain to groundwater modeling calibration and validation, and how work outlined in the DMEPP effects these activities. Flowcharts are provided with the responses to better communicate Fernald Environmental Management Project (FEMP) plans. These flowcharts were also presented at the Technical Information Exchange Meeting held on January 7, 1993.

If you have any questions or require further information, please contact me at FTS/Commercial (513) 738-6159 or Pete J. Yerace at FTS/Commercial (513) 738-6178.

Sincerely,

Jack R. Craig
Fernald Remedial Action
Project Manager

FN:Yerace

Enclosure: As Stated

cc:

W. E. Murphie, EM-42, TREV
K. A. Hayes, EM-424, TREV
B. Barwick, USEPA-V, 5CS-TUB-3
G. Jablonowski, USEPA-V, AT-18J
J. Kwasniewski, OEPA-Columbus
P. Harris, OEPA-Dayton
M. Proffitt, OEPA-Dayton
T. Schneider, OEPA-Dayton
J. Michaels, PRC
L. August, GeoTrans
J. D. Wood, ASI/IT
R. L. Glenn, Parsons
P. Clay, FERMCO/19
D. Dubois, FERMCO/65-2
J. W. Thiesing, FERMCO/2
AR Coordinator, FERMCO

REVIEW COMMENT FORM

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General Comment

1 Because many of the activities described in this document will be the responsibility of the new ERMC, Fluor Daniel, a statement acknowledging this should be included in the text.

Response

DOE concurs.

Action

Text will be added referencing the new ERMC FERMCO.

Specific Comments

1 Page 1-2, Line 30 - Remove mercury from the list of contaminants associated with the PRRS.

Response

DOE concurs.

Action

Mercury will be deleted.

2 Section 1.3, Page 1-4, Line 24 - The Zone 1 plume is defined here by the extent of the 20 ug/1 total uranium level, whereas page 1-3, line 12 and page 1-4, line 7 seem to define Zone 1 as the extent of the 30 ug/1 total uranium level. This indirect discrepancy should be clarified.

Response

The extent of the Zone 1 plume is defined as 20 ug/l.

Action

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Text will be corrected as required.

3 Section 1.2, Page 1-3, Line 34 - It should be clear that this is referring to a future document. Suggested language ... "but at a level that may be specified in the FEMP OU-5 Record of Decision (ROD) in August of 1995".

Response

DOE concurs.

Action

Text will be revised as noted.

4 Section 1.3, Page 1-4, lines 37 and 38

This sentence causes the reader confusion as the recovery wells are not located near the "source".

Response

DOE concurs.

Action

This sentence will be removed.

5 Section 1.4, Page 1-5, Line 17 - "Volume I -- Operation Methodology" appears to be a relic of the prior draft.

Response

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DOE concurs.

Action

Text "Volume I -Operational Methodology" will be removed.

6 Page 1-5, Lines 27-30 - The ground water model has never been properly calibrated nor has it ever been validated. The lines should be revised to read "The pump test data will be used to calibrate the model. Over time, field measurements will be obtained and compared to predicted values in order to validate the model.

Response

Pump test data will be used to calibrate the model and field measurements collected over time will be used to validate modeled predictions. The attached diagram (Attachment A) illustrates how DMEPP activities integrate with modeling calibration and validation. This strategy was also presented at a Technical Information Exchange Meeting which took place on January 7, 1993.

A primary objective of DMEPP activities is to evaluate and optimize the operation of the well field. An aspect of this is to provide additional groundwater data which can be used to validate modeled predictions. The original DMEPP text did not clearly explain how system evaluation and performance optimization activities would integrate with modeling calibration and validation.

To summarize the process, the site groundwater model was used to determine initial operating conditions for the extraction wells; objectives being to create a hydraulic barrier and minimize impact to PRRS contamination. Engineering contingencies have been incorporated into the design of the extraction system to account for uncertainties in initial operating conditions defined by the groundwater model. Pump test and additional field data will be used to set final operating conditions for the wells and to calibrate the site groundwater model.

The groundwater model will be calibrated to pump test calculations. Once calibrated, it will be used to predict operational performance of the well field. Field data will be collected and used to validate the modeled predictions throughout the operational life of the system and the useful life of the model. If the model fails to meet validation criteria, it will be calibrated again. The DMEPP will be revised to include a model calibration.

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DOE is aware of more global model accuracy issues (calibration, validation, boundary conditions, anisotropy ratio, transient verses steady state) and a broader program is being developed to address these issues. An evaluation of the present site groundwater model will be conducted and a model improvement plan based on identified problems with the model will be prepared. A flowchart showing the approach to the groundwater model improvement is also included in Attachment A. Pending or additional comments pertaining to model performance should be directed toward the model improvement effort to expedite the model improvement process.

Action

Text will be revised in the DMEPP to use the pump test data to calibrate the site model. A process will be included within the DMEPP to check the ability of the model to match field data over time.

7 Page 1-5, Line 32 - Change "Validation" to "Calibration and Validation"

Response

See response to Comment #6.

Action

See action to Comment #6.

8 Page 1-5, Line 35 - Change Validation to Calibration.

Response

See response to Comment #6.

Action

See action to Comment #6.

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9 Page 1-5, Line 36 - Change Recalibration to Validation. The activities which FEMP refers to as "Recalibration" are actually part of calibration. FEMP needs to develop a deliverable discussing activities performed to validate the model.

Response

See response to Comment #6.

Action

See action to Comment #6.

10 Page 1-5, Line 32 - Change Validation to Calibration.

Response

See response to Comment #7.

Action

See action to Comment #7.

11 Page 1-5, Line 37 - Change Validated to Calibrated.

Response

See response to Comment #6.

Action

See action to Comment #6.

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12 Page 1-5, Line 40 - Add a step detailing how long term validation will be determined.

It is clear from this report that DOE does not intend to properly validate the groundwater model. Short term changes to make the groundwater model reflect observed data are part of model calibration not validation. Model validation is done by comparing observed values against values which have been predicted by the model over a very long period of time. Validation is a dynamic process which corrects and adjusts the model over its useful life.

DOE should incorporate this type of model validation in the work plan. Additionally, the wording of the entire work plan should be revised to reflect the true meaning of calibrate and validate in regard to the groundwater model.

Response

DOE agrees that this type of model validation should be conducted. Also see response to Comment #6.

Action

Text will be revised to better communicate calibration and validation activities. See action to Comment #6.

13 Section 2.1, Page 2-6, Line 17 - It seems that runoff from the waste pits to Paddys Run should also be added as contributors to the south plume contamination.

Response

The intent of this discussion was only to summarize others' evaluation efforts. No additional analysis was performed; consequently only the conclusions presented by others in the referenced reports can be presented. The referenced reports, according to our review, did not conclude that runoff from the waste pits was a contributor to the south plume.

Action

No action necessary

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14 Section 3.1.2, Page 3-3, Lines 31 - 32 - How will vertical capture be defined?

Response

The Pump Test and Model Validation Work Plan in Appendix A provides further detail on how vertical capture will be defined. Defining vertical capture is a difficult technical issue. Ongoing investigations include provisions for obtaining Hydropunch samples at discrete depths so that an improved vertical characterization of contamination can be made. The pump test includes a 7-level piezometer near the pumping well that will be continuously monitored during the test to determine the vertical zone of influence. In addition, many 3000 series wells will be monitored during the pump test to see if effects are seen at the 3000 level. The revisions to the South Plume Groundwater Modeling Report (presently ongoing) will include capture zone analysis using reverse particle tracking to assess vertical transport and capture under pumping conditions. A final determination on vertical capture and a decision on what screen lengths to be used will be made using this additional water quality data, pump test results, and capture zone simulations. This is not a completely quantitative process, rather it must rely on engineering and scientific judgement. However, as discussed in Section 3.1, conservatism has been incorporated in the design (pumping rates may be increased more than 60 percent above the modeled values 2000- gpm to 3250 gpm), and corrections can be made in the future if they are necessary.

Action

No action necessary.

15 Page 3-3, Lines 12 - 13 - Include a table with sampling results which show that the south plume is primarily at shallow depth.

Response

DOE believes that such a table is appropriate; however, such a table should be in the South Plume Modeling Report (soon to be revised) since that is where the initial analysis of plume capture was performed.

Action

A table with sampling results will be added to the South Plume Modeling Report. A reference to this report will be included within the DMEPP.

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16 Section 3.4, Page 3-7, Line 14 - This report should be provided to U.S. EPA and Ohio EPA for review and comment. These comments will give DOE and contractors feedback prior to DOE submitting revisions to the operation, design, and monitoring plans.

Response

DOE concurs that this report should be provided to the US and Ohio EPA for review.

Action

Text will be added to include the agencies review and comment.

17 Page 3-5, Line 4 - An additional monitoring well should be installed 90 degrees to the orientations of the other three monitoring wells to indicate the shape of the cone of influence and anisotropic characteristics of the hydraulic conductivity distribution. This will provide more representative data than one well, and will insure that this data will be obtained even if a problem develops with one of the wells.

Response

The referenced text states a minimum requirement. As defined in Appendix A, the pump test includes provisions for a total of five piezometer locations in three orthogonal directions (see Figure 2-3 in Appendix A). Please refer to Appendix A for details of piezometer placement.

Action

No action necessary.

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18 Page 3-5, Line 16 - Revise line 16 to read "The other two observation wells will be at 90...".

Response

DOE concurs.

Action

Text will be revised as stated.

19 Page 3-6, Line 34 - Incorporate these Activities in the Model Calibration section (3.3) and change section 3.4 to Model Validation. This section should discuss DOE's plans for long term model validation.

Response

See response to Comment #6.

Action

See action to Comment #6.

20 Section 5.2, Page 5-3, Line 4 - See Comment #16

Response

See response to Comment #16.

Action

See action to Comment #16.

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21 Appendix A, Section 1.3, Lines 9 - 10 - Results of the pump test will be used to set the initial recovery well pumping rates at the pre-validated, model-determined recovery well locations. Provisions are included for system redesign after the model determined recovery well system is constructed, tested and evaluated; however, what provisions are included to use the pump test results to initially "validate" the model? If the pump test results demonstrate that the model determined number and location of recovery wells is not adequate, it may be necessary to modify the system design prior to the construction of the remaining recovery wells.

Response

Due to schedule constraints, there is not enough time to validate (or recalibrate) the model with pump test data and recommend modifications to the system while still meeting the deadline for having the recovery system operational.

DOE has tried to develop a logical and defensible recovery system design program that satisfies Consent Agreement schedules and meets land acquisition requirements. As described in Section 3.1 of the DMEPP, planar locations of recovery wells had to be defined early in the design effort and at this stage are fixed. A range of pumping rates have been included in the design, so if a problem is found during review of the latest characterization or pump test data, then the optimum location could be compensated for, to some degree, by changing the pumping rates. Obviously situations may arise that may not be compensated for by pumping rates only. Excess capacity of utilities and capped future tie-in connections have been included in the design to facilitate future expansion. Unless the schedule is delayed, there is no other option available.

In the vertical dimension, because land taking is not an issue and screen length is a relatively simple design change, a more iterative approach has been taken. Based on the latest available data after pump test completion, well screen lengths may be altered. Pump test determined values for hydraulic properties and the latest characterization data will be utilized in making these decisions (see Section 3.1.2 of the DMEPP).

Action

No action necessary.

22 Appendix A, Section 2.3.1, Tables 2-2 and 2-3, Pages [A] 2-7 and [A] 2-8 - Well No. SPM-2006 is listed as both a primary well and a secondary well.

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Response

SPM-2006 is a primary well.

Action

Tables will be corrected.

23 Appendix A, Section 2.3.1, Figure 2-2 - Wells 3015, 2015, 2106, and 3106 are not visible.

Response

DOE concurs.

Action

Wells will be added to Figure 2-2.

24 Appendix A, Section 2.3.1, Page [A] 2-9, Lines 4 - 5 - See Comment #21

Response

See response to Comment #21.

Action

See action to Comment #21.

25 Appendix A, Section 2.3.1, Page [A] 2-9, Lines 27 - 29 - While an expected drawdown of 3-4 feet may be reasonable, this statement assumes similar hydrogeologic properties/materials in the vicinity of RW-4 to that of the Venice test well. This statement should, therefore, be qualified.

Response

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DOE concurs.

Action

Text will be modified.

26 Appendix A, Section 3.2, Page [A] 3-2, Lines 8 - 9 - This sentence is misleading as it implies that the model is numerically correct. The model validation described only considers groundwater flow, not aqueous chemistry. Because previous invalidated model simulations were used to distribute the contaminants, and the model will be used to simulate the containment of this distribution, the model's "correctness" in simulating the Removal Action is limited by the assumptions and approximations inherent in the solute transport runs.

Response

DOE agrees that model use is limited at this time due to assumptions and approximations inherent in the solute transport runs. Model improvements will be conducted. An outline of the model improvement approach is attached (Attachment A).

Action

Text will be revised to better communicate calibration, validation and model improvement activities.

27 Appendix A, Section 3.1, Page [A] 3-1 Lines 14 - 15 - The validation should refer to the model application at the site, not the validation of the SWIFT III model. In other words, the text should read "validation of the site application using the SWIFT III model". It is important to remember, the numerical model is not being validated; but rather that the validation of the data set used to represent the conceptual model of the site is what is sought.

Response

The terminology used in the report is "SWIFT III site flow model" where SWIFT III is an adjective defining the "site flow model". DOE considers this terminology properly represents the concept of the model developed at the site using the SWIFT III code. The program has been developed to validate the site model, not the SWIFT code.

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Action

No action necessary.

28 Appendix A, Section 3.3, Page [A] 3-2 Lines 30 - 32 - Comparison of simulated steady-state conditions to the observed conditions of the five-well pumping program after the first quarter of pumping will not provide an accurate indication that the model is "validated" because the hydrogeologic system cannot be considered to be at steady-state before pumping begins or after the first quarter of pumping.

Why is there no mention of an unsuccessful validation? Does not the discussion of model recalibration deserve attention here? Model calibration and validation are iterative, thus why be so presumptuous that the results will be successful? The tone of the test seems to imply that model recalibration may not be necessary. The additional data gained from the pump test should logically be included in a refined model calibration. It is not rational to simply assume that the model may be able to demonstrate some degree of validation because such limited field tests have been used to develop the current conceptual model. Thus with a model, based on a very limited number of field tests in the region of concern, greater emphasis on refined calibration should be made. In reality, won't the validation exercise simply serve to demonstrate the insensitivity of the model, rather than the validity? Furthermore, the current calibrated model is based on steady-state flow conditions, thus wouldn't it be more prudent to discuss the simulation of the pump test as a calibration exercise rather than validation? The storage effects (primarily porosity to represent drainable porosity have neither been measured in the form of specific storage, nor have the parameters been effectively used in the 1986 or 1988 head calibration comparisons. In other words, how can one validate storativity when the existing model was never calibrated with regard to storativity?

Response

See response to Comment #6

Action

See action to Comment #6.

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29 Appendix A, Section 3.3, Page [A] 3-2 Lines 15 - 16 - The groundwater flow model of the site is not "embodied in the SWIFT III computer code", rather, the conceptual model of the site is modeled by construction of the data sets (i.e., the numerical model) and simulated using the SWIFT III computer code.

Response

DOE concurs that the statement "embodied in the SWIFT III computer code" was used inappropriately.

Action

Statement will be removed to eliminate confusion.

30 Appendix A, Section 3.3, Page [A] 3-2 Line 19 - It is inappropriate to conclude that water in the pump test will only be drawn from the top 35 feet of the saturated zone of the aquifer. The MODFLOW model discretization is simply too coarse (2 layers, 35 and 120 feet) to develop such a conclusion.

Response

The text states the pumping test " .... will draw water from the top 35 feet of the Great Miami Aquifer". This is intended to simply explain the screen location and not judge the capture from this well. In fact, DOE considers there will be significant vertical (upward) flow under these partially penetrating conditions (see Appendix A, Sections 2.3 and 2.5).

Action

Text will be altered for clarity.

31 Appendix A, Section 3.3, Page [A] 3-2 Line 23 - Change "each days" to "each day".

Also, this section reads as though MODFLOW were to be used in the validation. The SWIFT code typically refers to "blocks", not "cells". Also what about vertical plots, an option available in SWIFT maps, but not MODFLOW head save files? What are the unexpected boundaries and why

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would they be unrepresented in the model? Furthermore, the model is not "programmed", but rather "data sets should be developed".

Response

DOE concurs with the suggested changes. By definition, it is not known what the "unexpected boundaries" are. The intent of the statement is to incorporate any anomalous findings identified through the pump test into the model validation/calibration process.

Action

Text will be altered to comply with comment.

32 Appendix A, Section 3.3, Page [A] 3-3 Lines 12 - 13 - The model user should save the simulated heads at monitor wells in the "well file" (____.WL). There is no need to save the entire matrix values for each time step at each block. The writer of this document is tainted by MODFLOW.

Response

DOE concurs that there is no need to save the entire matrix for each time step at each block.

Action

Text will be altered.

33 Appendix A, Section 3.3, Page [A] 3-3 Lines 17 - 19 - The issue of provisional model revision is conveniently slipped in here. What happened to the successful model validation? How can one define "significant differences" in step 5 when step 7 defines the calibration criteria? What determines validation criteria? If you can state calibration criteria, why not quantify what would determine validation criteria? Maybe the goal of validation is simply wishful thinking?

Response

See response to Comment #6.

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Action

See action to Comment #6.

34 Appendix A, Section 3.3, Page [A] 3-3 Lines 28 - 29 - What will the calibration criteria be? How will the calibration criteria for steady-state differ from the transient?

Response

The calibration criteria are defined on Page [A]3-5, lines 1-22. The reference should read "Subsection 3.4" instead of "3.3". Data sets from both the steady state and transient cases will be evaluated using this criteria. The transient case will evaluate several time-discrete results. The primary basis of the model calibration will be the steady state case since the model will primarily be used in the steady state mode. Transient test cases will be only used to obtain further insights into the model behavior to support the steady state calibration.

Action

Text reference to the calibration criteria section will be corrected. Also see response to Comment #6.

35 Appendix A, Section 3.3, Page [A] 3-3 Lines 32 - 33 - Do not perform visual comparisons, but rather create head difference of residual maps between the observed and simulated. This is best discussed in Section 3.4 and should be referenced here.

Response

The program is intended to perform visual comparisons and to create residual maps.

Action

Text will be clarified and a reference will be added.

36 Appendix A, Section 3.3, Page [A] 3-3 Lines 35 - 36 - What is the justification for simply revising

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the storage values? What about the hydraulic conductivity? The storage values will enter as the porosity. What about zonation of storage values? What about changes in boundary conditions parameter such as leakage? What about the anisotropy ratio? The writer makes model calibration of a complex transient pump test seem so simple. It is suggested that this section at least mention the possibilities, rather than attempt to be so prescriptive.

Response

See response to Comment #6.

Action

See action to Comment #6.

37 Appendix A, Section 3.3, Page [A] 3-3 Lines 38 - 39 - What are the four cases? There are two sets of simulations - the transient pump test and the steady-state 5-well plan. Also, why are there expected conclusions? While additional field testing will almost always provide meaningful information to support the conceptual model development, why would one expect the model to be "validated" as originally calibrated, especially when the "validation" criteria are not yet defined? Don't develop the "validation" criteria after performing the "validation comparison". This is not acceptable.

Response

The approach to model calibration has changed. The model will be calibrated using pump test data. A diagram illustrating the DMEPP approach is attached (Attachment A). A model improvement program is being developed to adress model accuracy issues. Pleas see response to Comment #6.

Action

Text will be reviseed to reflect the DMEPP approach illustrated in Attachment A. Also see action to Comment #6.

38 Appendix A, Page [A] 2-23 Line 20 - If 1200 gallons per minutes (gpm) is theorized to be the optimum pumping rate for the pumping well, then add a fourth pumping rate of 1300 gpm, a fifth pumping rate of 1400 gpm and a sixth pumping rate of 1500 gpm to the step test. This will indicate if the 1200 gpm estimate is high or low compared to the actual capacity of the well.

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Response

A fourth pumping rate of 1500 gpm will be added to the step- drawdown test in order to provide a safety factor above the expected value of 1200 gpm. Results from these four pumping rates (600, 900, 1200 and 1500 gpm) will be analyzed to select the optimum rate for the pump test. DOE does not believe that it is necessary to include the three additional rates stated in the comment; rather the maximum rate and graphical data analysis techniques will be sufficient to select the optimum rate.

Action

Text will be added to include a fourth pumping rate in the step drawdown test. Pump test design parameters will be checked and altered as necessary to include this additional capacity.

39 Appendix A, Page [A] 2-23 Lines 28 - 34 - The paragraph should be revised to state: "If the test is interrupted at any point so that the aquifer begins to recover, then the aquifer will be allowed to fully equilibrate and the pump test will be repeated from the beginning (time=0).

Response

DOE concurs. EPA should be aware that such an interruption and restarting of the test will cause schedules to slip.

Action

Stated text will be added.

40 Appendix A, Page [A] 2-24, Line 10 - Should read "The maximum duration of a single test....".

Response

DOE concurs.

Action

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Text will be modified.

41 Appendix A, Page [A] 2-24, Lines 17 - 28 - The paragraph should be revised to state: "If the test is interrupted at any point so that the aquifer begins to recover, then the aquifer will be allowed to fully equilibrate and the pumping test will be repeated from the beginning (time=0).

The data which is obtained from this pump test is to be used in the calibration of the ground water model which is intended to predict ground water flow and transport characteristics for a very long period of time.

Additionally, as stated in the work plan, the aquifer which has been affected is a very sensitive resource. As such, it is critical to maximize the accuracy of data when possible.

Response

DOE concurs that the pump test should be rerun if interrupted. EPA should be aware that such an interruption and restarting of the test will cause schedules to slip.

Action

Stated text will be added.

42 Appendix A, Page [A] 3-3 Line 37 - An additional step should be inserted between items 9 and 10. This item should discuss validation of the ground water model over time.

Response

The approach to model revision has changed, thus the comment is no longer relevant. See response to Comment #6.

Action

See action to Comment #6.

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43 Appendix A, Page [A] 3-3 Line 40 - Should read "(1) the model's original calibration was correct, ...".

Response

The approach to model revision has changed, thus the comment is no longer relevant. See response to Comment #6.

Action

See action to Comment #6.

44 Appendix A, Page [A] 3-4 Lines 28 - 30 - DOE should explain why kriging will be used over min curve.

Response

The text states that the previous calibration effort (DOE 1990) found that Kriging produced the most accurate and realistic contour plots. However, an evaluation of various gridding options will be performed as part of the data evaluation process and a particular method will be selected based upon this evaluation (see Page [A] 3-4, line 29).

Action

No action required.

45 Appendix A, Attachment B, Page [A] B-2 - The rationale and purpose for implementing this procedure has not been stated in Appendix A. The coordination of this procedure with the rest of the procedures in the field test should be clarified.

Response

DOE concurs.

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Action

Text will be revised.

46 Appendix A, Attachment B - All of the procedures to implement this test are not included in this attachment including: the collection of water level data utilizing the float/recorder and the transducer/data logger and the collection of head measurements to correlate with the transducer collected data.

Response

DOE concurs.

Action

These procedures will be added to Attachment B.

47 Appendix B, Section 1.3, Page [B] 1-2, Lines 25 - 26 - This section should differentiate between system problems and system optimization as discussed in Section 5.3, Page 5-3, of the DMEPP.

Response

DOE concurs.

Action

Text will be added.

48 Page [B] 3-10, Lines 26 - 37 - Data should be displayed graphically in addition to statistics in order to visually display any possible trends.

Response

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The program includes graphical depiction of data (see Section 3.3.1, Bullets 2, 4, and 8; Section 3.3.2, Bullet 3; and Section 3.3.3, Bullet 3).

Action

No action necessary.

REVIEW COMMENT FORM

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Reviewer: U.S. EPA Doc. Status: Dr

1. Section 1.4, Page 1-5, Line 32

The Design, Monitoring, and Evaluation Program Plan (DMEPP) lists five specific reports to be completed during this program but does not provide submittal dates. The DMEPP should, at a minimum, state how many days after work plan approval each document will be submitted.

Response

DOE concurs.

Action

Text will be revised to include maximum number of days for preparation of the deliverables following completion of the pump test.

2. Section 1.4, Page 1-7, Figures 1-1

The South Plume Modeling Report is not listed as a deliverable. This document was a deliverable that required revision. It should be listed as a deliverable in the DMEPP and the revised report should be submitted to EPA.

Response

DOE concurs.

Action

Text will be revised to include the South Plume Modeling Report as a deliverable. The revised report will be submitted to EPA.

3. Section 3.1.1, Page 3-2, Line 35

The DMEPP states that it will refine the grid for the solute transport model; however, the DMEPP is designed to validate the ground-water flow model. It is unclear how refining the grid on the

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Reviewer: U.S. EPA Doc. Status: Draf

solute transport model will effect the modelling of the flow field. In addition the grid size should be presented in the DMEPP.

Response

The "solute transport grid" is simply a term for the 78 by 102 cell grid (each cell 125 feet square) which is used for flow and transport modeling at the FEMP. This grid and the "refined grid" (which is a portion of this grid in the south plume area telescoped to a 62.5 square cell size) are used for both flow and solute transport modeling.

Action

Text will be clarified and the grid size will be included.

4. Section 3.1.2, Page 3-2, Line 31

EPA has not received the document referenced in this section (DOE 1992 b, Work Plan for the South Plume Contamination Plume Removal Action).

Response

DOE transmitted the referenced document to the U.S. EPA on August 12, 1992 (Letter from J.R. Craig to J. A. Saric, DOE-2246-92).

Action

No action required.

5. Section 3.1.2, Page 3-4, Line 1

The DMEPP states that the grid for the solute transport model will be refined; however, the DMEPP is designed to validate the ground-water flow model. It is unclear how refining the grid on the solute transport model will affect the modelling of the flow field. In addition, the grid size should be presented in the DMEPP.

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Response

See response to Comment #3

Action

See action to Comment #3.

6. Section 3.1.2, Page 3-4, Line 6

The DMEPP should state the date when the Vertical Capture Letter Report will be submitted to EPA.

Response

DOE concurs.

Action

Text will be modified to include an estimated duration (relative to pump test completion) for preparation of the Vertical Capture Letter Report.

7. Appendix A, Section 2.4, Page [12-15, Line 13

If the piezometer are not completed in separate bore holes, DOE should describe its approach to ensure that accurate piezometric data are collected and that the water levels are characteristic of the screened interval.

Response

Separate boreholes are being prepared.

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Action

Text will be revised to clarify that separate boreholes are being used.

8. Section 2.4, Page [A] 2-15, Line 20

The rationale for abandoning piezometer SPPZ 1, 3, 4, and 5 should be presented. These piezometer may provide for useful long-term monitoring.

Response

DOE concurs that the piezometers may be useful for long term monitoring.

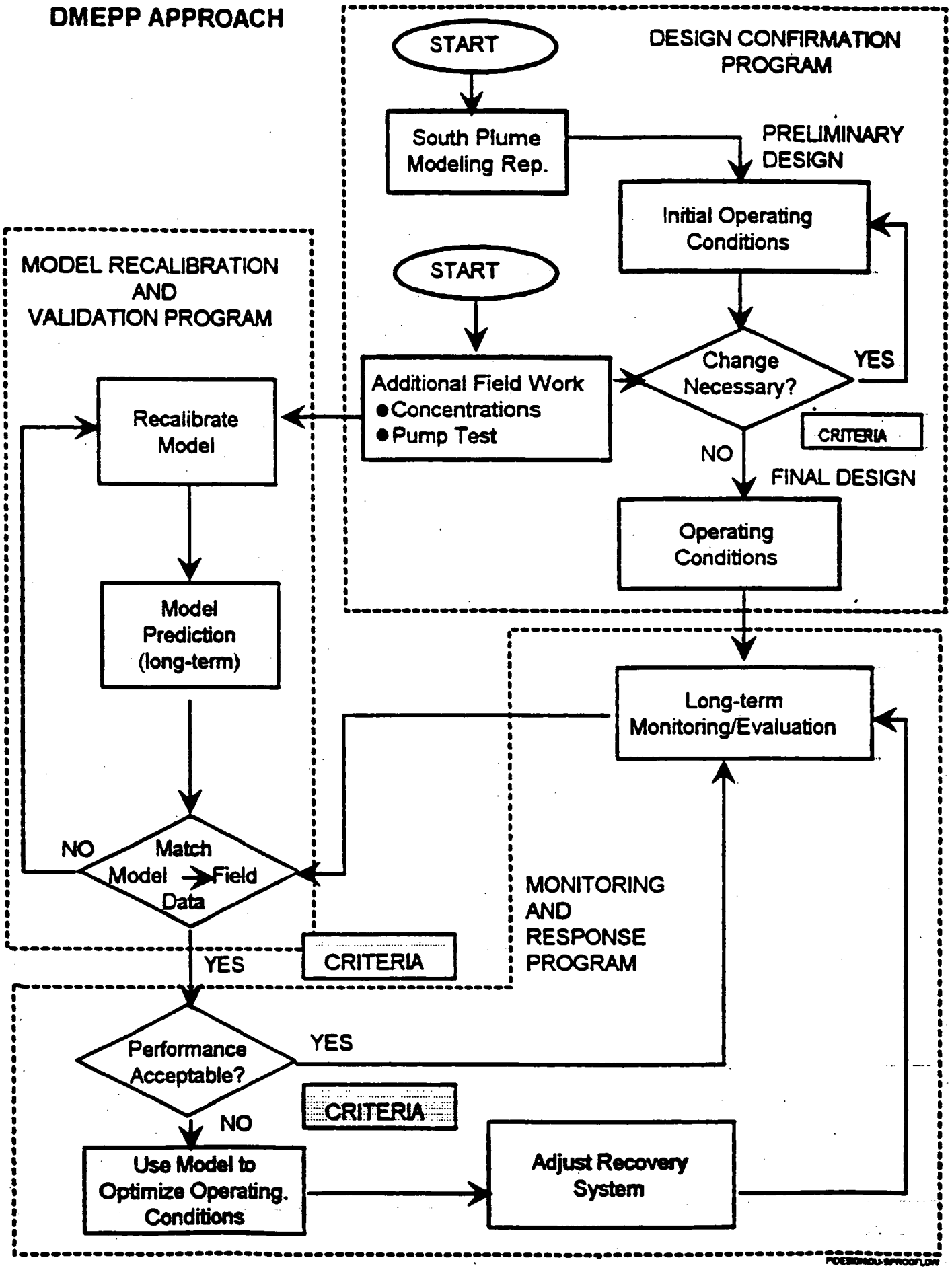
Action

The paragraph containing this sentence will be deleted from the text.

ATTACHMENT A

FLOWCHARTS OF DMEPP AND MODEL IMPROVEMENT PROCESS

DMEPP APPROACH



GLOBAL MODEL IMPROVEMENT