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February 7, 2000

Dr. English C. Percy, Element Manager  
Geohydrology and Geochemistry  
Center for Nuclear Waste Regulatory Analyses  
6220 Culebra Road, Building 189  
San Antonio, Texas 78238-5166

SUBJECT: ACCEPTANCE OF INTERMEDIATE MILESTONE 20.01402.561.010, "MULTIFLO  
VERSION 1.2-LETTER REPORT"

Dear Dr. Percy:

The deliverable, "MULTIFLO User's Manual, MULTIFLO Version 1.2, Two-phase Nonisothermal Coupled Thermal-Hydrologic-Chemical Flow Simulator" was submitted to me by your letter dated January 12, 2000. This submission was in fulfillment of Intermediate Milestone 20.01402.561.010, "MULTIFLO Version 1.2-Letter Report." The deliverable was received on January 13, 2000, one day before its due date. The U.S. Nuclear Regulatory Commission staff has completed its technical and programmatic review of the subject document. This document is acceptable and fulfills the requirements set forth in the FY 2000 Operations Plans for the Evolution of the Near-Field Environment Key Technical Issue.

I agree with your observation that the U.S. Department of Energy (DOE) has consistently demonstrated a high interest in obtaining and using MULTIFLO. NRC has provided DOE copies of MULTIFLO Version 1.2 $\beta$  for its use in support of Nuclear Waste Policy Act activities. We anticipate sending DOE the substantially improved Version 1.2 code and user's manual. However, before we release the user's manual to the public or send the manual to DOE several changes should be made to the manual. Our comments and suggested corrections are provided below. Your changes should be supplied as change pages, rather than reproducing the entire report. Please provide me a copy of the code (both source and executable versions) and the user's manual in appropriate electronic formats when you submit the corrections. These actions will facilitate the transfer of the MULTIFLO Version 1.2 code and its manual to the DOE.

The reference in the text for Wolery (1983) on pages 1-4 and B-6 may need to be changed to reflect the source of the database. Wolery (1992) is cited as the reference for the database (page 6-1). The number of lines of code are provided for Version 1.2 $\beta$  (page 1-5). The number of lines of code in the MULTIFLO code, and METRA, and GEM subroutines should match the 1.2 version of the code. Some of the descriptions of the keywords for the code do not match the capability of the 1.2 version of the code. For instance, PLOT (page 2-52) and PLTL (page 2-112) are valid for the unstructured grid capability of the Version 1.2 code. However, the text indicates these keywords are only valid for the structured grid. The description of the BCON keyword on pages 2-75 and 2-77 is unclear. The text indicates that a zero flux boundary condition is possible, but the flux boundary condition (IBNDTYP=2) is stated as not implemented. The discussion between a zero gradient boundary (a flux boundary condition equal to 0) and flux boundary condition should be clarified. The initial screen display for

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Dr. English C. Pearcy

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METRA (page 4-1), GEM (page 4-2), and MULTIFLO (page 4-4) should be consistent between the status of the copyright and the version of the code. If Version 1.2 has been copyrighted then the copyright date should be updated. If Version 1.2 has not been copyrighted, then the text and screen display should indicate which version has been copyrighted and the status of copyright for Version 1.2. On page A-9 the reference is [sic] Nnarasimhan (1982). On page B-16 Pantakar (1980) is listed in the references, but is not cited in Appendix B.

If you or the author of the deliverable have any questions, please contact me at (301) 415-6652.

Sincerely,  
[Original signed by:]  
Bret W. Leslie  
Program Element Manager  
High-Level Waste & Performance  
Assessment Branch  
Division of Waste Management  
Office of Nuclear Material Safety  
and Safeguards

cc: J. Linehan  
B. D. Meehan

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