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April 15, 1984

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Dr. Richard Codell
Geotechnical Branch
Division of Waste Management
U.S. Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, MD   20910

WM Record File
A-1166

WM Project 10, 11, 16
Docket No.
PDR ✓
LPDR B, N, S

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Dear Dr. Codell:

Enclosed is the monthly report for FIN A-1166, Maintenance of
Computer Programs, for March 1984.

Please call or write if you have any questions or comments.

Sincerely,

Robert M. Cranwell

Robert M. Cranwell, Supervisor
Waste Management Systems
Division 6431

RMC:6431:jm

Enclosure

Copy to:
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1134

PROGRAM: Maintenance and Validation   FIN#: A-1166
              of Computer Programs

CONTRACTOR: Sandia National Laboratories   BUDGET PERIOD: 10/83 -
                                                               9/84

NMSS PROGRAM MANAGER: R. Codell   BUDGET AMOUNT: $130K

CONTRACT PROGRAM MANAGER: R. M. Cranwell   FTS PHONE: 844-8368

PRINCIPAL INVESTIGATORS: P. A. Davis   FTS PHONE: 846-5421

PROJECT OBJECTIVES

The objective is a maintenance task that will ensure that the
Sandia computer programs remain consistent with current operat-
ing systems, are as error-free as possible, and have up-to-date
documentation for NRC.   There is also a validation assessment
task to identify real physical situations which could provide
data for validation of the Sandia computer program.

ACTIVITIES DURING MARCH 1984

Verification and Field Comparison of SWIFT

The microfiche containing the results from the example problems
included in the "Verification and Field Comparison of the
Sandia Waste Isolation Flow and Transport Model (SWIFT)" report
was forwarded to NRC on March 9, 1984.   The microfiche will be
reproduced by NRC and attached to the final printing of the
report.   The results included in this microfiche were produced
using version 12.83 of the SWIFT II computer code.

SWIFT II Version 12.83

A magnetic tape containing Version 12.83 of SWIFT II and the
verification and field comparison data sets was received from
Geotrans, Inc.   The computer code has been installed on the
Sandia computer system and verification of the example problems
is expected to be continued into April.   In addition to the
12.83 source listing, a cross referenced microfiche copy of the
code was received.   A copy and description of all 301 updates
that have been added to the SWIFT 4.81 Release to create the
12.83 Version of SWIFT II was also received from Geotrans.
These updates will be forwarded to NRC along with the SWIFT II
computer code following completion of the verification and QA
procedures at Sandia.

The SWIFT II computer code has been implemented on the Harris
H-800 computer, which is now being used by Geotrans/Houston in
addition to a CDC-176.   Insofar as quality control is
concerned, this transfer has been extremely useful in three
respects.   First, various hard-coded machine-dependent tests,

which were based on word length and maximum and minimum exponents, as prescribed for CDC machinery, were scattered throughout the code. To facilitate machine independence, machine-dependent variables were defined up front in a single location and were passed to the various tests through a labelled COMMON. Second, because of the shorter Harris word Length (48-bit double word) as compared to CDC (60-bit single word), unsuspected significance-loss problems occurring both within the Gaussian elimination and within dual-porosity source-term evaluations were isolated and corrected. This exercise has been extremely valuable in that, sooner or later, these significance-loss problems would have occurred on CDC machinery. Transfer to the Harris simply permitted their early detection.

Third, it has been found on several minicomputers (Harris, Prime and VAX) that SWIFT-like codes (SWIFT, SWIPR and SWENT) have word-boundary errors. Such errors arise whenever double precision is introduced to obtain the necessary accuracy for the real-variable computations. During the month of April, the solution to these problems will be reviewed. The result will be a new baseline which will have a high degree of machine dependence.

NWFT/DVM Verification

The report "Verification of the Network Flow and Transport/ Distributed Velocity Method (NWFT/DVM) Computer Code" has been retyped incorporating the review comments from Robert Cranwell that clarify many of the NRC comments. Final management approval is being processed and the camera-ready copy will be forwarded to NRC on April 15, 1984.

Generalized NWFT/DVM

Comparison of the Generalized and Fixed Network Version of NWFT/DVM is continuing. All updates have been identified and several runs with the first update sets have been performed. So far, no differences in the output data from the original and updated version have been found. This comparison is continuing with additional updates.