

QUALITY ASSURANCE TASK PLAN NUMBER 7

SUBTASK 1.5 UPDATE

TECHNICAL REPORT NUMBER 9

ANALYSIS OF DATA AVAILABLE FOR THE EVALUATION

OF FLOW AND TRANSPORT AT YUCCA MOUNTAIN

WATER, WASTE AND LAND, INC.

APRIL, 1987

APPROVED:
(TASK MANAGER)

Tom Sniff

DATE: 5-12-87

APPROVED:
(SUBCONTRACTOR MANAGEMENT)

Lyle A Davis

DATE: 5/12/87

APPROVED:
(NWC QA DIRECTOR)

DATE:

APPROVED:
(NWC PROJECT MANAGER)

DATE:

8709280342 870624
PDR WMRES EECNWC
D-1021 PDR

WATER, WASTE AND LAND, INC.
NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS
TASK DESCRIPTION SUMMARY #4

1.0 TASK TITLE: Capillary Barrier Effects at Hydrogeologic Unit Interfaces
 in the Unsaturated Zone at Yucca Mountain

2.0 OBJECTIVES:

The primary objective of this study is to estimate the relative importance of capillary barriers as mechanisms to divert flux laterally at interfaces of materials with differing hydraulic properties.

3.0 TECHNICAL APPROACH:

The importance of capillary barriers will be investigated using a two-dimensional, finite element computer model for variably saturated flow. It is anticipated that the calculations will be performed with the UNSAT2 code. Initially, simple flow systems (non-fractured) will be modeled to demonstrate capillary barrier effects without introducing the complexities of fracture versus matrix flow. Next, more complex flow regimes, typical of those expected at Yucca Mountain, will be considered. Sensitivity to anisotropy within the flow regime will also be investigated.

4.0 PRODUCT DESCRIPTION:

The product which will be delivered will consist of a Technical Report which describes the computer modeling results obtained. The report will include substantial graphical information regarding the finite element mesh used in the simulations as well as results obtained. In addition to providing information regarding the effectiveness of capillary barriers as mechanisms for diverting flow away from the repository, it is felt that this report will provide insight into the difficulties that modelers will face in developing complete mathematical models of the unsaturated zone at Yucca Mountain.

5.0 TASK ASSIGNMENTS:

Lyle Davis has been assigned primary responsibility for this task. He will be in charge of developing the simulations to be performed and for reviewing the results. He will also be responsible for writing the draft report. Managerial and Quality Assurance activities will be coordinated by Lyle Davis, NNWSI Project Manager. Prior to issuance, the draft report will be reviewed by Dr. David McWhorter, NNWSI Project Director.

6.0 MANPOWER RESOURCES:

The following summarizes our estimates of manpower resources required to complete the proposed task:

| <u>Title</u> | <u>Name</u> | <u>Hours</u> |
|------------------|--------------------|--------------|
| Project Director | David B. McWhorter | 8 |
| Sr. Engineer | Lyle Davis | 120 |
| Engineer | Thomas Sniff | 100 |
| Clerical | Donna Loomis | 20 |
| Draftsman | Rodney Grebb | 20 |

7.0 SCHEDULE:

This report is currently scheduled to be issued as part of the May 31, 1987, report update for Subtask 1.5. However, to insure that two other reports scheduled for release at that time (Recharge Review as outlined in TDS Number 1 and Tracer Review as outlined in TDS Number 2) are completed on time, it is anticipated that this report will be issued later than May 31. The schedule for the report is summarized in the following:

June 1, 1987 Complete computer analyses

June 15, 1987 First draft of final report completed

June 16, 1987 Senior Engineer review of draft report

June 20, 1987 Second draft of final report completed

June 25, 1987 Project director review of report

June 30, 1987 Final Draft Report issued to NWC for review and submission to the NRC.

8.0 QUALITY ASSURANCE TASK PLAN:

This section of the Task Description Summary (TDS) is dedicated to a description of Quality Assurance (QA) activities envisioned during performance of this task. It is essentially a modification of the QA Task Plan format specified previously by NWC and includes only those items which are not specifically covered in the previous sections. This task has been designated as QA Task Plan Number 8.

8.1 QA APPLICABILITY

This task has been assigned a QA level of 1. This QA level was assigned based on the assumption that the technical reports issued under Subtask 1.5 may be used as the bases for various decisions regarding site characterization. QA records for this task will include:

1. Task Description Summary (including QA Task Plan)
2. Justification for data parameters used in simulations
4. Initial Draft Report
5. Check-list of QA activity
6. Draft Final Report
7. NWC/NRC Comments Regarding Draft Final Report
8. Final Report
9. Completed Record of Report/Analysis Review Form

8.2 DATA AND DOCUMENTATION HANDLING PROCEDURES

Records of the data include the original document, a hard copy of the original data, a hard copy of the data as it appears in the data base, and magnetic media containing the data base. Files containing the hard copies of the data, as well as the magnetic media and original documents remain at the offices of Water, Waste and Land, Inc.

8.3 DATA REDUCTION, VALIDATION, AND REPORTING PROCEDURES

Data which is used in the simulation will be based on data which exists in the data base which is currently maintained as part of this project. Since the simulations are not designed to model the entire flow regime but rather to demonstrate how capillary barriers may effect the flow regime, the data used will be somewhat arbitrary in nature and data reductions will not be necessary. The data selected for inclusion in this study will be representative of parameters which exist at the site.

8.4 PERFORMANCE AUDITS

A performance audit will be performed when the first draft of the technical report is completed.

8.5 ASSESSMENT PROCEDURES FOR DATA/REPORT ACCEPTABILITY

The draft technical report will undergo management review for adequacy of the topic coverage and overall responsiveness to contractual requirements.

8.6 CORRECTIVE ACTION

Should corrective action be indicated by any of the QA procedures and reviews, personnel responsible for a given task will be responsible for determining the nature of the corrective action, subject to both management and QA review. All corrective action will be documented.

8.7 QA REPORTS TO MANAGEMENT

The QA file will be available for management review at the end of the performance audit and at the completion of the task. A task plan will be provided. In addition, QA activities related to this task will be listed in monthly and annual summary QA reports.

8.8 TASK PLAN REVIEW AND APPROVAL

Level 1 and 1-A task plans shall be reviewed and approved prior to issuance by: Task Manager, Subcontractor Management, NWC QA Director, and NWC Project Manager. Approval signatures and dates appear on the following page.

QUALITY ASSURANCE TASK PLAN NUMBER 8

SUBTASK 1.5 UPDATE

TECHNICAL REPORT NUMBER 10

CAPILLARY BARRIER EFFECTS AT HYDROGEOLOGIC UNIT INTERFACES

IN THE UNSATURATED ZONE AT YUCCA MOUNTAIN

WATER, WASTE AND LAND, INC.

APRIL, 1987

APPROVED: *Lyle A Davis*
(TASK MANAGER)

DATE: 5/12/87

APPROVED: *Lyle A Davis*
(SUBCONTRACTOR MANAGEMENT)

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