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**Summary Report to EES-13, Yucca Mountain Project:
Outcomes of Task Order 52 between
Sumner Associates and Los Alamos National Laboratory**

by Roger Eckhardt

22 September 1997

LA-13262-MS: Summary and Synthesis Report on Radionuclide Retardation for the Yucca Mountain Site Characterization Project.

Revision 0: This approximately 290-page report was one of the main projects I worked on with this Task Order. The report was developed from the original Yucca Mountain Site Characterization Program (YMP) milestone report (3784M), which had been cobbled together in August 1996 from a series of previous reports and additional contributions from 7 different authors (at and outside LANL). As a result, the report contained a great deal of repetitive material and lacked transitions and introductory material. Using the original report and material from additional YMP papers, I wrote an introductory chapter and then removed repetitive material and accomplished a high-level edit of the other chapters, including editing and reformatting of figures and tables to make the entire report have a consistent look. I also checked the material and worked with the original authors to rectify unclear passages or mistakes.

After the initial approval, I used this DRAFT version to generate pdf files of all sections, which were then placed on the EES-13 web site so that other scientists could access the material.

The batch sorption data, on which major sections of the report were based, were contained in very large MS Excel spreadsheet files. To help the EES-13 technical database person deliver this material to the YMP database in Nevada, I reformatted the files in an electronic form acceptable to the people handling the database and sent these files to them electronically.

Revision 1: In July, before final approval of the Rev. 0 of the document, the authors decided to remove some of the figures. Eliminating the figures necessitated a revision of much of the document (changing page and figure numbers and cross references).

Revision 2: In August, with the document ready to be sent to the printers, the authors decided, based on a comments from DOE reviewers, that the document was too large as a single volume. In addition, it was indicated that two other milestone reports needed to be included with this report to make it a complete summary of the research. As a result, I have been breaking the material into an eight-volume work, with two of these volumes containing the new material. I have also been carrying out the same high-level edit and formatting work on the new volumes as I did on the original material. Currently, this work is approximately 60% complete.

Article for Public on Los Alamos YMP Research.

We learned that the *Los Alamos Science* magazine was interested in doing an issue on plutonium and the actinides. It was decided that this would be the best way to present Los Alamos

research for the YMP to the public. Working with the Los Alamos Science editor, Los Alamos Yucca Mountain managers, and other scientists, a working outline for the issue was developed. It was decided that I would be responsible for two articles: the overview article of the actinides and an article entitled "Environmental Fate and Transport of Actinides," which would present the key findings of the Los Alamos research. For the second article, it was decided what topics to emphasize (e.g., neptunium sorption) and which scientists would contribute drafts of these topics to the article. I obtained introductory material from Julie Canepa and contributions from Inés Triay and Dave Clark, which I began editing. Two other authors have not made their initial contributions yet. In the meantime, *Los Alamos Science* indicated it would not be able to begin work in earnest on this issue until FY98. As a result, it was decided I should focus on getting out more LAMS reports on YMP milestones, and I set my work on this article aside.

LA-13305-MS: Software Requirements, Design, and Verification and Validation for the FEHM Application—A Finite-Element Heat- and Mass-Transfer Code.

This 210-page LAMS report was prepared by combining three milestone reports on the FEHM code, which required re-writing of transition passages, etc. I did an edit of the material as well as bringing consistency to the formatting of tables and figures, and I generated the standard LAMS front matter and cover. This report has been completed and is at the printers. I also generated pdf files of this report, and they have been placed on the EES-13 web site.

LA-13306-M: User's Manual for the FEHM Application—A Finite-Element Heat- and Mass-Transfer Code.

This 150-page LAMS report was prepared from a single-milestone report on the FEHM code and only required a moderate edit of the material, bringing consistency to the formatting of tables and figures, and generating the LAMS front matter and cover. This report has been completed and is at the printers. I also generated pdf files of this report, and they have been placed on the EES-13 web site.

LA-13307-MS: Summary of the Models and Methods for the FEHM Application—A Finite-Element Heat- and Mass-Transfer Code.

This 70-page LAMS report was prepared from a single milestone report on the FEHM code and only required a moderate edit of the material, bringing consistency to the formatting of tables and figures, and generating the LAMS front matter and cover. This report has been completed and is at the printers. I also generated pdf files of this report, and they have been placed on the EES-13 web site.

LA-13352-MS: Summary Report of Chlorine-36 Studies: Sampling, Analysis, and Simulation of Chlorine-36 in the Exploratory Studies Facility.

I prepared this 70-page document for publication as a LAMS report, editing, checking for accuracy, reformatting the text and figures, and working with the original authors to rectify unclear passages or mistakes. The document is now complete and ready for the printers with the exception of 16 computer-generated figures whose files have yet to be supplied by one of the authors. Space has been allocated in the layout for the figures so that they only need to be "pasted" into place.

Technical Review of Five Radionuclide Transport Reports.

In June, I performed a technical review of five reports on radionuclide transport (Radionuclide Species Sorbed onto Tuffaceous Minerals; Report on Microautoradiography Experiments; Reversibility of Radionuclide Sorption; Colloid Transport through Fractured Tuff; Radionuclide Transport through Saturated Fractures), checking the reports for consistency in the technical content.

Curve-fitting and Preparation of Figures on Slope of Volcanic Cone.

To help Frank Perry analyze some of his volcanic cone data and create figures for future publication, Dianne Hyer and I used Mathematica to fit data describing the slope (east, west and north faces) and crater of a volcano in the Yucca Mountain area with sixth-degree polynomials (10th-degree for the crater) that give the elevation as a function of distance from the rim. The curves were plotted along with the original data to show the fit graphically. Then functions giving the angle of the slope were generated for each face, and those curves were plotted as a function of distance from the rim and placed on the same chart so the slope angles of the three faces could be compared.

The Site-Scale Unsaturated Zone Transport Model of Yucca Mountain, Milestone SP25BM3 Report.

I reviewed and edited two-thirds of the chapters of a draft version of this report in preparation for its submittal as a milestone report. This edit included checking references, figures, and text for errors as well as clarifying unclear passages.