May 10, 1977

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Mr. Robert W. Ramsey, Jr., Chief Development Branch Division of Waste Management, Production and Reprocessing U.S. Energy Research & Development Administration Washington, D.C. 20545

Gentlemen:

Attached is the April, 1977, report on three programs being pursued at LASL dealing primarily with shallow land burial of radioactively contaminated solid waste materials.

Sincerely,

LaMar J. Johnson
H-8 Group Leader Environmental Studies

LJJ:mar
Attachment: Report a/s
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(A414, A415, A420)
MONTHLY PROGRESS REPORT
APRIL 1977

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• RADIOACTIVE WASTE BURIAL TECHNOLOGY

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LOS ALAMOS SCIENTIFIC LABORATORY
ENVIRONMENTAL STUDIES GROUP H-8

WORK PERFORMED FOR
DIVISION OF WASTE MANAGEMENT,
PRODUCTION, AND REPROCESSING
U.S. ENERGY RESEARCH
AND DEVELOPMENT ADMINISTRATION
EVALUATION OF TRU-CONTAMINATED WASTE BURIAL SITES, LS-14-1-7A

Documentation of the Biologic Transport Model is progressing rapidly. The draft user's manual was completed in January, as previously reported, and has been used for a number of different simulation runs as a test of its clarity and completeness. These tests, which included the simulations used in the paper "LASL Models for Environmental Transport of Radionuclides", disclosed a few minor errors in the manual. Primarily, the user's manual has been demonstrated to be a clear and useful document.

A draft of the code documentation for the main program of the Biologic Transport Model was received this month. It included 1) additional commentary incorporated in the code itself to clarify operations, 2) enhanced input-output options to facilitate user operation, and 3) a report describing the process and state equations, and code operations. The information provided in the draft is limited to the main program, with the subroutine portions to be described in the coming month.

The final segment of the documentation effort, model documentation, will begin as soon as the code documentation is completed. The last portion will justify the equations and logic, and provide references for sources of data.

Work in support of the validation of the Biologic Transport Model continued with biomass measurement and sample collection trips to selected ecosystem study sites. As in the past, these samples and measurements will be used for comparison with output from the model. This is the primary means for determining the ability of the model to correctly simulate a given ecosystem.

LASL RADIOACTIVE SOLID WASTE DISPOSAL SITES STUDIES, LS-15-1-8-A

The principal activities in this program during the month relate to the geologic mapping project. Detailing the stratigraphic relationships of the Bandelier Tuff requires an understanding of the way in which the tuff was formed. The mapping will produce maps and cross-sections covering the waste disposal sites at LASL, and provide a framework for describing the hydrology
of the sites. A symposium was conducted early in the month, attended by several national experts on volcanic ash deposits. An entire week was spent in discussions, primarily in the field, regarding the nature of specific sub-units of the Bandelier Tuff, and how these sub-units can be expected to change from place to place. Insights gained through that symposium were applied to field mapping during the remainder of the month. Present field work is concentrated on developing a generalized geologic map of the laboratory area. Detailed work will then be done at each major LASL disposal site.

A calibration experiment has been designed for the neutron moisture probe which is used for monitoring boreholes at the main disposal site, Area G. Construction of the experimental facility was completed during April, with the emplacement of ten 83-gallon drums in a shallow trench. These drums will be used as experimental units in which specific soil and moisture systems will be constructed for calibration of the neutron moisture probe. The effect on calibration of various borehole liners will be a major item of interest in these experiments.

A data acquisition system was installed at the meteorological station at Area G. This battery powered system uses a microprocessor to scan data channels, and prepare 12 minute averages and standard deviations. The summary data is then entered on a cassette tape unit, which can later be read directly into a remote computer terminal for data storage and analysis. A graphics display package was developed, to present daily summaries of the data. A sample output, for dummy data, is shown in Fig. 1. The graphs present relative humidity, precipitation, air temperatures (and the difference between them) at two levels, and wind direction and velocity information. This form of graphic presentation increases data utility by aiding pattern recognition.

RADIOACTIVE WASTE BURIAL TECHNOLOGY, LA-20-1-7A

Further work was done on developing instrumentation for analysis of radionuclides in soils. Soil sample standards were
prepared, spiked with 500 pCi/g, 100 pCi/g and no plutonium. The samples were counted using a planar, hyperpure-germanium photon detector and associated electronics. Theoretical detection limits for this system, reported previously, is 5-10 pCi/g of plutonium. However, the local tuff contains sufficient natural radioisotopes whose emissions are similar to plutonium, that actual plutonium detection limits are about 20 pCi/g in a 20 g sample, for a four-hour count. Longer counting will increase the sensitivity of the measurements. Work is currently in progress to characterize the natural radionuclide content of the tuff to aid in interpretation of data on "man-made" nuclides.

Soil permeameters were assembled for measuring the permeability of tuff collected from various locations. The permeameters are standard items, obtained from a soil testing company. Modifications were made to permit sealing solid tuff samples in the permeameter. Water is allowed to flow through the tuff, under a controlled hydraulic head. The rate of flow is then related to the permeability. The columns will also be used for measuring the leaching of stable and radioactive contaminants in prepared soil and tuff cores. Further modifications will permit measurements at various moisture contents, so that moisture and leachate migrations in arid zones can be characterized.
Fig. 1. Graphical display of meteorological data.
April 1977

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