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August 8, 1978

1804 Report

Dr. Goetz Oertel
Director
Division of Waste Products
US Department of Energy
Washington, DC 20545

Dear Dr. Oertel:

Enclosed is the July 1978 Monthly Progress Report. Please call if you have any questions regarding the report or other matters (FTS 843-3331).

Sincerely,

Daniel W. Wilson

Daniel W. Wilson
H-12 Group Leader
Environmental Science

DWW:pdb

Attachment: 1. Monthly Progress Report, July 1978
2. Distribution List

7958

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MONTHLY PROGRESS REPORT
July 1978

LS-1418A
EVALUATION OF TRU-CONTAMINATED WASTE BURIAL SITES

LS-1518A
LASL RADIOACTIVE SOLID WASTE DISPOSAL SITE STUDIES

LS-2018A
RADIOACTIVE WASTE BURIAL TECHNOLOGY

LOS ALAMOS SCIENTIFIC LABORATORY
ENVIRONMENTAL SCIENCE GROUP H-12

WORK PERFORMED FOR

OFFICE OF NUCLEAR WASTE MANAGEMENT
DIVISION OF WASTE PRODUCTS
US DEPARTMENT OF ENERGY

los alamos
scientific laboratory
of the University of California
LOS ALAMOS, NEW MEXICO 87544

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UNITED STATES
ENERGY RESEARCH AND
DEVELOPMENT ADMINISTRATION
CONTRACT W-7405-ENG. 36

LS-1418A EVALUATION OF TRU-CONTAMINATED WASTE BURIAL SITES

M. L. Wheeler, Principal Investigator

The general objective of this program is to develop and apply techniques for the long-term evaluation of the containment provided by LASL waste burial sites containing wastes contaminated with transuranic (TRU) elements. This is being pursued through (1) simulation of the long-term release of radionuclides through the actions of plants, animals, wind, and water on the buried waste, (2) description of the ways in which long-term geologic, hydrologic, and climatic changes will affect such releases, (3) application of the containment evaluation techniques to LASL TRU-waste burial sites, and (4) application of the evaluation techniques and insights to other burial sites, or to other problems involving the long-term containment of hazardous wastes.

Progress to Date

The simulation model BIOTRAN was documented, and work begun on validation of some of the simulation techniques. Types of long-term geologic, hydrologic, and climatic changes have been identified, and some documentation of those changes in the Los Alamos area during recent archaeological periods has been collected. The preliminary evaluation of a LASL waste burial site, performed during CY76 has been expanded to become part of a description of alternatives for long-term management of LASL buried TRU-waste. LASL assisted in the review of a similar document for Idaho National Engineering Laboratory, and developed a description of alternate approaches to environmental impact assessments performed by various DOE contractors for appliaction to the alternatives documents. LASL staff contributed to other work on evaluation of nuclear waste disposal performed for the Nuclear Regulatory Commission, and DOE.

Work During June 1978

A subroutine to simulate partially saturated flow was completed for use with the BIOTRAN plant uptake model. Programming was completed on a desk-top calculator, and is now being implemented on the main computer. Preparations were also made for implementing an expanded version of the flow model for use in analysis of field data.

Various approaches to writing criteria for shallow land burial sites were investigated. Two strategies were identified, dependent on the intended purpose. Initial site selection must rely on existing hydrologic, geologic, and sociologic information which is readily available at a regional scale. Evaluation of an existing site, or of a prospective site, requires collection of additional field data, simulation of site performance, and an assessment of engineering techniques which can be used to mitigate certain site shortcomings.

LS-1518A LASL RADIOACTIVE SOLID WASTE DISPOSAL SITE STUDIES

M. L. Wheeler, Principal Investigator

The general objectives of this program are to provide a system of surveillance for any possible environmental releases from LASL radioactive waste burial sites, and to collect sufficient long term data to evaluate the significance of such releases. The specific objectives are (1) maintenance of a continuous record of all former and current operational or research activities at the disposal sites, (2) determination of the current radionuclide content of the sites, (3) identification of the current distribution of radionuclides in the burial site environment, (4) description of the geologic, biologic, and hydrologic pathways by which releases might occur, and (5) testing, followed by implementation, of various methods for environmental surveillance at the burial sites.

Progress to Date

Information is being collected for an update of the Source Document on LASL waste burial sites, scheduled for the end of this fiscal year. Tabulation of the radionuclide contents of disposal shafts was completed. Samples were collected and analyzed to determine the distribution of radionuclides in plants and soils at LASL disposal sites. Field work on the geologic mapping project is nearly complete, and transfer of the data to a map has begun. Calibration of the neutron moisture probe was completed, and measurements continued of the moisture distribution above and around disposal sites. All samples from the horizontal core beneath a LASL waste disposal pit have been analyzed; results indicate no migration of radionuclides from the pit.

Work During June 1978

Additional field work was performed on the geologic mapping project. Considerable time was spent trying to establish the location of a fault which had been identified by previous investigators. Field evidence now casts doubt on the existence of the fault, indicating that the plateau may be more structurally stable than previously thought. Because such faults have long-term implications regarding adequacy of disposal sites at LASL, further work is planned on that and other similar structures near disposal sites.

Additional data was developed to define stream channel slopes at LASL. Abrupt changes in slope, related to differences in the erodiability of gelogic units, will aid in the interpretation of the geologic mapping data.

Measurements were made of the flux of water and tritiated water from the soil over a disposal pit at Area G. Additional measurements of the soil moisture changes during the study period showed that, within experimental error, all infiltrated precipitation was evaporated, and additional soil drying occured. Tritium fluxes decreased during the study period, perhaps due to

declining soil moisture. The techniques used will be employed to obtain longer term data on tritium flux from the burial pits.

Publications/Presentations

Purtymun, W. D., Wheeler, M. L., Rogers, M. A., Geologic Description of Cores from holes P-3 MH-1 through P-3 MS-5, Area G, Technical Area 54, LA-7308-MS, May 1978.

LS-2018A RADIOACTIVE WASTE BURIAL TECHNOLOGY

J. W. Nyhan, Principal Investigator

The objective of this continuing program is to improve the technology related to the shallow land burial of radioactive waste. The need for modigying present burial techniques to provide a more effective means for the disposal of waste generated by the nuclear power industry has been recognized for some time. Several problem areas are pursued in this endeavor, including modifications to burial sites, modified operational procedures, altered site selection procedures, and improved monitoring. This program pays particular attention to an examination of radionuclide mobilization and migration mechanisms, developing and improving monitoring techniques around burial sites, the development of engineering methods to improve waste containment, and the construction of a waste burial demonstration facility.

Progress to Date

Progress has been made in several research areas through May 1978. Drilling operations are in progress at Area T to sample tuff beneath a previously used liquid radioactive waste disposal bed. Concurrently, a hyperpure germanium (HpGe) detector system is being developed to analyze tuff samples, such as those collected at Area T, for plutonium, americium, and thorium. Tuff leaching studies have been initiated to determine the effects of various non-radioactive components of waste solutions on the migration of radionuclides through Bandelier Tuff. Feasibility studies have been initiated to characterize erosion, vertical migration, and plant uptake of radionuclides near waste disposal pits, using stable-elements as chemical analogs of radioactive contaminants and neutron activation techniques. We have also initiated evapotranspiration studies, using the heat balance equation, the profile method,

and the combination method, to provide information on one of the driving variables influencing tritium release from disposal pits and near-surface distribution of other radionuclides. The engineering studies of waste containment practices (University of Texas subcontract; annual report) has generally involved a survey of shallow land burial techniques for radioactive and non-radioactive waste through literature surveys and actual disposal site visits.

Work During June 1978

Several specific accomplishments were made during June 1978, as related to the research areas discussed above. The drilling operations at Area T were continued. The second hole in a second waste disposal pit was sampled to a depth of 31 m and the resulting samples were analyzed for their water content. Preparation of tuff core samples for tuff leaching experiments was completed recently and are currently being encased in plastic. The computer system and additional radionuclide counting equipment obtained for the hyper-pure germanium - GE (Li) system is being developed to assay tuff samples for transuranics and high-energy gamma-ray emittors. Design of an automated sample changer system, which will become part of this tuff assay system, was initiated. A procedure is being developed for rapid stripping of plutonium from tuff samples by leaching followed by anion exchange collection of the mobilized plutonium.

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