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IN REPLY
REFER TO: H12-78-290
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June 12, 1978

Dr. Goetz Oertel
Assistant Director for Waste Handling
Division of Waste Management
US Department of Energy
Washington, DC 20545

1802 Report

Dear Dr. Oertel:

Enclosed is the May 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, May 1978
2. Distribution List

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MONTHLY PROGRESS REPORT
May 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

DIVISION OF WASTE MANAGEMENT
US DEPARTMENT OF ENERGY

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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 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 application 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 April 1978

A modified version of BIOTRAN was implemented, permitting more efficient use of the model. Work continued at Colorado State University on a critical review of the model and development of an information data base. Advanced graphical techniques developed at LASL were linked to the model. Literature was collected describing the archaeological record in the Los Alamos area. This information is being used, in part, to describe previous climatic conditions in the area. A review meeting was attended regarding the INEL TRU-waste management alternatives document. LASL strongly encouraged the abandonment of "man-rem" as an indicator of the impact of various management alternatives, in favor of concepts indicating actual damage, such as risk of cancer or life-shortening. However, the time schedule on the Idaho document does not permit such a modification at this point, and such modifications will have to wait for either the environmental impact statement or other alternatives documents.

Publications/Presentations

1. Gallegos, A. F. and Johnson, L. J., LASL Models for Environmental Transport of Radionuclides in Forests; Modeling and Simulation Conference, Ninth Annual. University of Pittsburg, PA, April 1978.

   Synopsis: A detailed discussion was presented on simulated plant succession that allowed for description of forest succession over extended time periods. The radionuclide transport modeling capability was illustrated through simulation of plutonium activity held in biomass at different states of succession.

2. Wheeler, M. L., Nuclear Energy and Waste Disposal; Seminar sponsored by the University of South Dakota, Environmental Law Forum, Vermillion SD, April 1978.

Synopis: The paper outlined the nature of radiation (both natural and manmade), the sources and types of wastes generated within the nuclear fuel cycle, the current inventory of wastes and the plans for their disposal, and how the various wastes impact on man and the environment.

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. Nearly 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 April 1978

Additional information was collected on activities during 1960 at a now inactive disposal site, Area A (Fig. 1). Other information was obtained regarding current operations for inclusion in the update of the Source Document. Data on the radionuclide content of plants and soils at disposal Area C (Fig. 1) was reviewed, and organized for inclusion in a final report on the sampling study. That data will serve as input to the design of a follow-up study at the area, to determine subsurface distribution of water and radionuclides. A review was completed of data collected from moisture monitoring holes at the operational site, Area G. A few of the holes were selected as representative, and routine monitoring of the remainder was discontinued. The savings in time will be used to establish moisture monitoring holes at other disposal sites. Adjustment of a zoom transfer scope was completed and transfer of geologic mapping data from aerial photographs to topographic sheets was begun. Work continued on a field study of the orientation and distribution of joints in the Bandelier tuff. Study locations are scattered throughout the Los Alamos area, with emphasis on areas near disposal sites. The data is being used to determine, if possible, the relationship between the jointing and faulting in the Los Alamos area. Such information is important in determining the long-term containment of the LASL burial sites. Additional data was returned on the radionuclide content of cores removed from beneath Pit #3, Area G. Results from plutonium, americium, uranium, and cesium analyses indicate no radionuclide migration was occured to the depths of the cores, which varied from 0.5 to 6 meters beneath the pit.

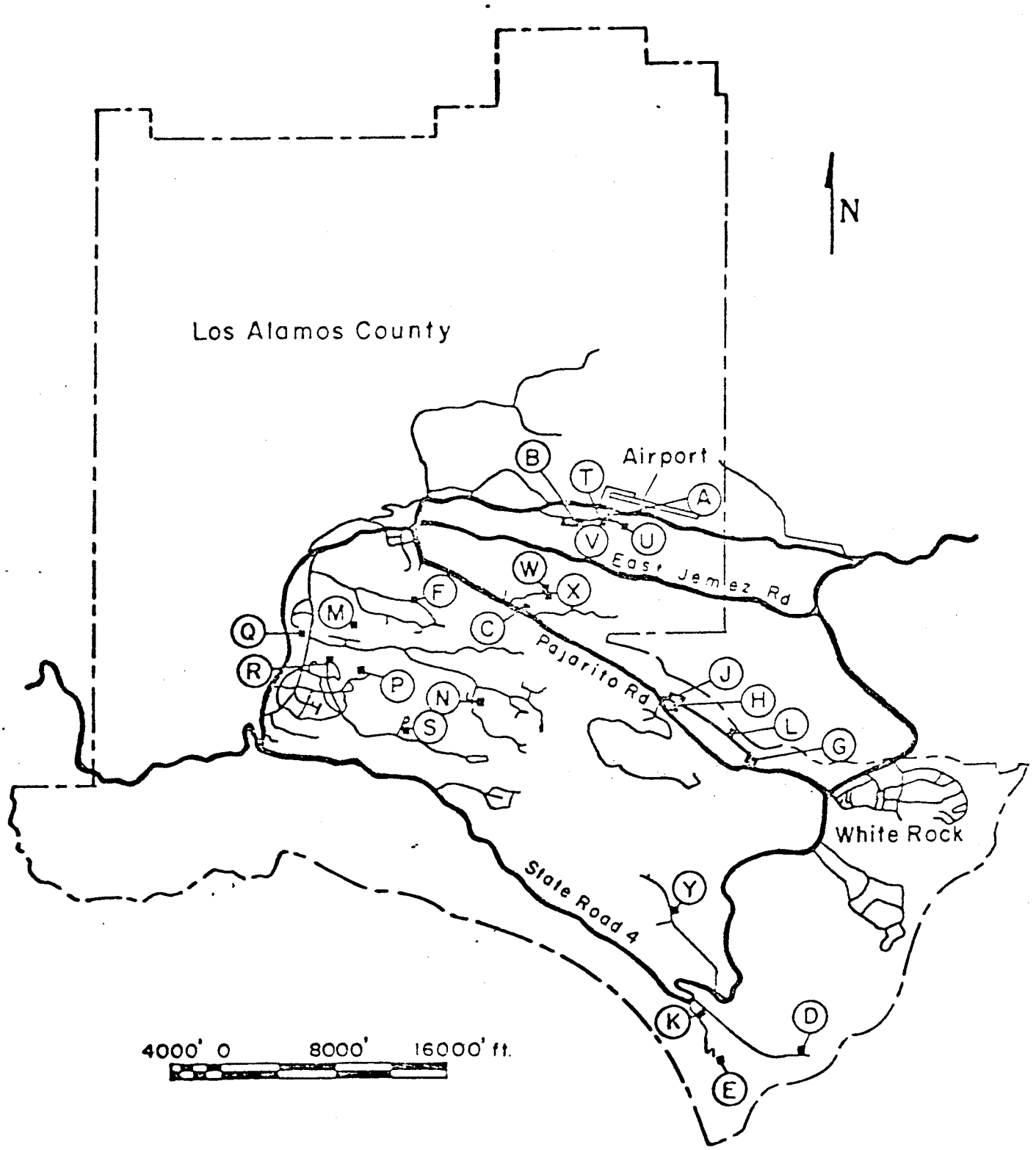

Fig. 1.
Map of Materials Disposal Areas.

Publications/Presentations

1. Abeele, W. V., The Influence of Access Hole Parameters on Neutron Moisture Probe Readings, LA-7241-MS, April 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 modifying 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 parallel general approaches 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 has been made in several research areas through March 1978. Drilling operations are in progress at Area T (Fig. 1) 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 nonradioactive 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 nonradioactive wastes through literature surveys and actual disposal site visits.

Several specific accomplishments were made during April 1978, as related to the research areas discussed above. We completed drilling our first hole in Pit 1 at Area T to a depth of 31 m and analyzed the 200 samples collected for their water content; elevated water levels were found in and around tuff fracture zones, which contained large amounts of fine-textured particles with high water-holding capacities. More tuff samples were collected adjacent to Area T and cut into 12-cm core segments with a rock saw for the tuff leaching experiments. A special plastic sample container is currently being designed for the hyperpure germanium detector system transuranic analyses, and a preliminary 24-hour plutonium assay procedure was developed which will lower the plutonium detection limits on this counting system to less than 0.5 pCi Pu/g. A collector was constructed to collect soil adhering to plant surfaces as part of our project to determine the role of plant uptake in disposal areas using stable element tracers. Dewpoint hygrometers for the meterological tower at Area G (Fig. 1) were ordered to get the evapotranspiration studies started, and the theoretical preparatory work involved in the application of evapotranspiration formulae to the Los Alamos environment was completed.

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