1369 General

OPERATING COSTS AND EQUIPMENT

Division of Waste Management and Transportation

LS-15-1-7A

DATE

May 14, 1975

1. BUDGET ACTIVITY NO. RU-06-02	3. PROJECT TITLE LASL/USGS RELATED TRU SOLID WASTE DISPOSAL SITE STUDIES
2. SITE Los Alamos, New Mexico	
4. FREQUENCY OF PROGRESS REPORTING: [ ] 1. Monthly [ ] 2. Quarterly [ ] 3. Semi Annual [X] 4. Annual	5. PERSON IN CHARGE: LaMar J. Johnson — PRINCIPAL INVESTIGATOR(S): T. K. Keenan, M. A. Rogers
9. CONTRACTOR: Los Alamos Scientific Laboratory	10. CONTRACT NO.: 74-5-ENG-36 — 15. LEAD BRANCH: WO
7. WORKING LOCATION: Los Alamos, New Mexico	12. WASTE APPLICATION: AEC [X] Industry [ ]
8. TYPE: 1. Industry [ ] 2. AEC Lab [X] 3. Educational [ ] 4. Government [ ] 5. Other Non-Profit [ ]	13. TYPE OF WASTE: 1. High-Level [ ] 2. Solid-Transuranium [X] 3. Solid-Fission Product [ ] 4. Tritium [ ] 5. Gaseous or Airborne [ ] 6. Other [ ]
	18. PROJECT TERM: 1. Open [X] 2. Limited [ ] From ____ (date) To ____ (date) Funding Termination ____ (date) Reference:

	July 1974 thru June 1975	July 1975 thru June 1976	July 1976 thru September 1976	FY 1977
1. MAN YEARS				
Scientific	1.0	1.0	0.25	2.0
Other Direct	0.5			2.0
Total Direct	1.5	1.0	0.25	4.0
2. COSTS				
a) Direct Salaries	28	26	7	84
b) Materials & Services	6	3	3	50
c) Subcontracts		75	17	25
Total Direct Costs	34	104	27	159
d) Indirect Costs	14	12	3	41
e) Fee				
Total Costs (In Thousands)	48	116	30	200
3. EQUIPMENT a) Budget Activity No. 35-RU-06				

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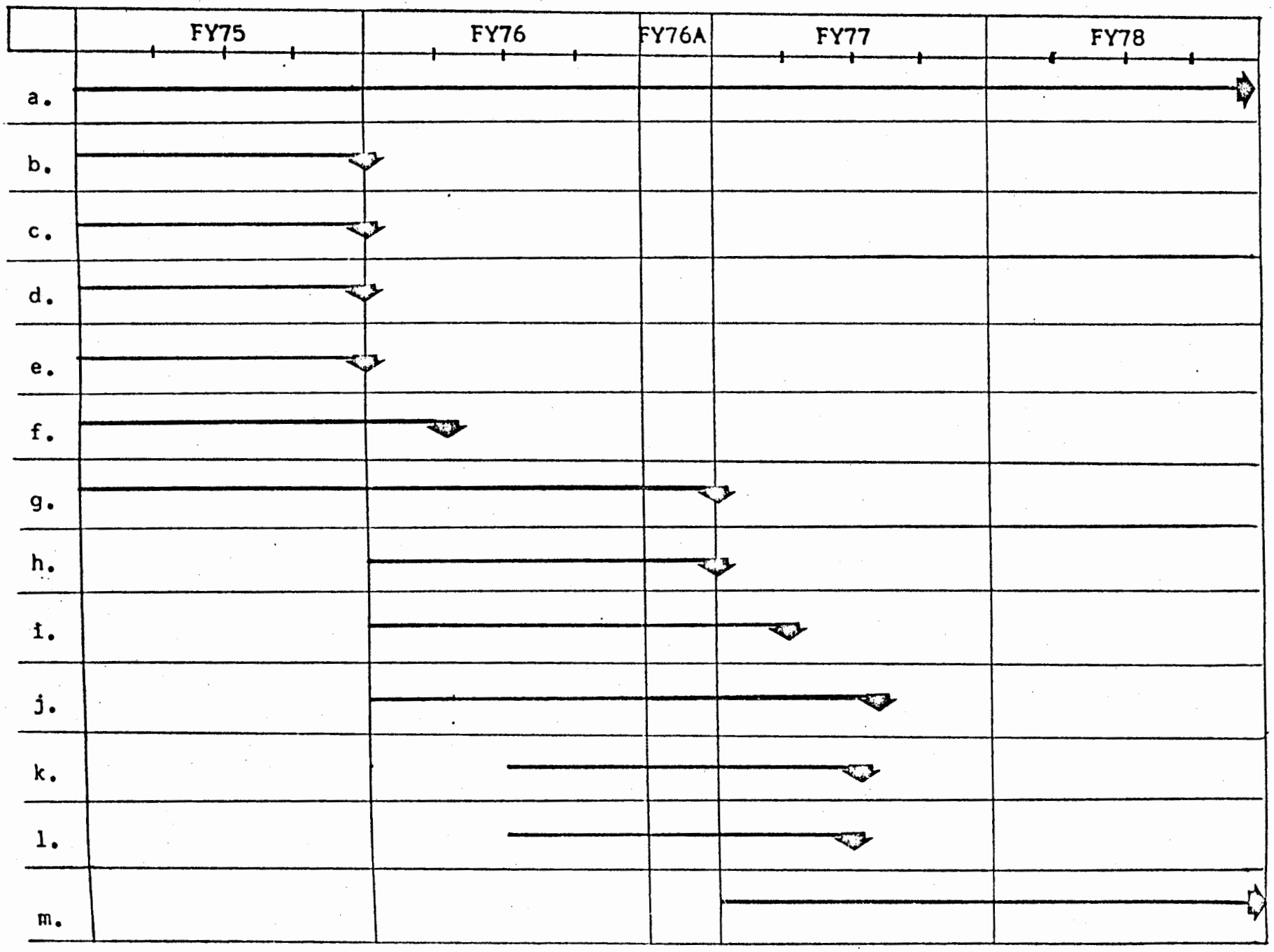
25. MILESTONE CHART



KEY TO MILESTONE CHART

A. Liasion with USGS

B. Literature and records search

C. Survey of regional and local geology and hydrology

D. On-site investigation of burial and storage areas

E. Compilation, interpretation of data, and review of results

F. Issue Topical report

G. Review and apply USGS and LASL recommentations - core-drilling beneath burial pit, detailed geologic surface mapping, geologic subsurface mapping

H. Initiate study to develop monitoring techniques to detect radionuclide movement after wastes are buried

I. Determine the efficiency of various monitoring techniques

J. Intensify monitoring net

K. Collection and analyses of data from monitoring net

L. Establish preliminary criteria for monitoring

M. Initiate seismic relection profile study

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26. PUBLICATIONS

"Use History and Environmental Setting of LASL Near-Surface Land Disposal Facilities for Radioactive Wastes (Areas A, B, C, D, E, F, G, and T)". In preparation.

Planned

1. Detailed geologic map of area where burial sites are located.
2. Preliminary criteria for monitoring radioactive solid waste disposal sites.

27. SCOPE

This program is structured to evaluate past and present monitoring practices at the LASL burial grounds. Determination of the adequacy of these monitoring practices to recognize or predict migration of radioisotopes from the burial grounds and recommendation for improvement of monitoring practices are the program's goals. The evaluation of monitoring practices is based upon: (1) field inspections which determined the physical characteristics of the burial facilities and the surface geohydrologic features of each burial site, and (2) literature and record searches plus interviews which determined the adequacy of past and present monitoring systems in relation to the geohydrology of the burial sites.

Liaison with the USGS has been maintained throughout these initial studies and detailed reports by the USGS and LASL describing the results of those investigations will be issued by the end of the current (FY75) year.

The groundwork and appropriate data bases have now been es-

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tablished. It was suggested, because of the scientific and technical merit of future results, to explore additional monitoring techniques in FY76 making use of the prior field studies and literature/records searches.

The expanded program will involve detailed surface geologic mapping of the burial sites' area, test drilling beneath one of the oldest LASL waste pits at Area G, and the development of monitoring techniques and instrumentation. These results will provide accurate data on the possible migration of radionuclides through Los Alamos soil and rock. They may then be related to the effectiveness of past burial techniques with obvious application to present and future techniques and standards. Furthermore, one may estimate the rates of migration of radionuclides under natural Los Alamos field conditions from the levels of any activity found.

The results of the expanded study can be immediately extended to other ERDA contractor burial sites throughout the country. Even though soil and rock character differ from site to site, each contractor has enough knowledge of his own conditions to enable extension of LASL's results with a high degree of reliability.

28. RELATIONSHIP TO OTHER PROJECTS

Other programs funded by ERDA/DWMT at the LASL include:

1. TRU Contaminated Solid Waste Disposal and Storage, LS-11-1-7A
2. TRU Solid Waste Research and Development, LS-12-1-7A
3. TRU Solid Waste Reduction and Stabilization, LS-13-1-7A

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4. Environmental Evaluation of TRU Waste Burial Sites and Their Ultimate Disposition, LS-14-1-7A

The present study utilizes data from and strongly interacts with all of the above listed efforts. A detailed knowledge of past burial practices and site location is critical to site evaluation. Therefore, the data accrued in the TRU Waste Disposal and Storage work is used for primary background information. The TRU Research and Development studies examine the various chemical and physical reactions among the stored radionuclides and the eventual changes which may take place in the waste matrix. These data provide a valuable projection base for proposed migration routes. As the incineration studies planned for the TDF facility proceed, a modified approach to the chemical reactions and their ultimate degradation products could undoubtedly affect migration routes and velocities. The theoretical modeling studies will provide a second basis on which to plan the detailed testing and evaluations herein described.

Since personnel of all of these efforts continually interact at the LASL, a productive atmosphere is maintained for current interchange of ideas, concepts, and data. A versatile, multi-disciplined staff in the various programs continually complement and augment their professional backgrounds. This profitable interplay, while difficult to quantify, brings a high degree of proficiency to the above listed programs.

29. TECHNICAL ACCOMPLISHMENTS IN FY75

The LASL has worked in conjunction with the USGS (retained by ERDA) to evaluate present monitoring of waste burial sites

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in regard to the geology and hydrology of the Los Alamos area. Both the LASL and the USGS recognized and recommended the need for the generation of new and more precise data.

Detailed geologic surface-mapping of the disposal sites area is currently in progress to establish points where migration of radionuclides might take place. New monitoring techniques and instrumentation to detect possible migration of radionuclides through or from disposal sites are likewise under development.

30. EXPECTED RESULTS IN FY76 AND FY76A

If the LASL/USGS recommendations for an expanded program are approved, significant enhancement of monitoring systems will be undertaken. This includes not only detailed geologic surface-mapping to establish migration paths for radionuclides but also core drilling horizontal access holes beneath a pit to determine migration patterns.

The latter recommendation involves drilling a minimum of 7 horizontal holes 5 ft. beneath Pit 2 (in use between 1959 and 1963). The access holes will be drilled from an 8 ft. diameter shaft augered adjacent to the north side of Pit 2. Continuous core drillings will be taken during the drilling of each access hole. Core drilling offers the most meaningful way to analyze the pattern of migration. The length of the access holes will be terminated at the opposite side of the pit or if abnormally high concentrations of moisture are encountered. When an access hole is terminated it will be fitted with a removable neoprene sleeve. The sleeve will be inflated to seal the hole, and then removed to permit access of monitoring probes.

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It will be necessary to develop equipment for monitoring the presence of radionuclides in the material surrounding the access hole. Commercial probes for detecting gamma radiation are available, but no systems have been developed for downhole detection of low-level beta-gamma or alpha activity. The development of such instrumentation will involve an initial period of design and feasibility studies, followed by a period of construction calibration and field testing.

Data obtained during the expanded FY76 efforts from the geologic mapping project and the core-drilling project will be assessed in respect to future development of the LASL waste burial site monitoring system. New monitoring points may be established as a result of the geologic surface-mapping project. Completion of the full array of horizontal access holes beneath Pit 2 and extension of this technique to other pits in Area G depend upon the data obtained from this project in FY76.

31. EXPECTED RESULTS IN FY77

In addition to continuation of the mapping and detection studies, the LASL proposes to initiate a seismic reflection profile study. The Los Alamos area is located on the Pajarito Plateau. Preliminary geophysical data for the plateau suggest the presence of two major faults bounding a block, or graben, which has been downthrown relative to the adjacent rocks. A much greater thickness of sediments may have accumulated in this depression than may be present under other parts of the plateau. The main aquifer of the area lies within these sediments. Therefore, it is important to determine the boundaries of the graben and associated

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sediments. A well-established geophysical technique called Seismic Reflection Profiling may be utilized for these studies.

Six of the eight LASL waste disposal sites are within the surface projection of the graben. Confirmation of the graben boundaries will affect future waste management policies at the LASL. Knowledge of these boundaries will enable more accurate predictions of the effects of earth tremors and radionuclide migration routes. Completion of this project will enable a considerably more broad-based assessment of the current disposal site and its geologic future as well as reliable selection of new disposal sites.

32. EXPECTED RESULTS BEYOND FY77

As the data from the expanded USGS/LASL monitoring are reviewed and collected, significantly more reliable predictions will be possible for movement of radionuclides away from a burial pit. These data may be related to other ERDA contractor sites for analagous predictions taking into account the differences in soil types, ground water, etc. The seismic reflection data will augment the immediate results of the USGS/LASL work to enable even longer range predictions.

33. DESCRIPTION AND JUSTIFICATION OF MAJOR PROCUREMENT ITEMS

The expanded program described earlier would entail costs of $75K in FY76 in addition to present budget projections. These costs would be dispersed as follows:

8 ft. diameter shaft	$10K
Core drilling access holes	$30K

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Instrumentation Development	$25K
USGS Consultation	$10K

Total: $75K

34. DESCRIPTION AND JUSTIFICATION OF MAJOR EQUIPMENT ITEMS

The following items are needed for the subsurface geologic mapping project and its required support instrumentation.

FY77

Magnetometer -- to perform a variety of geologic functions such as magnetic surveys, geologic mapping, and anomoly investigations $6K.

Resistivity Meter -- to obtain information on subsurface formations in soil and rock, location of water tables, and location of fault zones $3K.

Neutron Moisture Probe -- to determine moisture concent of soil and rock which relate to relative migration velocities of radionuclides $6K.

Total: $15K

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