University of California
LOS ALAMOS SCIENTIFIC LABORATORY
Post Office Box 1663 Los Alamos, New Mexico 87545

In reply refer to: LS6-80-144
Mail stop: 495

April 16, 1980

0819 TA-50

Mr. John Peel
Idaho Operations Office
550 2nd St.
Idaho Falls, ID 83404

Dear John:

Enclosed are the March 1980 Monthly Reports on those projects under your low-level waste program.

Sincerely,

James G. Steger
LS-6 Alternate Group Leader
Environmental Science Group

JGS:tj

Enc: Monthly Report
Distribution List

8326

MONTHLY PROGRAMS REPORT

March 1980

AL 3.5.1
Solid Radioactive Waste Disposal Studies

AL 3.5.4
Shallow Land Burial Technology

AL 3.10.1
Alternative Systems Study

LOS ALAMOS SCIENTIFIC LABORATORY
ENVIRONMENTAL SCIENCE GROUP LS-6

Work performed for

DIVISION OF WASTE MANAGEMENT
US DEPARTMENT OF ENERGY

LOS ALAMOS SCIENTIFIC LABORATORY

PROGRAM STATUS REPORT

Title: Solid Radioactive Waste Disposal Studies BR&C NO.: AR-05-15-15

FO/Contractor: AL/LASL WEP NO.: AL 3.5.1

Manager: James G. Steger Annual Budget: $300k

Principal Investigator: M. A. Rogers Date: April 1980

Month Covered: March 1980

Task Description:

The purpose of this task is to develop methods for environmental monitoring and surveillance of low-level waste disposal facilities. The approach taken will be to assess the migration of radionuclides from wastes buried during the last 35 years at LASL in order to determine waste/soil interactions and radionuclide movement in a semi-arid environment. Potentially significant pathways will be identified and modeled. A method of monitoring radionuclide movement along these pathways will be developed along with identifying the constraints that must be imposed upon disposal site operating practices and waste forms.

Highlights and Significant Accomplishments:

All staff members on this project attended the Waste Management '80 meeting at Tucson the week of March 10, 1980. For most of them, this was their first experience with this kind of a meeting and they found it very profitable to interact with other scientists engaged in similiar activities.

On March 20, 1980, Dr. William Chappell from the University of Colorado reviewed the Group's research (including waste management) to evaluate the quality and direction of our work. This evaluation is by the direction of the Laboratory Director, Donald Kerr, and will be a semi-annual event. The results of the evaluation have not yet been made known to us.

LaMar Johnson left LASL March 21, 1980 to take a position with EGG/ID. A search is now in progress to find a successor.

The water gauging station at Area G has now been completed and is ready to record any significant runoff that will occur after a heavy rainfall. A stilling pond was built in order to collect the runoff from the surface of the surrounding disposal pits. Inside the stilling pond a circular pipe (about 12" in diameter) was installed that will allow the water level to rise respectively to the water level inside the stilling pond. On top of the pipe (which is about 4' from the ground surface) a recorder shelter was mounted with a water level recorder installed inside of it. With the increase of runoff accumulation inside the stilling pond and pipe, the recorder will simultaneously record the increase on a chronometric chart. The data collected from this gauging station will be applied to the construction of the simulation model of precipitation-runoff-sediment transport being performed for LASL by Battelle Northwest Laboratory.

An investigation has also been initiated to try and determine the probable effects a "wetter climate" would have on the hydrological properties of the geologic media that is used at LASL for storage of radioactive waste. The research has been started by collecting climatology literature and world water balance atlases. The purpose of the research is to find a geographical area similar to Los Alamos that has a very high annual precipitation rate. This area will then be studied and compared to the Los Alamos area to predict the most probable effects that would result from such a climatic change.

In order to expand our knowledge and examinations on soil moisture characteristics, some thermocouple psychrometers will be used to evaluate the potential gradients of soil water. A total of 15 psychrometers will be installed in an uncased drill hole down to 30 meters. With the aid of our neutron logging charts, we have indentified the subsurface geologic contacts and will locate one psychrometer below and above each contact. Each psychrometer has been ordered with lead wires to these desired depths and will be assembled into one instrumental cable, calibrated, and then placed down-hole at the selected intervals. By comparing the in-situ readings to the calibrated values of known moisture potentials and temperatures, we will be able to get a better handle on the potential gradients of soil moisture around the LASL waste disposal sites.

The last of the trace element data came back from the chem lab and was sent to Dick Beckman, S-1, for his final statistical analysis starting April 1, 1980. We have analyses on 114 useable samples for 13 elements. An analysis of Co/Fe ratios in the tuff samples show that fractionation within the magma from which the Bandelier Tuff was derived proceeded normally: no surprises. Furthermore, no major temporal discontinuities are indicated in the data for the Tshirege Member, i.e., the entire Tshirege was probably deposited within a very short time period.

Further studies involving the investigation of the atmospheric pressure, moisture gradient and water vapor gradient upon the emanation of tritiated water, were pursued. New instrumentation will further enable us to measure the heat flow in soils and calculate several thermal characteristics of soils (or tuffs) such as thermal diffusivity and conductivity. Temperature sensors will be buried at depths of 0.1 m, 0.25 m and 0.75 m, while the heat flow sensor will be located at a depth of 0.25 m. The corings in AREA C are yielding results for ^{238}Pu and ^{239}Pu. Computations show that there is a strong decrease of activity with depth, which definitely seems to point to surface spill as a source and not upwelling from the pit due to a movement driven by evapotransporation.

Budget Variance Analysis:

Due to delays in obtaining analytical results (reported last month), it became clear that the geologic map printing contract we expected to let in March could not be accomplished. Consequently our Financial Management Office has recalculated our expenditure rate and moved the map contract to the last quarter of the FY. The new funding chart reflects this change.

Milestone Variance Analysis:

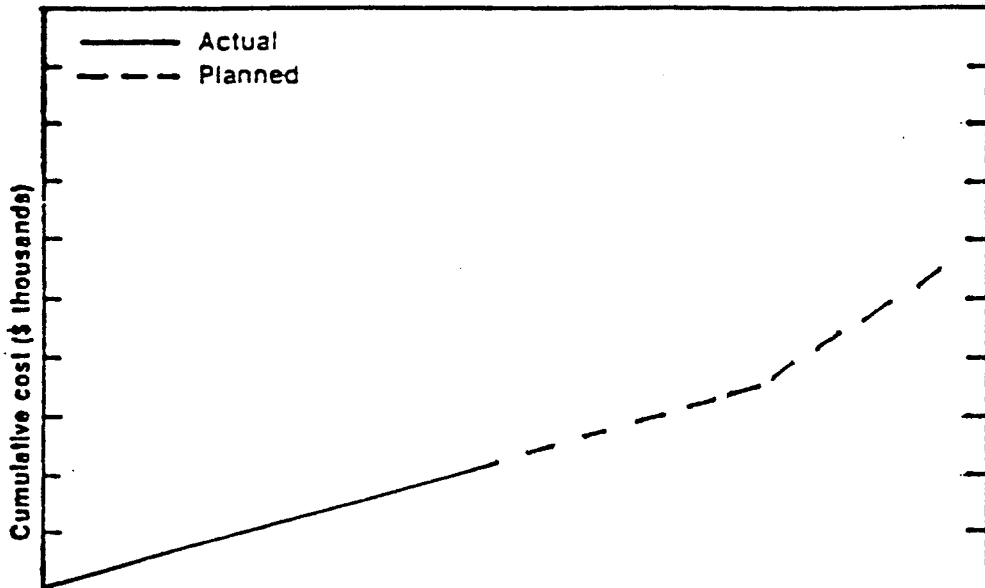
None

Problems and Issues

None

Title: Radioactive Waste Disposal Studies	B&RC No. AR 05-15-15
FO/Contractor: AL/LASL	FY 80
	WEP No. AL 3.5.1

Operating Dollars in Thousands (BO)

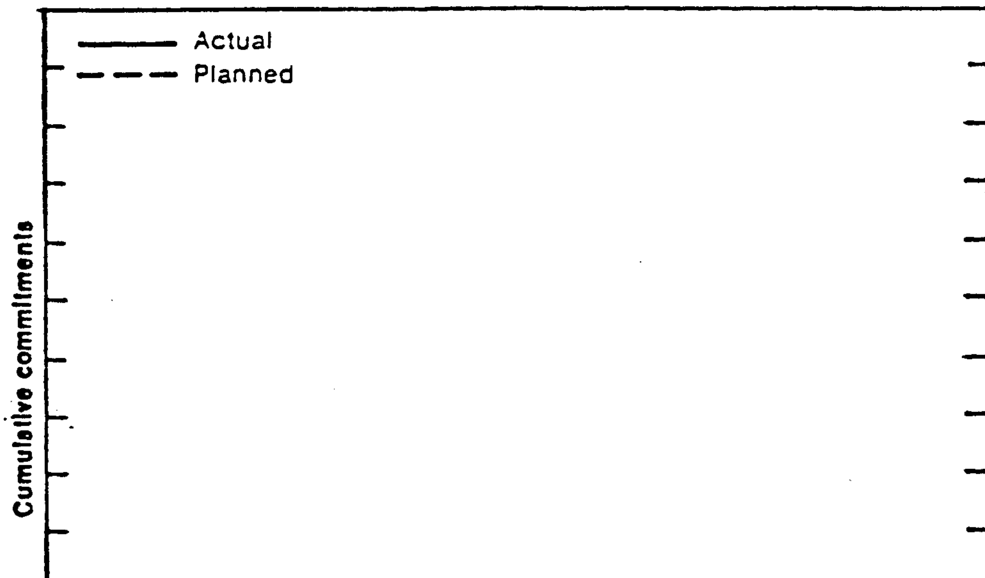


	O	N	D	J	F	M	A	M	J	J	A	S
Planned	23	46	70	94	117	126	147	169	191	235	279	323
Actual	23	46	67	89	109	128						
Variance (over)	0	0	3	5	8	(2)						

Month

Remarks:

Capital Equipment Dollars in Thousands (BA)



	O	N	D	J	F	M	A	M	J	J	A	S
Planned												40
Actual												
Variance (over)												

Month

Remarks:

Milestone No.	Milestone	FY 80 O	N	D	J	F	M	A	M	J	J	A	S	FY 81 1Q	2Q	3Q	4Q
1.1	Summary Report on Source Term																Δ
1.2	Field Sampling Completed												Δ				
2.1A	Summary Report on Hydrology									Δ							
2.1B	Summary Report on Geology												Δ				
2.2A	Feasibility of Coupling PNL/LASL Surface Models Determined	Δ															
2.2B	PNL/LASL Surface Models for TRU Adopted to LLW																Δ

Solid Radioactive Waste Disposal Studies

B&R No. AR-05-15-15

WEF No. AL 15 1

Level 0 - Departmental Controlled Milestone
Level 1 - LLW - Controlled Milestone
Level 2 - LLW P Controlled Milestone
Δ Level 3 - Lead Field Office - Controlled Milestone
∇ Level 4 - Other Milestones and/or Intermediate Event

— — — ◇ Scheduled Deviation for ☆ or Δ
——— Activity Line
↓ Time Now

PROGRAM STATUS REPORT

Title: Shallow Land Burial Technology BR&C NO.: AR-05-15-15

FO/Contractor: AL/LASL WEP NO.: AL 3.5.4

Manager: James G. Steger Annual Budget: $400k

Principal Investigator: John W. Nyhan Date: April 1980

Month Covered: March 1980

Task Description:

To improve the technology related to the shallow land burial of radioactive waste by examining radionuclide mobilization and migration mechanisms, by developing monitoring techniques around burial sites, by developing engineering methods to improve waste containment, and by the construction of a waste burial demonstration facility.

Highlights/Significant Accomplishments:

We have continued to process a group of 800 tuff samples collected under an old liquid waste disposal pit at LASL in an effort to examine radionuclide mobilization/migration mechanisms. About 260 of these samples are currently ready to be assayed using ATASS for transuranics and fission products previously added to these pits.

Quite a large effort was expended on characterizing americium tuff standards on the ATASS system. We finished counting 18 americium tuff standards, which we prepared last fall. Each of the 18 standards were counted three times to check the repeatability of the new intrinsic germanium detector. The first run was made in November before the IG detector was sent to the factory for repair. The second and third runs were made after the detector was sent back. The americium sensitivity data is presented in Tables I, II, III, with a statistical analysis in

Table IV. Sensitivity ranged from 0.02665 to 0.03137, 0.03032 to 0.04091, and 0.03053 to 0.04162 cps/pCi/g in runs I, II, and III (Table I-III). A preliminary statistical analysis of this sensitivity data was performed (Table IV). Even though the sensitivity seems higher in runs II and III than in run I, no significant difference (± 3 standard deviations) was observed with time between the sensitivities measured in each run. In addition, sensitivities comparisons made within the same run did not vary significantly (± 3 standard deviations).

Several other project-related accomplishments were achieved. A final draft of the manuscript describing the ATASS system was written and subjected to review, as well as the attached Standard Operational Procedure for our research activities in our trailer. In an effort to upgrade our data analysis capabilities involving the PDP 11 computer portion of the ATASS system, a technician successfully completed an RT-11 user course sponsored by Digital Equipment Corporation held in Santa Clara, California on March 17-21, 1980.

Budget Variance Analysis

None

Milestone Variance Analysis

None

Problems and Issues

The method of using vanadium as a radionuclide mimic was suggested by John Umbarger, H-1, as probably the best means of studying accelerating weathering. We would like to investigate this, and an additional $90k for FY80 would be of considerable help.

Table 1. Sensitivity data on americium tuff standards (Run I).

Sample #	Count time (sec)	Total counts (Area C)	Counts per sec	Calculated Concentration pCi/g	Actual Added Concentration pCi/g	Sensitivity (cps/pCi/g)
AML-1						
AML-2	5,000	8435.0	1.690	59.60 ±5%	60.48	.02794
AML-3	5,000	8940.0	1.790	63.168±5%	61.27	.02921
AML-4	5,000	9188.0	1.837	64.917±5%	61.70	.02998
AML-5	5,000	9129.0	1.825	64.504±5%	60.90	.02996
AML-6	5,000	9453.0	1.896	66.790±5%	61.27	.03094
AMM-1	5,000	47289.0	9.4578	334.131±5%	306.2	.03098
AMM-2	5,000	47682.0	9.5364	336.903±5%	304.0	.03137
AMM-3	5,000	47101.0	9.4202	332.803±5%	305.0	.03098
AMM-4	5,000	45677.0	9.1354	322.741±5%	305.4	.02991
AMM-5	5,000	46563.0	9.312	328.990±5%	306.3	.03040
AMM-6	5,000	53808.0	10.76	380.192±5%	306.0	.03516
AMH-1	5,000	169889.0	33.97	1200.383±5%	1227.0	.02768
AMH-2	5,000	162245.0	32.44	1146.372±5%	1217.0	.02665
AMH-3	5,000	165385.0	33.07	1168.561±5%	1219.0	.02712
AMH-4	5,000	168908.0	33.78	1193.451±5%	1228.0	.02750
AMH-5	5,000	170721.0	34.14	1206.264±5%	1211.0	.02819
AMH-6	5,000	170721.0	34.14	1206.260±5%	1218.0	.02803

Table 2. Sensitivity data on americium tuff standards (Run II).

Sample #	Count time (sec)	Total counts (Area C)	Counts per sec	Calculated Concentration pCi/g	Actual Added Concentration pCi/g	Sensitivity (cps/pCi/g)
AML-1	13,000	28191.0	2.170	81.517±4%	60.35	.03595
AML-2	12,000	23586.0	1.965	82.629±4%	60.48	.03249
AML-3	12,000	27249.0	2.270	115.452±4%	61.27	.03704
AML-4	12,000	25351.0	2.112	102.162±4%	61.70	.03423
AML-5	12,000	25933.0	2.1611	132.485±5%	60.90	.03548
AML-6	13,000	25441.0	1.957	85.378±4%	61.27	.03194
AMM-1	4,000	42632.0	10.65	513.045±4%	306.2	.03478
AMM-2	4,000	42596.0	10.64	442.081±4%	304.0	.03500
AMM-3	5,000	56102.0	11.22	170.890±5%	305.0	.03678
AMM-4	4,000	43469.0	10.86	332.314±4%	305.4	.03556
AMM-5	4,000	43637.0	10.90	356.094±4%	306.3	.03558
AMM-6	5,000	62627.0	12.52	64.015±5%	306.0	.04091
AMH-1						
AMH-2	1,000	38088.0	38.088	1494.237±4%	1217.0	.03139
AMH-3	1,000	37171.0	37.17	2220.046±4%	1219.0	.03049
AMH-4	1,000	37240.0	37.24	1562.251±4%	1228.0	.03032
AMH-5	1,000	37788.0	37.78	2060.850±4%	1211.0	.03119
AMH-6	1,000	40072.0	40.07	1362.305±4%	1218.0	.03289

Table 3. Sensitivity data on americium tuff standards (Run III).

Sample #	Count time (sec)	Total counts (Area C)	Counts per sec	Calculated Concentration pCi/g	Actual Added Concentration pCi/g	Sensitivity (cps/pCi/g)
AML-1	13,000	26562.0	2.043	62.487±5%	60.35	.03385
AML-2	13,000	24769.0	1.905	58.267±5%	60.48	.03149
AML-3	12,000	26696.0	2.224	68.036±5%	61.27	.03630
AML-4	12,000	26499.0	2.208	67.531±5%	61.70	.03286
AML-5	12,000	25295.0	2.107	64.464±5%	60.90	.03461
AML-6	13,000	24397.0	1.876	57.390±5%	61.27	.03061
AMM-1	4,000	42944.0	10.73	328.331±5%	306.2	.03504
AMM-2	4,000	41523.0	10.38	317.466±5%	304.0	.03414
AMM-3						
AMM-4	4,000	43338.0	10.38	331.341±5%	305.4	.03551
AMM-5	4,000	44100.0	11.03	337.116±5%	306.3	.03604
AMM-6	4,000	50938.0	12.73	389.445±5%	306.0	.04162
AMH-1	1,000	41311.0	41.31	1263.367±5%	1227.0	.03367
AMH-2	1,000	39909.0	39.91	1195.468±5%	1217.0	.03279
AMH-3	1,000	40607.0	40.60	1248.856±5%	1219.0	.03331
AMH-4	1,000	37494.0	37.49	1146.641±5%	1228.0	.03053
AMH-5	1,000	38235.0	38.23	1170.818±5%	1211.0	.03157
AMH-6	1,000	39642.0	39.64	1212.332±5%	1218.0	.03255

Table 4. Statistical analysis of americium sensitivity data given in Tables I - III.

	$\bar{x}$	S	CV
Am-Low	.02960	0.0011	3.71
Am-Med	.03143	0.0018	6.01
Am-High	.02747	0.0057	2.08

Run II

	$\bar{x}$	S[a]	CV[b]
Am-Low	.03452	.00200	5.81
Am-Med	.036435	.002300	6.31
Am-High	.031236	.001017	3.25

Run III

	$\bar{x}$	S	CV
Am-Low	.03328	.002084	6.26
Am-Med	.036470	.002962	8.12
Am-High	.03240	.001166	3.59

[a]Standard deviation

[b]Coefficient of variation

Standard Operating Procedure
For the Preparation and Analysis of
Radioactive Samples with the Transuranic
Assay System for Soils in Trailer TA 0710
at TA-59

Approved:	Eugene M. Wewerka	8/8/79
	Eugene M. Wewerka, H-12	Date
	Wayne R. Hansen	8/13/79
	Wayne R. Hansen, H-8	Date
		8/16/79
	Harry J. Ettinger, H-5	Date
	R.J.W. 8-16-79	
		1-28-80
	for Thomas K. Keenan, H-7	Date
		4/8/8[illegible]
	Jerome Dummer, H-1	Date
	4/7/80	

Written: 1/21/80

Renewal Date: 1-21-81

STANDARD OPERATING PROCEDURE FOR THE PREPARATION AND ANALYSIS OF RADIOACTIVE SAMPLES WITH THE TRANSURANIC ASSAY SYSTEM FOR SOILS IN TRAILER TA0710 AT TA-59

J.W. Nyhan
Environmental Science Group LS-6
January 17, 1980

I. INTRODUCTION

Projects within the Environmental Science Group (Group LS-6) aimed at exhumation of out-dated waste burial grounds and at measurement of transuranic migration in current burial grounds have necessitated developing techniques for rapid and quantitative analysis of transuranic materials in soil, and establishing a facility in which to perform these analyses. More selectivity and sensitivity than field phoswich detectors is provided by a photon spectroscopy system such as the ATASS (Automated Transuranic Assay System for Soils) system developed for our nuclear waste management personnel of LASL Group LS-6 (L. West, C.J. Umbarger, and T. Dempsey, "A Germanium Detector System for the Detection of Transuranics at Low Activity Concentrations in Soil," page 564, Proceedings of the Health Physics Society Eleventh Midyear Topical Symposium on Radiation Instrumentation, January 16, 1978, San Diego, CA). This ATASS system is currently housed in Trailer TA0710 at TA-59 behind the Occupational Health Laboratory, where environmental samples are also being prepared for radionuclide analyses.

II. PERSONNEL

The supervisory analyst for radiochemical procedures is currently a staff member at LASL with a Ph.D. in radioecology and soil science (J.W. Nyhan). He has had seven years of experience performing transuranic research in several LASL environmental and waste management programs, preceded by four years of radioecological research performed at Colorado State University. Consulting advice is also obtained from senior analytical chemists in Groups H-8, H-5, and H-1.

A Life Sciences Technician III is currently in charge of maintaining the count room and sample processing laboratory of Trailer TA0710 (George Trujillo). He has post secondary degree in environmental sciences and has had several years of specialized training in standards and sample preparation, instrument calibration, calculations, and data handling.

III. DESCRIPTION OF LABORATORY FACILITIES

The radionuclide detection system is housed in trailer structure TA0710 at TA-59, immediately behind the Occupational Health Laboratory. This 40 x 10 foot semimobile unit consists of a Timpte model TT 10AH134-69 trailer (Serial Number 16499) with US Government license plate E98925. The trailer contains separate rooms for offices, sample preparation, and radionuclide counting equipment. The count room contains the ATASS system mentioned previously. The count room also contains a 5-1/2 x 1 x 2-21/50 foot wall cabinet and a 5 x 3 foot table in its 14-1/3 x 7-1/2 foot area. The sample processing laboratory is 9-3/4 x 7-1/2 feet in size and contains 16-2/3 feet of laboratory bench space, 2-1/3 feet of which is a hood (2-2/5 ft deep), two 3 x 2-1/2 x 13-1/2 ft wall cabinets, and 12 feet of drawers (2.5 ft high by 2 ft deep). The office is 14-1/2 x 7-1/2 ft in area and contains two office desks and a file cabinet. In order to minimize possible sample-sample and room-room cross contamination, each of these rooms is completely separate with the exception of a small access door between the sample preparation and count rooms.

Carrier 1-1/2 ton room air conditioners were installed in Trailer TA0710 to maintain a room temperature below 27°C with a temperature variation not to exceed 3°C, as recommended by EPA (EPA 600/8-78-008).

The face velocity of the Lab-Con Co. hood in the sample processing laboratory has been checked by H-5 personnel and graded satisfactory.

This system is now equipped with a 18 x 12 x 12 inch HEPA filter and a 1/2 h.p. Allen-Bradley Co. auxilary blower, both of which are located outside of the trailer to avoid contamination of the sample processing room when the filter is changed.

We are currently investigating extending hot and cold running water service to Trailer TA0710, as well as setting up a source of distilled water in the sample preparation laboratory. This will necessitate connecting the trailer to the low-level waste line going to the liquid waste treatment plant at TA-50.

IV. LABORATORY EQUIPMENT

General Instrumentation and Equipment

A research grade analytical balance and pH meter have been purchased for the sample preparation laboratory of Trailer TA0710.

Radiation Instrumentation

The ATASS system contains a large area (21 cm^2) hyperpure germanium detector (HpGe) used for the monitoring of transuranics and a large volume lithium-drifted germanium [Ge(Li)] detector for higher energy gamma emitters such as ^{137}Cs. Both detectors are routed into a pulse height analyzer and computer system. The raw soil samples are contained in custom made petri dishes (with press fit caps) which were designed to hold about 24 g soil and to be optimized in plastic thickness and geometry for counting efficiency. An automatic sample changer is also included in the system and holds 20 individual plastic sample containers. Detectability of the system is currently being characterized and is expected to be approximately 4 pCi/g for plutonium and 40 pCi/g for ^{241}Am. This is for a four hour count time and working at the three sigma level above background. For five minute counts, the system will detect ~30 pCi/g for plutonium and ~170 fCi/g for ^{241}Am.

The surface monitoring equipment for Trailer TA0710 will consist of a Ludlum Model 43-1 alpha scintillator (zinc sulfide detector) used in conjunction with a

Ludlum Model 2200 analyzer. This system, as well as the ATASS system, will be used to monitor Group LS-6 swipes and lab surfaces needing monitoring.

V. GENERAL LABORATORY ACTIVITIES AND PRACTICES

Current plans for the sample processing lab involve handling tuff samples from Area T with activities in the range of 1-10,000 pCi Pu/g tuff. Samples with activities greater than 10,000 pCi Pu/g will be detected by Group H-1 and LS-6 monitors in the field and will be left in the field; however, no environmental sample has been found with activities as high as this in over 1000 samples collected to date at Area T in DP Site.

The following will constitute the standard procedure for the handling, preparation and counting of all radionuclide samples in Trailer TA0710 at TA-59:

1. All sample material will be brought to the sample handling and preparation room at Trailer TA0710.

2. All samples brought to the sample handling room will be provided with double containment to reduce the possibility of cross contamination.

3. No sample container (either raw or prepared samples) will be opened unless the container is inside the hood.

4. All tuff standards are kept in the sample processing laboratory and are double bagged, and are stored in a lead-brick cave.

5. Only one sample at a time will be worked on in the hood. Each sample will be provided with a tray lined with absorbent paper to prevent spillage onto the bottom surface of the hood, which is also lined with two layers of absorbent paper.

6. Any spillage of tuff into the sample tray will be poured into a plastic bag, which will remain in the hood until it is full. When full, the bag will be appropriately tagged, wiped clean, bagged, and properly disposed of according to the attached SOP for disposal of wastes at OHL.

7. After the sample has been placed in a sample holder and the holder tightly

closed and wiped clean, the tray and sample will be removed from the hood and the filled sample holder weighed.

8. After weighing, the sample holder will be sealed with glue and sent into the countroom in a plastic box via a small assess door connecting the two rooms. The contents of this box will be monitored for surface-contamination by LS-6 personnel using the Ludlum analyzer before the box is sent into the count room. Samples exhibiting count rates 30% above background count rates will be decontaminated with soap and water and a Chem-Wipe and resubmitted to monitoring with the Ludlum.

9. Before entering the count room from the preparation room, hands, feet, and clothing will be monitored for possible contamination. White-colored Anti-C laboratory coats and disposable booties will be worn by personnel working in the sample processing laboratory and will be removed upon leaving this room.

10. Transportation of samples within the count room will occur only when sample holders are enclosed in the plastic box, which will have a closeable cover.

11. After counting, all samples will be placed in plastic bags labeled with yellow and black radiation tap ("Caution: Radioactive Material") and stored in the basement of OHL. About 20% of these samples will be submitted to Group H-8 for transuranic analyses; the rest of the samples will be disposed of according to the attached SOP for solid waste disposal at OHL.

12. All contaminated material, such as Chem-Wipes, brushes, etc., will be placed in double plastic bags, appropriately tagged with radiation safety tape and properly disposed of as Type II wastes in the appropriate dumpster at the east end of OHL according to the attached SOP for solid waste disposal at OHL.

13. Routine radiological surveys will be performed in all three rooms of the trailer by Group LS-6 and Group H-1. Group LS-6 personnel will make bi-weekly surveys of the trailer using a Ludlum analyzer, with daily surveys made of the hood and other intensively-used sample preparation and handling areas (proportional to

the usage frequency). Group H-1 will provide monitoring instrumentation for the feet, hands, and clothing of personnel enterring and leaving the sample preparation laboratory. In addition, swipes will be taken by Group H-1 on a periodic basis (proportional to the work activities in the labs) to determine amounts and areas of potential laboratory contamination using a proportional counter. Computerized H-1 records of the results of these monitoring activities will be sent to LS-6 on a routine basis.

Air sampling and continuous air monitoring (CAM) in the sample preparation room will be carried out by Group H-1 personnel.

In the event of a CAM alarm, LS-6 personnel will immediately evacuate the laboratory, close the internal sliding door and the external trailer door, and call Group H-1 personnel.

All personnel associated with the trailer will wear routine Group H-1 dosimetry badges at all times and will be scheduled for routine chest and whole body counts, as well as urine analyses.

Several general safety procedures will be followed:

1. There will be no smoking or eating in the count and preparation rooms.

2. Gloves, dust masks, and protective glasses will be worn during sample preparation.

3. Spot checks of working surfaces in both the preparation room and count room will be made by Group LS-6 personnel with the Ludlum detector at the beginning and end of each working day to check for cross contamination.

4. In case of a sample spill outside of the hood or in the count room, Group LS-6 personnel will immediately notify Group H-1 personnel and with their help will isolate the spill, use dry and soapy-water moistened Chem-Wipes to pick up the dry, crushed, contaminated tuff, and thoroughly wash down the lab surfaces involved with soapy water and Chem-Wipes. The contaminated Chem-Wipes and other waste

materials will be disposed of as Type II compactable wastes according to the attached SOP for waste disposal at OHL and Group H-1 will be immediately notified of the accident and will be asked for addition clean-up advice, if needed, and for an immediate survey of the area of the accident.

VI. RADIOCHEMISTRY

A part of the upcoming research is currently involving a thorough characterization of the ATASS system. We have already prepared standard tuff samples spiked with ^{137}Cs, $^{239,240}Pu$, ^{241}Am, and ^{90}Sr to help in doing this, which will be stored in a lead cave in the sample preparation room. Detection limits and sensitivity of the system will then be accurately determined by our group and compared with similar results reported by other laboratory and private organizations.

The laboratory will participate once each year in an appropriate unknown performance study administered by EPA or some other group. Analytical results must be within control limits established by EPA or another group for each analysis for which the laboratory is, or wants to be, certified. Operating manuals and calibration protocols for counting instruments must be available to analyst(s) and technician(s). Calibration data and maintenance records on all radiation instruments and analytical balances must be maintained in a permanent record.

The following specifications are included in minimum daily quality control:

1. To verify internal laboratory precision for a specific analysis, a minimum of 10 percent duplicate analyses must be performed. The difference between duplicate measurements must be less than two times the standard deviation of the specific analysis as described in EPA-600/4-77-001. If difference exceeds two standard deviations, prior measurements are suspect, calculations and procedures must be examined, and samples should be reanalyzed when necessary.

2. When 20 or more specific analyses are performed each day, a performance standard and a background sample must be measured with each 20 sampes. If less

than 20 specific analyses are performed in any 1 day, a performance standard and a background sample must be measured along with the samples.

3. Quality control performance charts, or performance records, must be maintained.

Standard Operating Procedure
For Disposal of Solid Radioactive Waste
From H-5 and H-8 Group Areas at the
Occupational Health Laboratory
(TA-59, SM-OH-1)

Approved: ______________________ 6/7/79
Harry J. Ettinger, H-5 Date

______________________ 5/22/79
Wayne R. Hansen, H-8 Date

Eugene M. Weverka ______________________ 5/22/79
Eugene Weverka, H-12 Date

______________________ 6-5-79
Jerome Dummer, H-1 Date

______________________ 5/31/79
Thomas K. Keenan, H-7 Date

Written 5/22/79

STANDARD OPERATING PROCEDURE FOR DISPOSAL OF SOLID RADIOACTIVE WASTE FROM H-5, H-8, and LS-6 GROUP AREAS AT THE OCCUPATIONAL HEALTH LABORATORY (TA-59, SM-OH-1)

General

Sources of solid radioactive waste from H-5, H-8, and LS-6 areas at the Occupational Health Laboratory (SM-OH-1) are primarily laboratory waste and contaminated equipment.

Possible radioactive contaminants include isotopes of uranium and transuranics and radioactive nuclides generated by neutron irradiation.

Containers for intermediate storage of waste are located in rooms that generate the waste. No segregation of radioactive and non-radioactive waste is permitted in rooms in which radioactive materials (other than sealed sources) are used. All areas where radioactive materials are used shall be clearly identified on access doors as radioactive areas.

It is the intention of those who generate radioactive waste to minimize the amount of waste produced to as low as practicable.

Guidelines

1. Radioactive contaminated material.

This type of waste is presumed to be radioactively contaminated because it has been used in a potentially contaminated laboratory area. The radioactivity level is generally very low.

A. All compactable waste will be collected in a metal container lined with a 5-mil plastic bag. Manual compaction of this waste is not permitted. When full, the plastic bag is removed from the metal container, placed in a cardboard box and labeled with a piece of "Caution Radioactive Waste" tape. Also, the date, room, building, and site number are written on the box. The box must be identified as containing compactable waste. Waste packages are to be placed in the Dempster Dumpster container designated for radioactive wastes located at the rear of OHL (see Fig. 1). Packages are not to be stored outside of a metal fireproof container in the building or outside of the dumpster. Either B.C. Eutsler (H-5), E.S. Gladney (H-8), or J.G. Steger (LS-6) are to be contacted whenever packages are to be placed into a dumpster. They may monitor packages as they feel appropriate.

B. Non-compactable waste that can be packaged as in "A" above may be placed in the dumpster and labeled as non-compactable. Bulk soil samples from TA0710 shall be placed in 55 or 30 gallon drums for special Group H-7 pickup.

C. A record is to be kept in Room 110 and Room 179 of the number of packages placed in the dumpster.

D. A properly completed LASL Radioactive Solid Waste Disposal Form shall accompany each shipment of waste for disposal. Eutsler (H-5), Gladney (H-8), and J.G. Steger (LS-6) will be responsible for notifying H-7 of a filled dumpster.

E. If large items (that do not fit in the metal containers) become contaminated, either Eutsler, Gladney or Steger will assist in the disposal procedure.

F. Rooms in which radioactive material may be handled are indicated in Fig. 1. Solid waste from those rooms designated as extremely low level (Back-Ground) will be treated as nonradioactive materials.

2. Retrievable Waste.

No. TRU-retrievable waste is generated.

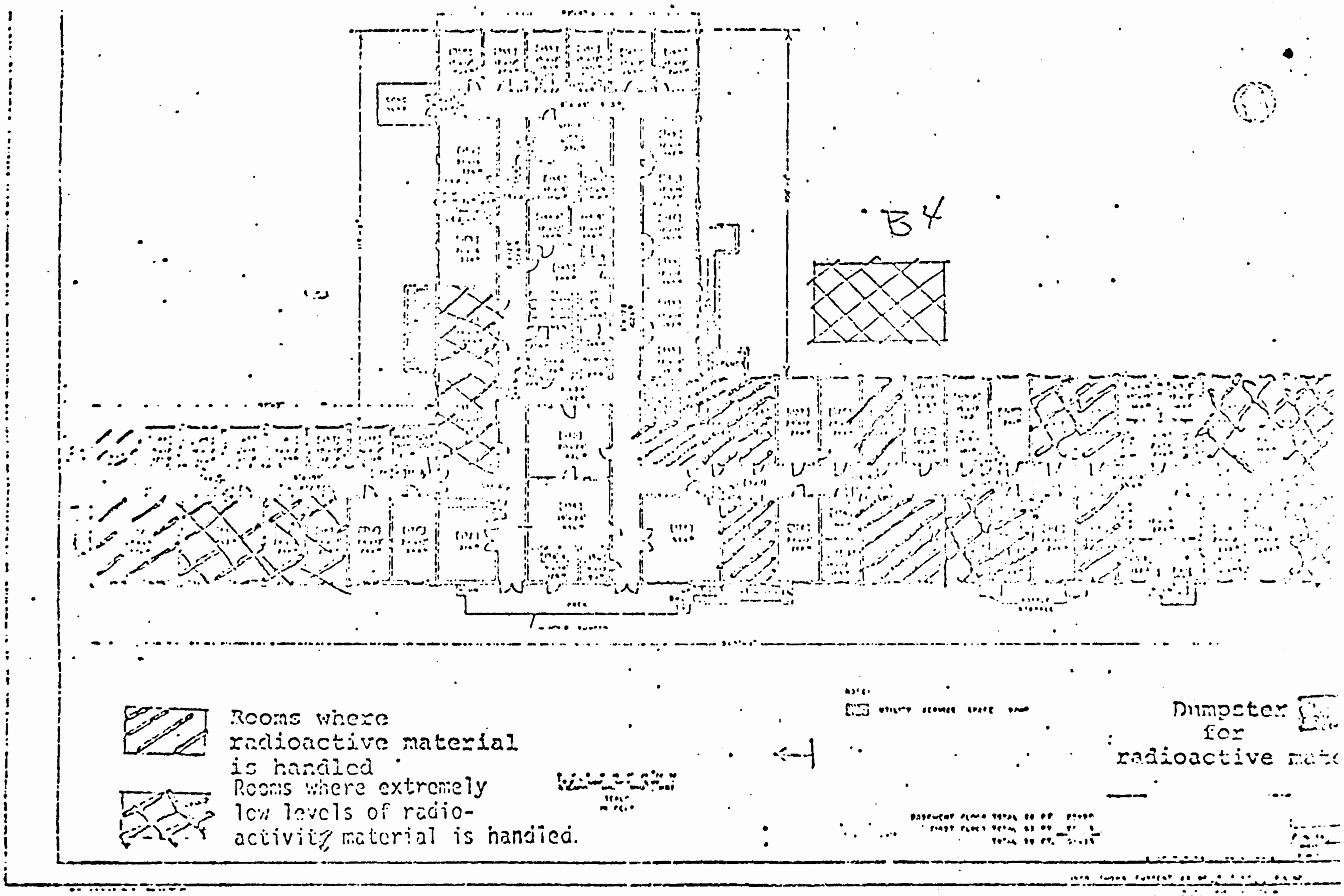
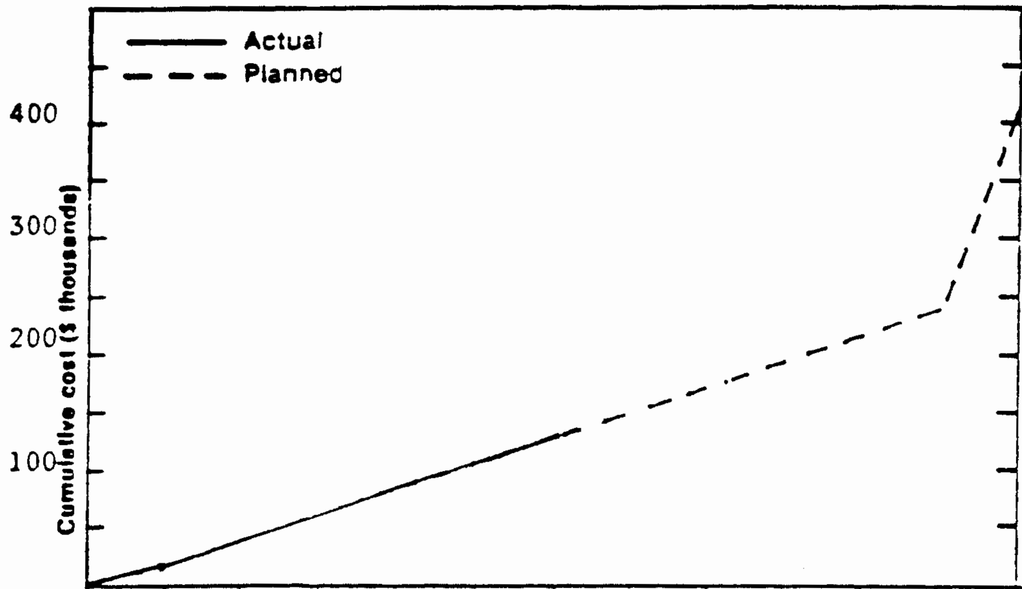


Figure 1: Radioactive material handling and disposal areas at the Occupational Health Laboratory (TA-3; SM-184)

Title: Shallow Land Burial Technology — B&RC No. AR 05-15-15

FO/Contractor: AL/LASL — FY 80 — WEP No. AL 3.5.4

Operating Dollars in Thousands (BO)

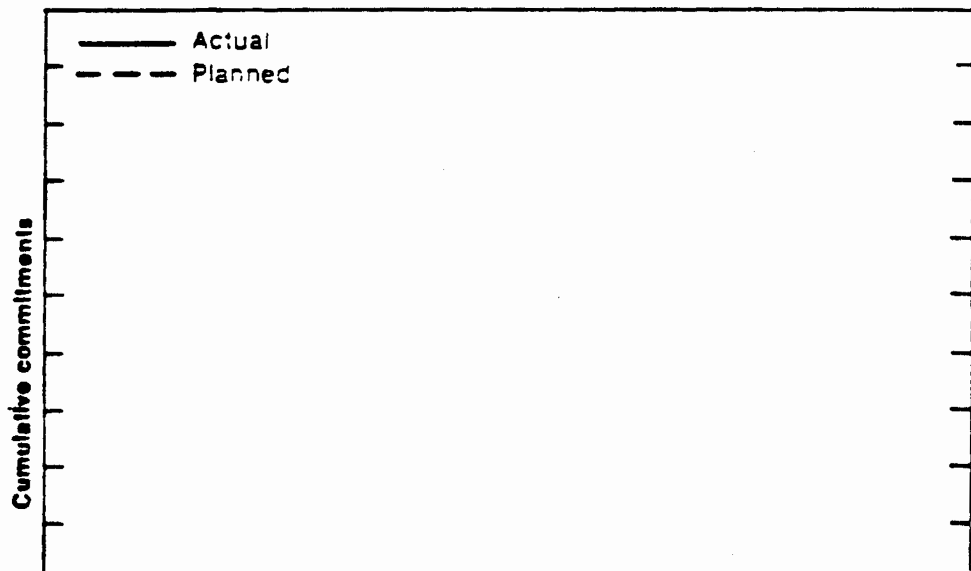


Remarks

	O	N	D	J	F	M	A	M	J	J	A	S
Planned	19	41	64	87	109	131	153	175	197	220	242	421
Actual	21	38	57	94	107	130						
Variance (over)	(2)	3	7	(7)	2	1						

Month

Capital Equipment Dollars in Thousands (BA)



Remarks

	O	N	D	J	F	M	A	M	J	J	A	S
Planned												60
Actual												
Variance (over)												

Month

Milestone Schedule

FY. 80: O N D J F M A M J J A S — FY. 81: 1Q 2Q 3Q 4Q

Level	Milestone No.	Milestone
	1	Evaluation of manmade barriers.
	3	Literature survey on influence of waste materials & environmental factors on engineered barriers.
	6	Analysis of tuff samples collected under a previously-used liquid radioactive waste disposal bed.
	7	Technology & modeling of water flow through unsaturated materials.
	8	Completion of LASL lab studies on saturated and unsaturated flow of radioactive waste solutions in tuff.
	9	Report on NMSU lab studies on stable element solute retention by soils & tuff.
	12	Development of neutron activation tracers & field equipment for monitoring tracer migration.

Level 0 - Department Controlled Milestone
Level 1 - EIW - Controlled Milestone
Level 2 - EIW P - Controlled Milestone

– – – ◊ Scheduled Deviation for ☆ or △
——— Activity Line
↓ Time Now

Shallow Land Burial
…hnology

B&FC No. AR-05-15-15
WEP No.: AL 3.5.4

PROGRAM STATUS REPORT

Title: Alternative Systems Study — BR&C NO.: AR-05-15-15

FO/Contractor: AL/LASL — WEP NO.: AL 3.10.1

Manager: James G. Steger — Annual Budget: $300k

Principal Investigator: Merlin Wheeler — Date: April 1980

Month Covered: March 1980

Task Description

The overall goals of the proposed work are to gather information pertinent to analyzing Alternative Disposal Methods and to generate a management plan for a program to evaluate selected alternatives to shallow land burial for the disposal of low-level radioactive waste. The work will be structured so as to take maximum advantage of all applicable ongoing and proposed work within DOE and other organizations. In particular, close cooperation will be sought between this work and the High Level Waste disposal work coordinated by ONWI.

Highlights/Significant Accomplishments

Writing began on an overview document to describe low-level waste, the reasons for alternatives, and a summary description of each alternative. A key issue has been identified with regard to intermediate depth burial; what is the critical depth below which it can be assumed that human intrusion is very unlikely? There have been specific suggestions made, such as the NRC statement that greater than 10 m cover qualifies as intermediate depth. Closer examination is required, we believe, of the factors controlling that depth, before completion of the generic description of intermediate depth burial.

A final report for FY79 was received from the University of Arizona.

The report contains extensive information on various disposal alternatives, including engineered storage and mined cavities. Copies of that report will be forwarded to ORNL and EG&G Idaho.

Budget Variance

None

Milestone Variance

None

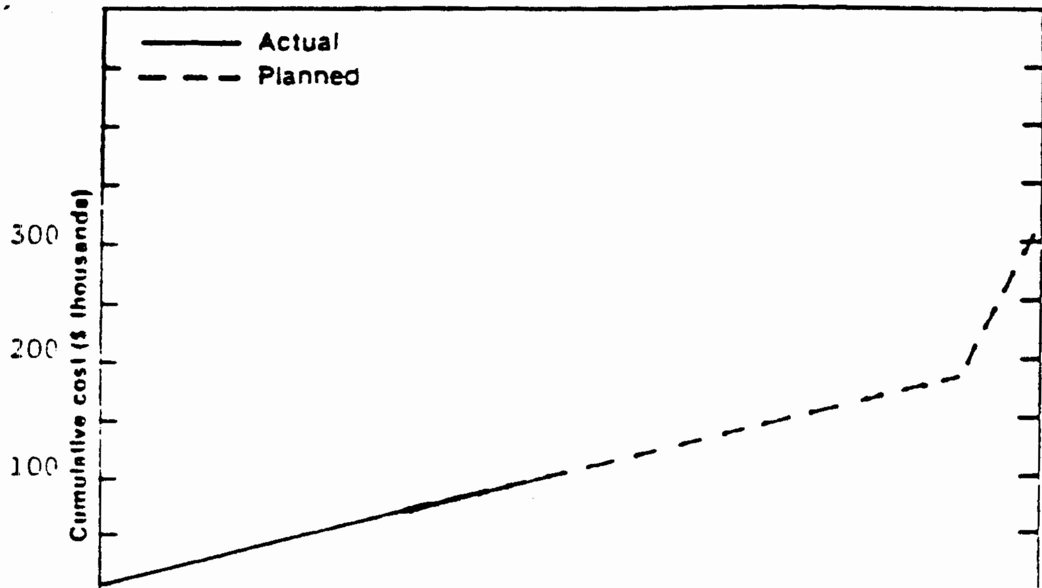
Problems and Issues

None

Title Alternative Sys ns Study   B&RC N AR 05-15-15

FO/Contractor: AL/LASL   FY 80   WEP No. AL 3.10.1

Operating Dollars in Thousands (BO)

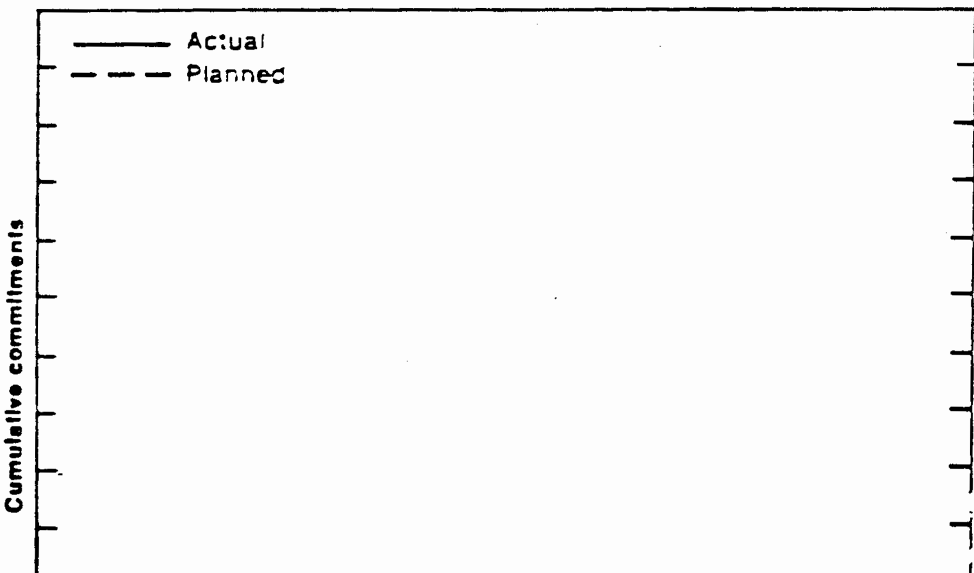


Remarks

	O	N	D	J	F	M	A	M	J	J	A	S
Planned	14	31	48	65	82	99	115	132	150	166	183	318
Actual	16	29	43	71	81	99						
Variance (over)	(2)	2	5	(6)	1	0						

Month

Capital Equipment Dollars in Thousands (BA)



Remarks

	O	N	D	J	F	M	A	M	J	J	A	S
Planned												0
Actual												
Variance (over)												

Month

Milestone No.	Milestone	FY 80 O	N	D	J	F	M	A	M	J	J	A	S	FY 81 1Q	2Q	3Q	4Q
								↓									
1.	Input waste characterized	—	—	—	—	—	△										
2.	Alternative Options Catalogued	—	—	—	—	—	—	—	△								
3.	Report on assessment of technical issues	—	—	—	—	—	—	—	—	—	—	—	△				
4.	Issue Development Plan				—	—	—	—	—	—	—	—	—	—	△		

Title: Alternative Systems Study

FTC No. AL 5-15-15

WBP No. AL 3.10.1

☆ Level 0 - Department Controlled Milestone

☆ Level 1 - EIW - Controlled Milestone

☆ Level 2 - EIW P - Controlled Milestone

△ Level 3 - Lead Field Office - Controlled Milestone

– – – ◇ Scheduled Deviation for ☆ or △

——— Activity Line

↓ Time Now

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