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DATE: February 28, 1983
IN REPLY REFER TO: Q-6-772 (R673)
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Safety Assessment

Mr. S. Bernstein
Office of Nuclear Regulatory Research
US Nuclear Regulatory Commission
5650 Nicholson Lane
Rockville, MD 20852

Dear Steve:

SUBJECT: R673 MONTHLY STATUS REPORT FOR JANUARY 1983--INVESTIGATION OF ACCIDENT-INDUCED FLOW AND MATERIAL TRANSPORT IN NUCLEAR FACILITIES

The monthly status report for January 1983 is enclosed. Please call if you have questions or need clarification.

Sincerely,

R. A. Martin

W. S. Gregory

RAM/WSG:tmg

Enc: As cited above

Cys w/enc: P. C. Owczarski/J. Mishima, PNL
M. Simon-TOV/ORNL
J. H. Scott, ES/NP, MS F671
J. F. Jackson/M. G. Stevenson, Q-DO, MS [illegible]
R. A. Haarman, Q-6, MS K557
Q-6 Fluid/Thermal Section
CRMO (2), MS A150
Q-6 File

PROGRAM STATUS REPORT

TITLE: Investigation of Accident-Induced Flow and Material Transport in Nuclear Facilities

PROJECT NO: R673

FIN NO: A7029

CONTRACTOR: Los Alamos National Laboratory

MONTH COVERED: January 1983

BUDGET STATUS: Annual Budget $437.6 k (includes FY 1982 carryover of $37.6 k)

Monthly Spending	$ 32.7 k
Cumulative Spending:	$ 134.8 k
Funds Remaining	$ 302.8 k

I. PROGRAM DESCRIPTION

The objective of this research is to develop the capability to predict accident-induced flow and material transport within a fuel-cycle facility. We will develop techniques and conduct experiments to provide supportive data for the transport of internal accident releases throughout a facility. The program will be limited to providing source-term characterization at a plant's atmospheric boundary. The primary pathway to the atmosphere is a facility's ventilation system, and techniques developed in this investigation will be designed for, but not limited to, ventilation system pathways. An accident analysis computer code for fire will be developed this fiscal year. We will perform tasks in both the analytical and experimental areas to support this program deliverable. We will provide the necessary support to outline fire accident analysis methods and provide examples for an accident analysis user's handbook.

II. HIGHLIGHTS/SIGNIFICANT MONTHLY ACTIVITIES

A. Compartment Fire Model Assessment

The main activity in compartment fire model assessment this month was preparing the data report for the FY 1981 Lawrence Livermore National Laboratory (LLNL) fire tests. This report will be delivered to the NRC on February 8, 1983. Validating the test data took much more time and effort

than originally planned. In retrospect, we should have been more aware of the validation problem. (A. Tewarson from Factory Mutual needed 3 yr to validate his test apparatus.) T. DeRis from Factory Mutual and T. Quintiere from the NBS currently are building intermediate-scale relese-rate ovens (8 ft high with a 1 ft^2 burn area) for under-ventilated fires. They both expect the tests and validation time to significantly exceed the cost and time of construction. Validating the full-scale LLNL test facility results within 18 months compares well with this.

We have requested approval to extend a consulting agreement to H. E. Mitler from Harvard University to work with us on evaluating the Harvard fire code for possible integration with FIRAC. We hope that this agreement will be effective by March 14, 1983.

B. Material Depletion/Modification

We have completed preliminary full-scale measurements of smoke transport and deposition in ventilation system ductwork and will deliver a rough-draft report to the NRC on February 8, 1983. This study is part of an effort to obtain experimental data in support of the fire accident analysis computer code FIRAC. To help assess the accuracy of the aerosol depletion model in FIRAC, we conducted the current depletion/modification experiments. The tests were performed under realistic conditions using real combustion products in full-sized ducts at typical airflow rates. We burned polystyrene, the most smoky fuel typically found in fuel cycle plants, at under-ventilated (oxygen-lean) conditions to product a combustion aerosol. Aerosol mass deposition and aerosol size and concentration measurements were performed. A mass balance of smoke generated upstream, deposited in a duct, and collected on a downstream high-efficiency particulate air filter was consistent to within about 20%. We found that as much as about 25% of the polystyrene smoke mass generated at the entrance of a 15.2-m (50-ft) duct is deposited on the duct walls. Our experimental results will be compared with the theoretical equations currently being used in FIRAC.

III. PROGRAM DEVELOPMENT VARIANCE (Fig. 1)

At this time there is no variance from the program development plan. This month the following topical reports were put in draft form.

- Data Report on FY 1981 LLNL Tests
- FY 1982 Filter Plugging Experiments
- Material Depletion/Modification

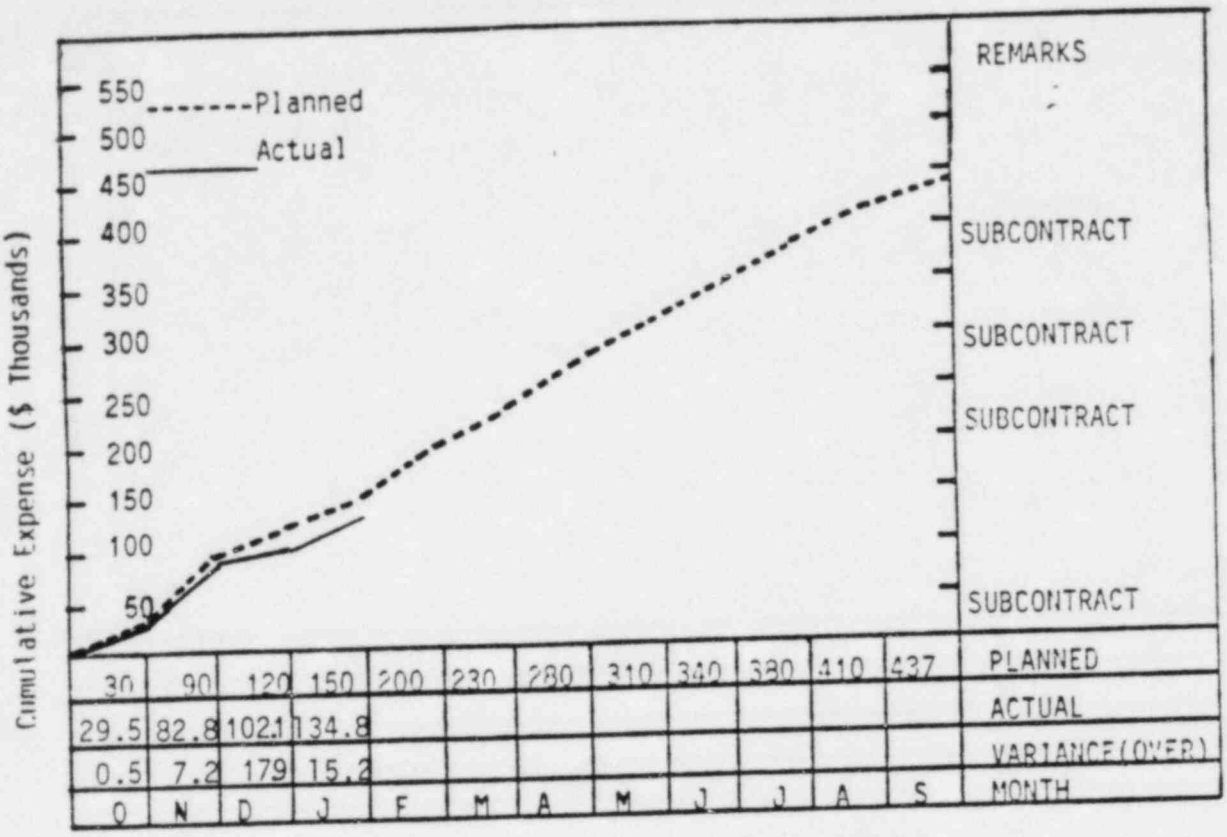
Two letter reports were written that outline our criteria to be used in selecting fire compartment models and our plans for assessment of FIRAC. The FIRAC assessment plan was given to you in rough-draft form so that we may incorporate your input at an early stage.

N. Alvares (LLNL) plans to send K. Foote to Los Alamos on March 7, 1983, to discuss the results of the FY 1982 LLNL tests. He will bring a digital tape of the results so that we can plot the results with our graphics package. In addition, the consulting agreement with H. Mitler may not go into effect until March 14, 1983. These two situations have led us to ask you for a 1-month extension for the fire model assessment report and the Harvard code assessment report. As we discussed on the telephone on February 15, 1983, we will vary the program development schedule to reflect this change.

IV. BUDGET VARIANCE (Fig. 2)

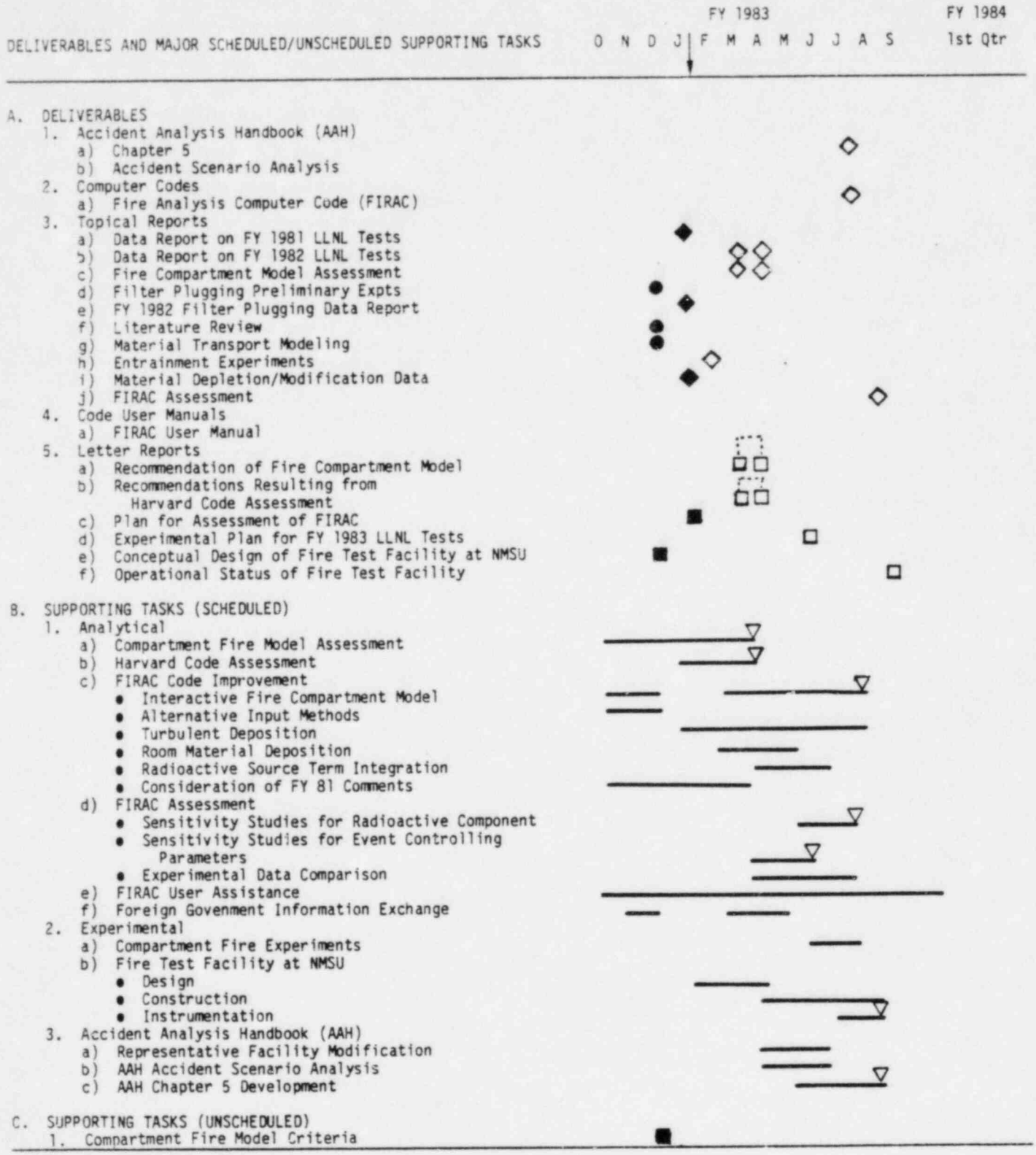
We have reduced our underspending by $15.2 k this month. The consulting agreement with H. Mitler will partially make up the difference between the planned and actual spending.

Fig. 2.
OPERATING COSTS IN THOUSANDS



30	90	120	150	200	230	280	310	340	380	410	437	PLANNED
29.5	82.8	102.1	134.8									ACTUAL
0.5	7.2	17.9	15.2									VARIANCE(OVER)
O	N	D	J	F	M	A	M	J	J	A	S	MONTH

FIG. 1
FY 1983 PROGRAM DEVELOPMENT SCHEDULE



PDR

March 8, 1983

LETTER REPORT

NRC Research and/or Technical Assistance Rept

Accession No. _____

Contractors Report No. _____

Contract Program or Project Title: Investigation of Accident-Induced Flow and Material Transport in Nuclear Facilities

Subject of this Document: Progress reported for JANUARY 83

Type of Document: Informal monthly progress report

Author(s): R. A. Martin and W. S. Gregory

Date of Document: February 28, 1983

Responsible NRC Individual and NRC Office or Division

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Prepared for
U.S. Nuclear Regulatory Commission
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NRC FIN A7029

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