

Los Alamos National Laboratory Los Alamos, New Mexico 87545

Safety Assessment

December 20, 1982 Q-6-648 (R673) IN REPLY REFER TO: K557 MAIL STOP: (505) 667-6231 TELEPHONE: FTS 843-6231

DATE.

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 OCTOBER 1982 -- INVESTIGATION OF ACCIDENT-INDUCED FLOW AND MATERIAL TRANSPORT IN NUCLEAR FACILITIES

The monthly status report for October 1982 is enclosed. Please call if you have questions or need clarification.

Sincerely,

Dick

R. A. Martin

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RAM/WSG:cd

Enc: As cited above

Cys w/enc: P. C. Owczarski/J. Mishima, PNL M. Simon-TOV/ORNL J. H. Scott, DAD/MP, MS F671 J. F. Jackson/M. G. Stevenson, Q-DO, MS E561 R. A. Haarman, Q-6, MS K557 Q-6 Fluid/Thermal Section CRMO (2), MS A150 Q-6 File

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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: October 1982 BUDGET STATUS: Annual Budget \$437.6 k (includes FY 1982 carryover of \$37.6 k) Monthly spending : \$ 29.5

Cumulative Spending: \$ 29.5 Funds Remaining: \$408.1

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 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

The first interactive version of FIRAC that simulates ventilation system/fire interactions that are caused by a change of airflow resistance in response to heat and smoke exposure of filters, blowers, and fans has been initiated. Interactions are modeled by adjusting fire source terms (mass burning rate, heat deposition in burn room gas, and particle exhaust) to changes in exhaust flow that reflect changes in airflow resistance. These source-term adjustments represent a new and important mode of fire growth and recession that cannot be simulated by existing building fire models. Preliminary verification using Lawrence Livermore National Laboratory (LLNL) fire test data was successful after we extended source-term bounding factors from second-step source terms to first-step source terms.

The stability of the interactive FIRAC code with extreme ventilation rates and fire strengths must be verified with the FY 1982 LLNL tests and with fire types other than moderately smoky fuel spray before it can be extended further. We intend to investigate FIRAC capabilities for simulating ventilation system/fire interactions such as filter plugging and blower heating through a FY 1983 series of fire tests at LLNL, which maximize rather than minimize fire-induced transients of the exhaust flow rate.

III. PROGRAM DEVELOPMENT VARIANCE (Fig. 1)

The FY 1983 program schedule is shown in Fig. 1. There is no variance in October 1983.

IV. BUDGET VARIANCE (Fig. 2)
None.

FIG. 1 FY 1983 PROGRAM DEVELOPMENT SCHEDULE

FY 1984 FY 1983 DELIVERABLES AND MAJOR SCHEDULED/UNSCHEDULED SUPPORTING TASKS OINDJFMAMJJAS 1st Otr A. DELIVERABLES 1. Accident Analysis Handbook (AAH) 0 a) Chapter 5
 b) Accident Scenario Analysis 2. Computer Codes 0 a) Fire Analysis Computer Code (FIRAC) 3. Topical Reports 0 Data Report on FY 1981 LLNL Tests a) b) Data Report on FY 1982 LLNL Tests c) Fire Compartment Model Assessment d) Filter Plugging Preliminary Expts 0 0 e) FY 1982 Filter Plugging Data Report 00 f) Literature Review g) Material Transport Modeling Entrainment Experiments C h) Material Depletion/Modification Data 0 j) FIRAC Assessment Code User Manuals

 FIRAC User Manual

 5. Letter Reports a) Recommendation of Fire Compartment Model
 b) Recommendations Resulting from Harvard Code Assessment c) Plan for Assessment of FIRAC
 d) Experimental Plan for FY 1983 LLNL Tests Conceptual Design of Fire Test Facility at NMSU e) f) Operational Status of Fire Test Facility B. SUPPORTING TASKS (SCHEDULED) 1. Analytical a) Compartment Fire Model Assessment Harvard Code Assessment b) c) FIRAC Code Improvement Interactive Fire Compartment Model Alternative Input Methods Turbulent Deposition Room Material Deposition Radioactive Source Term Integration Consideration of FY 81 Comments d) FIRAC Assessment Sensitivity Studies for Radioactive Component
 Sensitivity Studies for Event Controlling Parameters Experimental Data Comparison FIRAC User Assistance e) f) Foreign Govenment Information Exchange 2. Experimental a) Compartment Fire Experiments b) Fire Test Facility at NMSU • Design Construction Instrumentation 3. Accident Analysis Handbook (AAH) a) Representative Facility Modification b) AAH Accident Scenario Analysis c) AAH Chapter 5 Development C. SUPPORTING TASKS (UNSCHEDULED)

LEGEND

Informal Letter Report Complete Informal Letter Report ♦ Initial Draft Topical Report ♦Initial Draft Topical Report Complete O Final Draft Topical Report OFinal Draft Topical Report Completed A Draft Interim Report Complete △ Draft Interim Report ♥Intermediate Nilestone Complete VIntermediate Milestone ----Scheduled Variation Activity Line * Identification of Cause in Variation

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December 28, 1982 Por

LETTER REPORT

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 OCTOBER 82

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Type of Document: Informal monthly progress report

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

Date of Document: December 20, 1982

Responsible NRC Individual and NRC Office or Division

Steven Bernstein, Transportation and Materials Risk Branch, DRA/RES

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LETTER REPORT