

LETTER REPORT

May 7, 1981

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NRC Research and Technical
Assistance Report

LETTER REPORT

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May 7, 1981

Don Solberg
U.S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Transportation and Materials Risk Branch
Standards Section
Mail Stop NL 5650
Washington, DC 20555

NRC Research and Technical Assistance Report

Dear Don:

ACCIDENT AEROSOL CHARACTERIZATION-APRIL MONTHLY REPORT

Through March 29, 59.7% or \$254.8K of the available operating funds have been spent.

PROJECT MANAGEMENT

FY-81 operating expenditures through March 29, 1981 were \$254.8K, which is 59.7% of the available \$427K. The corresponding working period (October 1 - March 29) was 48.6% of the available time in FY-81. The expenditures from February 23 - March 29 were \$46.1K.

On March 10, 1981 I sent G. S. Lewis a detailed letter of our financial position in FY-81. In this letter I showed a number of options for producing the deliverables with \$100K, \$50K and \$0 augmented funds in FY-81. After meeting about this letter in your area on March 31, attended by G. S. Lewis, Tom Clark, Jofu Mishima, Martin Chan and myself, I was informed by G. S. Lewis that \$75K would be augmented to our FY-81 operating funds. When this happens, our spending rate up to March 29 of \$9.8K/week will more closely match a linear rate for the year of \$9.65K/week. This rate has been necessary to produce the required deliverables and to meet increased scope requirements for the Accident Analysis Handbook. We are proceeding on the various tasks as defined in that letter for the \$100K option with the exception of Task D, Failed Compartment Tests, which are proceeding on a reduced schedule.

TASK A. LITERATURE REVIEW, PROGRAM PLANNING, HANDBOOK INPUT

The literature review for Task B is in second draft typing and should be available for mailing as an intermediate draft before the May 19-21 RRG meeting. Task C review is in the final writing stages. Task D review writing has just commenced in March.

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The Program Planning Document is still in LANL's hands. We will add our revisions when we receive it.

Progress on the AAH is according to schedule (letter to G. S. Lewis dated March 5, 1981).

TASK B. AEROSOL GENERATION EXPERIMENTS

The final draft of the spill report "Aerosols Generated by Free Fall Spills of Powders and Solutions in Static Air" was delayed by a crunch at word processing. Revisions suggested by internal review were made and the document returned for corrections prior to sending out advance copies.

Four PARE runs with TiO_2 were completed in March for a total of 18. These were Type 1 release (pressure is within powder chamber) as opposed to Type 2 release where the elevated pressure is external before rupture. If the Type 2 releases are significantly different from Type 1 runs, the full schedule of 14 Type 1 and 6 Type 2 will be run with DUO. On this basis, the PARE runs with powders are 40% complete.

A program planning report, "Accident Generated Aerosols: Experimental Program," was completed and submitted to G. S. Lewis. A copy was sent to W. S. Gregory (LANL). This report scoped potential research areas for the project including extended RART experiments and pressurized liquid release experiments.

TASK C. FIRE GENERATED PARTICULATE TESTS

The literature review has revealed three laboratories on the East coast that have considerable experience in fire generated aerosol measurements. Jofu Mishima, Martin Chan and P. C. Owzarski visited these laboratories in March to obtain latest information, to see their facilities and to explore the possibility of subcontracting all or part of the needed fire aerosol experiments. The National Bureau of Standards Fire Research Group (near Germantown, MD) has had some good prior experience, but the necessary equipment seemed to be incomplete at this time. Factory Mutual Research of Norwood, MA (Dr. Archie Tewarson) has done excellent work in the energetics of and smoke produced in both smoldering and flaming combustion. They are fully equipped to do a portion of the required experiments. Georgia Tech Dept. of Aeronautical Engineering (Dr. Ben Zinn) has good available equipment for size measurement of fire generated aerosols and can probably do the remaining necessary experiments. We are considering them also for the extraneous particles in fires experimentation.

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TASK D. FAILED COMPARTMENT TESTS

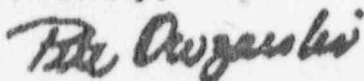
The complete aerosol measuring system including optical particle sizes, electrical aerosol analyzer, microcomputer was assembled and tested. Some components were returned to the factory for warranty work. Software development for interfacing the aerosol instruments to the microcomputer was initiated.

TASK E. MODELS

Martin Chan and P. C. Owzarski attended a four day workshop on fire modeling in Atlantic City, NJ sponsored by the FAA. The highlights of the workshop were the demonstrations of the major fire models on aircraft fires, a tour of the FAA fire test facilities, a day of seminars on fire plume modeling and a day of seminars on smoke transport in buildings. The two days of seminars were most valuable in the contacts made and latest modeling research reviewed. The preliminary conclusions that can be made from this week are:

1. The state-of-the-art of fire growth models, one of which seems to be needed for our fire scenario descriptions, is probably in the Harvard Fire Model, which is probably too complex for our needs.
2. No one has considered the typical room fire scenario with forced ventilation flows that are likely in our facilities.
3. There are models available that can do parts of the fire scenario. One can provide the radiant energy/sensible heat ratios. Another can do a fair job of initial plume definition and mixing with air. There are some good methods for heat transfer calculations from fires to compartment walls.
4. There are no models that can provide the smoke production to the course of the fire with any confidence. This is a major need of ours and can be substantially met by results of Task C and some modeling efforts on our part.

Sincerely,



P. C. Owzarski
Applied Meteorology & Emissions Assessment
Atmospheric Sciences Department

cc: WS Gregory/RA Martin - LANL
HW Godbee/EJ Fredrick - ORNL

PNL SCHEDULE/PROGRESS OF DELIVERABLES - FY-81 *(as of 5/29/81)*TASK A - LITERATURE REVIEW, PROGRAM PLANNING, HANDBOOK INPUT

1. Program Plan Document - Scheduled Publication with LASL: February 1981
Percent Complete 80
2. AAH (MOX) Chapters
Percent Complete 2-5%, 3-15%, 4-10%
3. Literature Survey Document - Scheduled Publication: February 1981
Percent Complete Task B - 95%; Task C - 80%; Task D/E - 60%

TASK B - AEROSOL GENERATION EXPERIMENTS

1. Unpressurized Release of Powders and Liquids
Experiments done by December 1980. Percent Complete 100
Draft Document by February 1981. Percent Complete 100
2. Pressurized Release of Powders
Experiments done by June 1981. Percent Complete 40
3. Pressurized Release of Liquids
Submit Experiment Plan by June 1981. Percent Complete 20
4. Additional RART Tests
Submit Plan by March '81 RRG Meeting. Percent Complete 90

TASK C - FIRE GENERATED PARTICULATE TESTS

1. Literature Search, see Task A.1
2. Combustion Products Experiments
Exp. Plan by January 1981. Percent Complete 70
3. Combustion Prod. & Extraneous Particulates
Exp. Plan by July 1981. Percent Complete < 5
4. Fire Particulates - Near Field Behavior
Study need - no deadline

TASK D - FAILED COMPARTMENT TESTS

1. Intact Glovebox Experiments
Submit plan by September 1981.* Percent Complete 10
2. Failed Glovebox Experiments
Submit plan by September 1981.* Percent Complete < 5

TASK E - ANALYTICAL MODEL VERIFICATION/SUBSTANTIATION

1. Preliminary Evaluation of Faulted Container Flow & Particulate Models
Submit with Task A.1
2. Free Fall Spills First Model
Submit draft by July 1981. Percent Complete 100 (in 81 document)

*Deadline to be changed to later date.