September 18, 1981

NRC Research and Technical Assistance Report

LETTER REPORT

Accession No. _____
Contractors Report No. _____

Contract Program or Project Title: ACCIDENT AEROSOL CHARACTERIZATION

Subject of this Document: Progress reported for JULY 1981

Type of Document: Informal Monthly Progress Report

Author(s): P. C. Owczarski

Date of Document: ~~August 26, 1981~~

Responsible NRC Individual and NRC Office or Division

Steven Bernstein, DRA, RES

Prepared by
Battelle Pacific Northwest Laboratories
P.O. Box 999
Richland, WA 99352

Prepared for
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

NRC FIN NO. B2287

DISTRIBUTION
J. E. Ayer
A. T. Clark
P. Loysen
J. C. Malaro
D. E. Solberg
M. C. Cullingford
S. Bernstein
L. Rouse
M.T. Jamgochian
T. Eng
R.G. Page

LETTER REPORT

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509) 375-6161
Telex 15-2874

August 26, 1981

Steven Bernstein
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 Steve:

ACCIDENT AEROSOL CHARACTERIZATION - JULY MONTHLY REPORT

Through June 28, 78.0% or $391K of the available operating funds have been spent.

PROJECT MANAGEMENT

FY-81 operating expenditures through June 28, 1981 were $391K, which is 78.0% of the available $502K. The corresponding working period (October 1 - June 28) was 74.1% of the available time in FY-81. The expenditures from May 31 - June 28 were $43.8K.

TASK A. LITERATURE REVIEW, PROGRAM PLANNING, HANDBOOK INPUT

The literature reviews concerning Tasks B, C, and D have been supplied in draft form at or prior to the June 2-4 RRG meeting. An up-to-date version of the AAH Chapters 2, 3, and 4 were also submitted at the RRG meeting for comments. During the meeting, the first sample fire problem was considered to have stretched reality in magnitude of combustibles and radioactive materials involved. We have responded to this by developing another slug press fire scenario that is more credible. This scenario will be submitted in July.

Also at the RRG meeting we presented an hand calculable analytical tool for determining the likelihood of compartment overpressurization during a compartment fire. This tool can indicate the likely complexity of a compartment fire due to the burning rate or duration of the fire.

TASK B. AEROSOL GENERATION EXPERIMENTS

Until the $75K additional funds were received for the overall project, we proceeded in our experimental plans incurring a Task B deficit.

In June, all planned PRAC pressurized powder releases were completed. Airborne quantities measured in the RART after the PRAC releases were 1.2 to 2 times larger than corresponding releases in the PARE experiments.

We anticipate having to revise the free fall spill report recently submitted, based on comments at the June RRG meeting. During subsequent phone discussions with Jim Ayer, we see this spill document becoming two documents: one containing the spill data alone and the other document containing all predictive models for calculating source terms in the AAH. These models will be based on fundamental principles wherever possible and not just on statistical formulations from the free fall data.

Since we did not have time during the June RRG meeting to adequately discuss the extended RART experiments for FY-82, we deferred such discussions to a later July date.

TASK C. FIRE GENERATED PARTICLE TESTS

An oral report on the Task C literature search was given at the June RRG meeting, where the available combustion product information and information gaps were clearly presented. As indicated at the meeting we plan to fill in the information gaps via a contract with Factory Mutual Research Corporation for some experimental measurements of combustion energies and products for selected fuel cycle facility combustibles.

During the period June 21 and July 2, Martin Chan of PNL spent eight work days with Don Beason at LLNL helping them carry out a series of burn tests for fire model evaluation. This was done so we could appreciate the far field modelers needs, so we understand the LLNL facility better and its measurement systems (in consideration of it for scale factor tests), and so we could be of help when they needed it.

TASK D. FAILED COMPARTMENT TESTS

In June John Glissmeyer submitted his partially completed literature survey (see Task E) for the RRG meeting. Also he has prepared basic experimental plans for FY-82 that he wants to present to the RRG (at the same date as "extended RART experiments").

TASK E. ANALYTICAL MODELS

The Task D and Task E literature survey on models for behavior of particles in compartments has all the essential literature reviewed and documented.

Battelle

Dr. Tom Bander (B.S. and M.S. Aeronautical Engineering and PhD in Theoretical and Applied Mechanics) has been assigned the modeling of the powder spill portion of the free fall spills. He will work with me in completing the overall document on spill models.

Sincerely,

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

PCO:dh

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

Date: as of June 28, 1981

PNL SCHEDULE/PROGRESS OF DELIVERABLES - FY-81

TASK A - LITERATURE REVIEW, PROGRAM PLANNING, HANDBOOK INPUT

1. Program Plan Document - Scheduling Publication with LANL: February 1981
   Percent Complete 85
2. AAH (MOX) Chapters
   Percent Complete 2-30%, 3-30%, 4-25%
3. Literature Survey Document - Scheduled Publication: February 1981
   Percent Complete Task B - 95%; Task C - 85%; Task D/E - 80%

TASK B - AEROSOL GENERATION EXPERIMENTS

1. Unpressurized Release of Powders and Liquids
   Rework basic data document. Percent Complete 80
2. Pressurized Release of Powders
   Experiments done by June 1981. Percent Complete 100
3. Pressurized Release of Liquids
   Submit Experiment Plan by June 1981. Percent Complete 100
4. Additional RART Tests
   Submit Plan by June RRG Meeting. Percent Complete 100

TASK C - FIRE GENERATED PARTICULATE TESTS

1. Literature Search, see Task A.1
2. Combustion Products Experiments
   Exp. Plan by January 1981. Percent Complete 100
3. Combustion Prod. & Extraneous Particulates
   Exp. Plan by July 1981. Percent Complete 80
4. Fire Particulates - Near Field Behavior
   Study need - no deadline

TASK D - FAILED COMPARTMENT TESTS

1. Intact Glovebox Experiments
   Submit plan by December 1981. Percent Complete 90
2. Failed Glovebox Experiments
   Submit plan by Devember 1981. Percent Complete 25

TASK E - ANALYTICAL MODEL VERIFICATION/SUBSTANTIATION

1. Preliminary Evaluation of Faulted Container Flow & Particulate Models
   Submit with Task A.1
2. Free Fall Spills Models
   Submit draft by December 1981. Percent Complete 20