INTERIM REPORT

October 27, 1980

Accession No. _____
Contractors Report No. _____

Contract Program or Project Title: Accident Aerosol Characterization

Subject of this Document: Reporting for September 1980

Type of Document: Informal monthly progress report

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Date of Document: October 16, 1980

Responsible NRC Individual and NRC Office or Division:

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This document was prepared primarily for preliminary or internal use. It has not received full review and approval. Since there may be sutstantive changes, this document should not be considered final.

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NRC FIN No. B2287

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October 16, 1980

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Dear Lew:

ACCIDENT AEROSOL CHARACTERIZATION--SEPTEMBER MONTHLY REPORT

Approximately 94% ($365K) of the authorized operating funds for FY-80 have been spent. $26,900 remain to be carried into FY-81.

TASK A. PROJECT MANAGEMENT

The FY-80 end cost accounting summary is as follows: Total expenditures for FY-80 were $365K for a project total of $498K. Total funds remaining to be carried over into FY-81 are $26.9K. With the additional funding of $400K for FY-81, $426.9K represents the total operating funds available for FY-81.

September expenditures were $27.1K.

Sue Sutter and John Glissmeyer attended demonstrations of Climet particle sizers in Portland, Oregon on September 11. Specifications for a Climet system will be sent out for bid in October.

A new form entitled, PNL SCHEDULE/PROGRESS OF DELIVERABLES - FY-81, is attached for comment. This form will be completed and attached to each monthly report for the FY-81 months.

TASK C. LITERATURE REVIEW

For the Program Plan Document "Particulate Generation Under Accident Stresses Section," the following having been completed in draft form: 1) Powder Spills, 2) Resuspension, 3) Pressurized and Explosive Releases, 4) Comminution.

TASK D. EXPERIMENTS TO CHARACTERIZE ACCIDENT GENERATED AEROSOLS

Performance tests of the pressurized airborne release equipment, PARE, were completed. Preliminary data were obtained in the RART using 350g of uranine

traced TiO_2 in each test. Explosive releases were obtained at 50, 100, 250, and 1000 psig (PARE chamber pressure). The airborne fraction of power increased to 6% maximum at 500 psig as the release pressures were increased. At 1000 psig only 4.5% was airborne, but considerable powder was impacted onto the RART ceiling. Therefore, some unrestricted releases are planned for the final test matrix. Samples showed that the airborne particles appeared to be agglomerated. The aerodynamic mean diameters range from 7 μm to as high as 92 μm. The unagglomerated TiO_2 particles are about 3 μm amd.

During September, 12 of the 14 scheduled free fall DUO powder spills were completed. High speed photography was used during selected spills to gain insight into mechanisms of aerosol formation.

TASK E. TIME DEPENDENT BEHAVIOR OF PARTICULATE MATERIAL

During September a demonstration of the Climet Model 208 and 225 optical particle counters and the Climet 210 multi-channel monitor was attended by Sue Sutter and John Glissmeyer. A system using multiple Model 225 sensors and the multi-channel monitor would be applicable to experiments in FY-81 Tasks B, C, and D for monitoring particle sizes in the 0.3 to 20 micrometer range. Care must be taken, however, to separate out particles larger than 25 μm prior to the sample aspiration to reduce optic contamination. Arrangements have been made to borrow an Electric Aerosol Analyzer (Thermosystems, Inc.) for particle sizing in the 0.003 to 1 micrometer range. It will be cost effective to reduce manual data reduction by procuring a small data management system to log and process the rapid accumulation of size data from these instruments. During October we will write the specification for the Climet system and send it out for bid.

TASK G. MODEL ASSESSMENT

A topical informal report entitled, Use of SOLAV and SOLAP Codes to Determine Aerosol Flow Patterns in a Glovebox, is completed and will be distributed at the October 27-28 RRG meeting. This report describes the application of these 2-D codes to understanding ventilation flow in gloveboxes and the movement of particulates entering the glovebox in the ventilation flow. The deposition of particles using these codes is compared with deposition using a simple well-mixed settling model.

The evaluation of existing aerosol behavior computer models was further studied in September. The objective is to determine the extent of their applicability to modeling aerosol releases from gloveboxes, containers, and other small enclosures. The two important families of codes are the descendants of the marker and cell approach summarized in a memo (J.A. Glissmeyer, June 28, 1979 to distribution) and the LMFBR sodium fire codes with heterogenous aerosol

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agglomeration, of which HAARM-3 is a recent example. Work is currently underway at Sandia and Battelle-Columbus for improvements to and replacements for the latter. We hope we can obtain more information on these developments.

A summary sheet enclosed shows the features of many known codes. Here SOLAV = SOLA-2D and SOLAP = SOLA-PARTICLE.

Sincerely,

Peter Owzarski

P. C. Owzarski,
Atmospheric Sciences Department

attachments

ndj

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

	SOLA-2D	SOLA-PARTICLE	SOLA-3D	SOLA-ICE	SOLA-VOF	SOLA-VM	SOLA-SURF*	SALE
Generates Velocity Field	X		X	X	X	X	X	X
Moves Particles:								
As flow tracers only				X				
Accounting for particle dynamics		X	X			X		
Allows Free Surfaces					X			
Compressible Flow				X				
Incompressible Flow	X	X	X		X	X	X	X
Dimensions:								
2D	X	X		X	X	X	X	
3D			X					X
Rectangular	X	X	X	X			X	
Irregular quadrilateral w/ general zoning								X
Cylindrical Polar						X		
Movable Boundary						X		X
Current Availability of Code								
Tape only					X	X		
Documented Listing	LA-5852 and Addendum	X		LA-6236			LA-5852 and Addendum	X
Descriptive Report		X	X	LA-6236				

* Allows curved surfaces.

Date: _____

PNL SCHEDULE/PROGRESS OF DELIVERABLES - FY-81

TASK A - LITERATURE REVIEW, PROGRAM PLANNING, HANDBOOK INPUT

1. Program Plan Document - Scheduled Publication Date: February 1981
   Percent Complete _____
2. UHB - MOX Plant Chapters 3, 4, 5, 6 - Publication Date: March 31, 1981
   Percent Complete _____

TASK B - AEROSOL GENERATION EXPERIMENTS

1. Unpressurized Release of Powders and Liquids
   Experiments done by December 1980. Percent Complete _____
   Draft Document by February 1981. Percent Complete _____
2. Pressurized Release of Powders
   Experiments done by June 1981. Percent Complete _____
3. Pressurized Release of Liquids
   Submit Experiment Plan by June 1981. Percent Complete _____
4. Additional RART Tests
   No 1981 schedule.

TASK C - FIRE GENERATED PARTICULATE TESTS

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

TASK D - FAILED COMPARTMENT TESTS

1. Intact Glovebox Experiments
   Submit plan by April 1981. Percent Complete _____
2. Failed Glovebox Experiments
   Submit plan by September 1981. Percent Complete _____

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 _____