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Aerosol Release and Transport Program

Report of Foreign Travel of T. S. Kress to the Meeting
of the CSNI Group of Experts on Nuclear
Aerosols in Paris, France

Foreign Trip Report

T. S. Kress

September 15, 1982

M. Silberberg, Chief
Fuel Behavior Branch
Division of Accident Evaluation

This document was prepared primarily for preliminary or
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FOREIGN TRIP REPORT

ORNL/FTR-1371

DATE: September 15, 1982

SUBJECT: Report of Foreign Travel of T. S. Kress, NRC/DAE Program Manager,
Engineering Technology Division

TO: Herman Postma

FROM: T. S. Kress

PURPOSE: At the request of NRC, to participate as a working member at
the meeting of the CSNI Group of Experts on Nuclear Aerosols

SITES VISITED: 9/9-9/10 CSNI Hdqts. Paris, France J. Royen

ABSTRACT: The CSNI Group of Experts on Nuclear Aerosols had previously
prepared a state-of-the-art report on nuclear aerosols in
reactor safety under the chairmanship of M. Silberberg of the
USNRC. At the urging of the UKAEA, the Group of Experts met
again in April 1982 and decided to produce a supplement to that
report which would update it and make it more specific for LWR's
(the original report emphasized LMFBR's).

The meeting being reported on here was held to review the first
draft of this supplement and to prepare summary conclusions and
recommendations to be presented to the CSNI in their October
meeting.

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REPORT OF FOREIGN TRAVEL OF
TOM S. KRESS
NRC/DAE Manager of Programs at ORNL

PURPOSE:

The purpose of this foreign travel was to review the first draft of a supplement report under preparation by the CSNI Group of Experts on Nuclear Aerosols and to prepare summary conclusions and recommendations to be presented to the CSNI in their October meeting. The Group had previously (June 1979) produced a state-of-the-art report on nuclear aerosols in reactor safety under the chairmanship of M. Silberberg of the USNRC. This original report emphasized LMFBR's and did not consider the influence of the primary coolant system. Consequently, at the urging of the UKAEA, the Group met again in April 1982 to begin preparation of the supplemental report that would emphasize LWR's and would include release from fuel, transport in the primary system, gas-phase chemistry effects, and containment behavior specific to the presence of steam in LWR's. At the meeting in September 1982, reported on here, the incomplete first draft of this supplement report was reviewed and recommendations were made to the various chapter authors for revisions.

REPORT OF THE MEETING:

The proposed draft contributions for each of the chapters for the supplement report were reviewed and revisions were recommended to the authors to be implemented in the final draft that is to be submitted for CSNI approval in November 1982.

A set of summary conclusions based on the draft chapters was developed by the Group to be included in the supplement and to be presented to the CSNI Working Group 4 in October.

Although these summary conclusions are too preliminary and lengthy to list here, a brief personal interpretation follows:

1. The major thrust of the original 1979 SOAR remains valid;
2. Important special aerosol behavioral features specific to LWR's are diffusiophoresis associated with steam condensation on cool surfaces and steam condensation onto aerosols;
3. The state-of-the-art for release of aerosols from fuel is still as presented in NUREG-0772 but is rapidly changing with more mechanistic treatments being developed. Timing of release of different species may be an important consideration;

4. Modeling of aerosol nucleation and growth is inadequate. The potential importance of this lies in the initial competition between airborne and system surfaces to establish the mass available for transport;
5. The impact of chemistry on aerosol behavior is an unknown element that needs additional definition. Although not specifically an aerosol area, aqueous chemistry of fission products is recognized to be an important consideration in assessing fission product release;
6. Substantial progress has been made toward predicting aerosol transport in LWR primary systems. The models need experimental validation;
7. Improvements are needed in the modeling of thermal-hydraulics and in the interfacing of such models with aerosol physics of release, transport, and deposition.

Although many areas were identified in which the state-of-the-art needs improving, it was generally agreed that the research programs now in place in the various countries should supply substantial improvement in the near future.

It was agreed that this Group would meet again in April 1983 to put the supplement report into final publication form.

It was also agreed that this group would recommend to the CSNI that its charter be broadened to include source terms in general.

It was also agreed to recommend that the CSNI consider sponsoring another technical conference, similar to the one held in Gatlinburg in April 1980, to promote information exchange and to update the progress (particularly with respect to LWR's) that has been made since then.

APPENDIX A

Itinerary of Trip

September 7, 1982 Leave Oak Ridge, Tennessee
September 8, 1982 Arrive Paris, France
September 9-10, 1982 Group of Experts Meeting, Paris
September 11, 1982 Travel to Oak Ridge, Tennessee

APPENDIX B

Persons Contacted

The meeting was chaired by F. Abbey of the UKAEA and J. Royen (France) was the Secretariat for the CSNI. Others in attendance were:

C. Andriessse, Netherlands
D. Booth, UK
S. Chakraborty, Switzerland
I. Dunbar, UK
J. Femandjian, France
J. Gieseke, USA
T. Kress, USA
D. Manesse, France
D. Mecham, Sweden (US Attaché)
H. Morewitz, USA
W. Schikarski, FRG
W. Schöck, FRG
D. Torgerson, Canada
J. Van de Vate, Netherlands

Appendix C

Bibliography of Literature Acquired

1. M. Lucas, et al, "Iodine Behavior in PWR Accidents Leading to Severe Core Damage," presented at the International Meeting on Thermal Nuclear Reactor Safety, Chicago, Illinois (September 1982).
2. D. F. Torgerson, "Fission Product Chemistry Under Reactor Accident Conditions," presented at the International Meeting on Thermal Nuclear Reactor Safety, Chicago, Illinois (September 1982).
3. J. M. Otter, "Aerosol Transport Analysis of LWR High-Consequence Accidents Using the HAA-4A Code," (Reference unknown).
4. C. D. Andriessse, "High Temperature Release of Fission Products from Overheated Reactor Fuel," a proposed research project at KEMA Research Laboratories, Arnhem, Netherlands.

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- 4-5. Director, Division of International Security Affairs, DOE, Wash.
- 6-7. Director, Division of International Programs, NRC, Wash.
- 8-9. Division of Technical Information and Document Control, NRC, Wash.
10. J. A. Lenhard, DOE-ORO
11. J. S. Denton, DOE-ORO
12. Herman Postma, ORNL
13. T. S. Kress, ORNL
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