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INTERIM REPORT

Accession No. \_\_\_\_\_  
Contractor's Report No. \_\_\_\_\_

Contract Program or Project Title: Definition of Parameters for Major  
Accidents at Waste Solidification and Spent Fuel Storage Facilities

Subject of this Document: Progress reported for October 1979

Type of Document: Informal monthly letter progress report

Author(s): E. J. Frederick

Date of Document: November 12, 1979

Responsible NRC Individual and NRC Office or Division: \_\_\_\_\_

Donald E. Solberg, Chief, Systems Performance Research Branch, SAFER:RES

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

Prepared By  
Oak Ridge National Laboratory  
Union Carbide Corporation  
Post Office Box X  
Oak Ridge, Tennessee 37830

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

NRC FIN No. B0425

NRC Research and Technical  
Assistance Report

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OAK RIDGE NATIONAL LABORATORY

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POST OFFICE BOX X  
OAK RIDGE, TENNESSEE 37830

November 12, 1979

Mr. Donald E. Solberg, Chief  
Systems Performance Branch  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Mail Stop 1130SS  
Washington, D. C. 20555

Dear Mr. Solberg:

In accordance with your instructions, I am transmitting herewith a brief report for the month of October 1979 on the "Definition of Parameters for Major Accidents at Waste Solidification and Spent Fuel Storage Facilities" program.

Very truly yours,

A handwritten signature in dark ink, appearing to read "E. J. Frederick / ms".

E. J. Frederick  
Manager of Regulatory Programs  
Chemical Technology Division

EJF:msb

Enclosure

cc: D. E. Ferguson  
R. W. Glass  
W. S. Gregory - LASL  
J. Mishima - PNL  
F. R. Mynatt  
C. D. Scott  
EJF File

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PROGRESS REPORT FOR OCTOBER 1979

PROJECT TITLE: Definition of Parameters for Major Accidents at Waste  
Solidification and Spent Fuel Storage Facilities

189 No.: BO425

BUDGET ACTIVITY No.: DOE 41 88 55 02 5

PERSON IN CHARGE: E. J. Frederick

PRINCIPAL INVESTIGATORS: H. W. Godbee, E. L. Compere

COSTS: October - \$10,794  
FY 1980 - \$10,794  
Total to Date - \$86,619  
Estimated Cost to Completion - \$118,381

ACCOMPLISHMENTS:

The draft summary description of the joint LASL, ORNL, BNWL walk-through exercise for analysis of a fire accident scenario at the Anderson, S.C. (Westinghouse) mixed oxide fuel fabrication facility has been reviewed and comments forwarded to LASL.

We have assembled major parts of the SRP Defense Waste Solidification Plant flowsheet, based on 1977 - early 1978 data. We are using this as our reference flowsheet for the SRP waste solidification process and will update it as more recent information becomes available.

We have also initiated a review of the waste solidification process proposed by Exxon in the Nuclear Fuel Recovery and Recycling Center PSAR.

In the examination of possible major accidents in waste solidification facilities, we note that the possible detonation of radiolytic hydrogen in a storage tank vapor space could lead to results recognized as serious:

- (a) Tank walls and possibly roof could collapse,
- (b) Major damage to offgas ducting and filters could occur, and
- (c) Loss of installed cooling might occur.

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An ORNL study (in process of publication) of such an accident in the Barnwell high-level waste storage tank indicate; that loss of all cooling might result in the

production of a molten mass which would penetrate the tank bottom, the vault liner and the concrete vault. The high level wastes of the Exxon plant would be similar, but the high-level waste storage tank serves only as intermediate holdup for solidification plant feed, and is much smaller in size and less vulnerable. Defense waste slurries or sludges are stored in large tanks at Savannah River and Hanford, but generate much less heat. However, scoping calculations, and extension of an analysis of a Hanford waste tank containing salt cake and a higher heat generating sludge layer (S. C. Slate and P. G. Pelto, Heat Transfer of an Underground Storage Tank Containing Solidified Heat Generating Wastes, BNWL-2043, August 1976) indicate that relatively high central temperatures could be produced in thick bodies of sludge. Thus, a more careful analysis of loss of installed cooling accidents is indicated, evidently becoming more serious as the thickness or heat generation rate of sludge increases.

The following documents (requested through NRC) have not been received:

1. DPSTD-77-13, "Preliminary Technical Data Summary for the Defense-Waste Solidification Facility", July 1978 (comment draft). This document has been distributed in DOE, but SRP did not respond to our request for this. Cited as reference in ADL-C-1065-1.
2. DPSTSY-200-1, W. S. Durant and W. E. Prout, "Systems Analysis - 200 Area Canyon Operations, Savannah River Plant, Chemical Separations Facilities," E. I. DuPont de Nemours & Co., Savannah River Laboratory, Aiken, South Carolina (1975). This internal document contains the accident analyses cited in the SRL Defense Waste Document - ERDA 77-42/1 (May 1977).

A follow-up request from NRC should be helpful in obtaining these documents for use in our work.

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