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August 14, 1979

Dr. Gordon Edison  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Dr. Edison:

Enclosed is a copy of the monthly report for July, 1979, on the program "Analysis of Hypothetical Accidents Resulting in Core Meltdown" which is Task 8 of Contract NRC-04-76-293. The report describes the efforts for: Subtask 1, Reactor Safety Study Follow-on Program; Subtask 2, Probabilistic Uncertainty Analysis; and Subtask 3, Analysis of Thermal-Hydraulic Behavior.

Sincerely,

A handwritten signature in cursive script that reads "Richard S. Denning".

Richard S. Denning  
Research Leader  
Nuclear and Flow Systems Section

RSD/sm

Enc.

cc: W. Vesely  
J. Curry  
R. Mattson  
R. DeYoung  
R. Boyd  
T. Novak  
M. A. Taylor  
J. A. Murphy  
R. DiSalvo  
✓ Div. of Tech. Info. and  
Document Control (2)

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 Analysis of Hypothetical Accidents Resulting in Core Meltdown

4. AUTHORS (If more than three, name first author followed by "and others.")  
 R. S. Denning, P. Cybulskis and P. Baybutt

5. ORGANIZATIONAL UNIT (If contract, give organizational unit of author to whom inquiries may be addressed)

OFFICE/DIVISION Battelle-Columbus Labs	BRANCH/UNIT Nuclear and Flow Systems Section	TELEPHONE NO. FTS-976-751
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6. REPORT DATE(S)  
August 14, 1979

BASIS FOR EACH DATE (e.g. date manuscript submitted, date manuscript published.)  
Date Mailed

7. CONTRACT NUMBER NRC-04-76-293-08	8. NAME OF NRC PROGRAM SPONSOR FOR CONTRACT G. Edison	TELEPHONE NO. 492-8377
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9. TYPE OF DOCUMENT ("X" one)

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(1) TITLE OF CONFERENCE: \_\_\_\_\_

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G. Edison R. DiSalvo  
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 J. Curry R. DeYoung T. Novak J.A. Murphy

11. ADDITIONAL INFORMATION AND REMARKS (Use this space if necessary to expand on answers given above. Continue on reverse or separate sheet.)

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12. OLD CLEARANCE	13. SUBMITTED BY:
Forward completed, signed NRC Form 426 together with the related document for review.	a. NAME OF HEAD OF ORGANIZATIONAL UNIT (type or print) Richard Denning
TO: Patent Counsel Office of Executive Legal Director	b. ORGANIZATIONAL UNIT Nuclear and Flow Systems Section
<input type="checkbox"/> a. PATENT CLEARANCE GRANTED. <input type="checkbox"/> b. PATENT CLEARANCE NOT GRANTED.	c. DIVISION Battelle's Columbus Laboratories
c. PATENT COUNSEL'S SIGNATURE	d. SIGNATURE (NRC responsible staff member.) <i>[Signature]</i> 372310
d. DATE	e. DATE: August 14, 1979

INTERIM REPORT

Accession No. \_\_\_\_\_

Contract Program or Project Title:

Analysis of Hypothetical Accidents Resulting in Core Meltdown

Subject of this Document:

Analysis of Hypothetical Accidents Resulting in Core Meltdown

Type of Document:

Monthly Progress Report for July, 1979

Author(s):

R. S. Denning, P. Cybulskis and P. Baybutt

Date of Document:

August 14, 1979

Responsible NRC Individual and NRC Office or Division:

G. Edison  
Office of Nuclear Regulatory Research

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.

BATTELLE  
Columbus Laboratories  
505 West King Avenue  
Columbus, Ohio 43201

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

972319

INTERIM REPORT

PROGRAM: REACTOR SAFETY STUDY FOLLOW-ON PROGRAM SUBTASK FIN : A4067

CONTRACTOR: Battelle Columbus Laboratories

BUDGET PERIOD: (mm/yy-mm/yy) 10/78-9/79

PAS PROGRAM MANAGER: J. Curry

BUDGET AMOUNT: (Thousands) 180.2\*

CONTRACTOR PROGRAM MANAGER: R. S. Denning

PHONE: FTS 976-7510

PRINCIPAL INVESTIGATOR(S): P. Cybulskis

PHONE: FTS 976-7509

**PROGRAM OBJECTIVES:**

Investigate the effects of LWR plant design variations on the risks associated with reactor meltdown accidents. Specifically, determine the effects of plant design variations on the probability and nature of the radionuclide source term released during key meltdown accident sequences.

**ACTIVITIES DURING JULY, 1979**

MARCH analyses for the GE Mark III design accident sequences were initiated.

The implications of hydrogen burning and deflagration in a number of accident sequences in the B&W PWR are being reevaluated in line with recent modeling changes.

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**MAJOR MILESTONES:**

MILESTONE DESCRIPTION	SCHEDULED/ACTUAL START	SCHEDULED COMPLETION	ACTUAL/PROJECTED COMPLETION
1. RSS PWR BASELINE ANALYSES	4/78-4/78	6/78	6/78
2. B&W PWR ANALYSES	4/78-4/78	6/78	11/78
3. CE PWR ANALYSES	7/78-8/78	9/78	**
4. RSS BWR BASELINE ANALYSES	6/78-6/78	9/78	11/78
5. GE MARK III BWR ANALYSES	9/78-9/78	12/78	**

**MANAGEMENT AND TECHNICAL ISSUES/POTENTIAL SCHEDULE OR FUNDING PROBLEMS:**

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Schedules are being reevaluated based on the delay in FY79 authorizations.

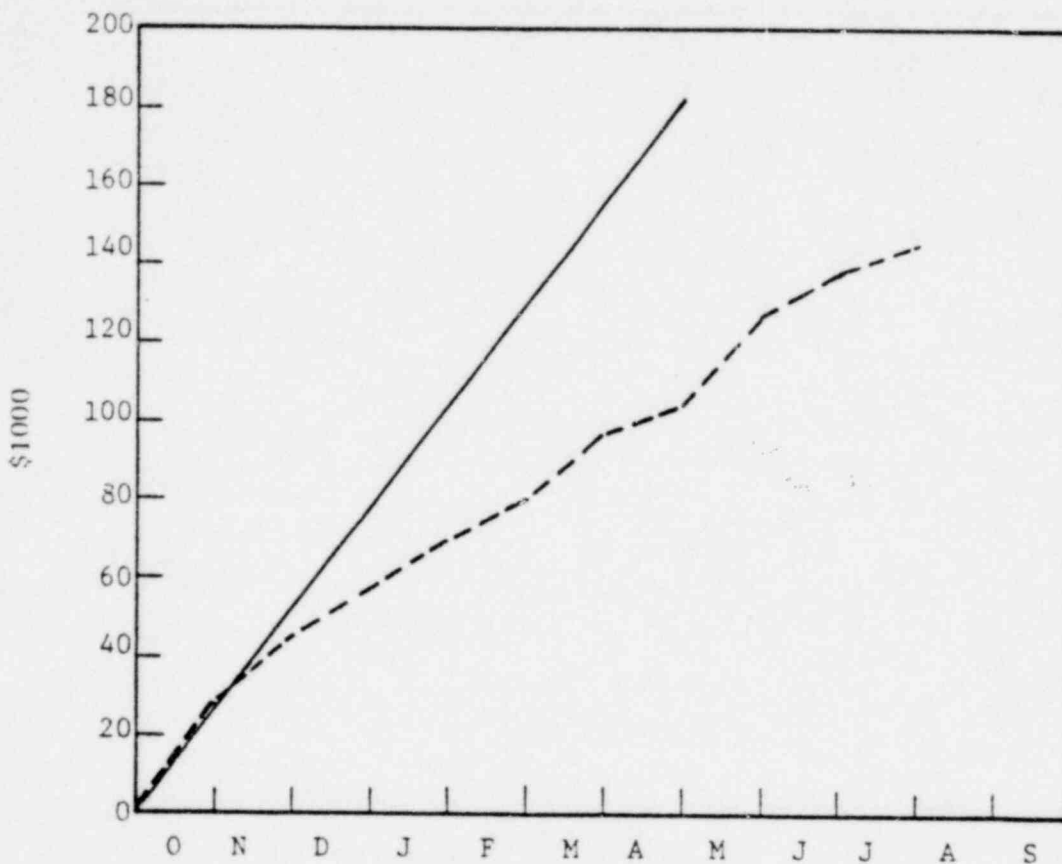
Definition of the shutdown power transient to be used for the reactor protection system failure sequences for the PWR plants are still required. Reanalysis of the plants previously considered may be required in order to have a consistent treatment of these sequences.

\* Includes \$30,250 carryover from FY78.

\*\* Milestones are under review as a result of the delay in FY79 authorization.

EXPENDITURES

PROGRAM: REACTOR SAFETY STUDY FOLLOW-ON PROGRAM



RESOURCES EXPENDED:

	JULY, 1979	CUMULATIVE
DOLLARS	8.4 K	145.8 (81%)
MAN-MONTHS	1.1	18.4

972321

PROGRAM: PROBABILISTIC UNCERTAINTY ANALYSIS SUBTASK FIN#: A4067

CONTRACTOR: Battelle Columbus Laboratories

BUDGET PERIOD: (mm/yy-nm/yy) 10/78-9/79

PAS PROGRAM MANAGER: J. A. Murphy

BUDGET AMOUNT: (Thousands) 228.1K\*

CONTRACTOR PROGRAM MANAGER: R. S. Denning

PHONE: FTS 976-7510

PRINCIPAL INVESTIGATOR(S): P. Baybutt

PHONE: FTS 976-7499

PROGRAM OBJECTIVES:

- Perform probabilistic uncertainty analyses for PWR and BWR accident sequences
- Evaluate the uncertainty analysis methodology and develop decision criteria
- Assess the feasibility of developing response surfaces for the MARCH and CORRAL codes.

ACTIVITIES DURING JULY, 1979

Work progressed on the analysis of the uncertainty study results. A report on the methodology and a demonstration uncertainty analysis is nearing completion. A second report will describe the results of uncertainty analyses of the TMLB' and TC sequences. Preparations were made for a review of FY79 objectives, milestones, and activities with NRC personnel.

A review of Sandia's report NUREG/CR-0394 "Risk Methodology for Geologic Disposal of Radioactive Waste: Sensitivity Analysis Techniques" was begun.

MAJOR MILESTONES:

MILESTONE DESCRIPTION	SCHEDULED/ACTUAL START	SCHEDULED COMPLETION	ACTUAL/PROJECTED COMPLETION
1. Project milestones have been defined for FY79. NRC approval is still required.			
2.			
3.			

MANAGEMENT AND TECHNICAL ISSUES/POTENTIAL SCHEDULE OR FUNDING PROBLEMS:

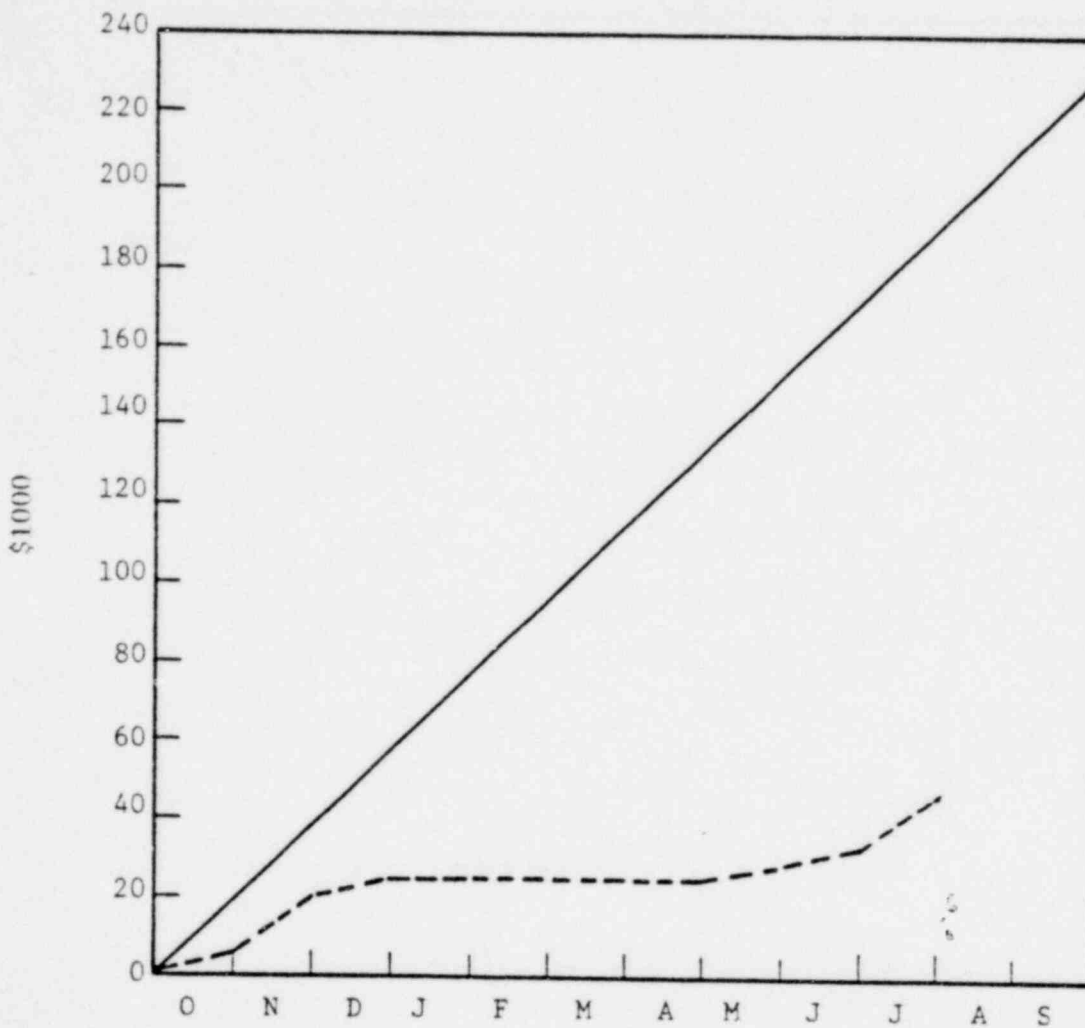
The delay in funding authorization will require rescheduling of the FY79 effort.

\* Includes \$18.1K carryover from FY78.

972322

EXPENDITURES

PROGRAM: PROBABILISTIC UNCERTAINTY ANALYSIS



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RESOURCES EXPENDED:

	JULY, 1979	CUMULATIVE
DOLLARS	13.6 K	46.4 (20%)
MAN-MONTHS	1.7	5.7

972323

PROGRAM: ANALYSIS OF THERMAL-HYDRAULIC BEHAVIOR

FIN#: A4067

CONTRACTOR: Battelle-Columbus Laboratories

BUDGET PERIOD: (mm/yy-mm/yy) 10/78-9/79

PAS PROGRAM MANAGER: J. Curry

BUDGET AMOUNT: (Thousands) \$90

CONTRACTOR PROGRAM MANAGER: R. S. Denning

PHONE: FTS 976-7510

PRINCIPAL INVESTIGATOR(S): P. Cybulskis

PHONE: FTS 976-7509

PROGRAM OBJECTIVES:

1. Test each of the modules in the MARCH code
2. Standardize programming and units
3. Document the MARCH code
4. Verify against available data and compare with similar codes

ACTIVITIES DURING JULY, 1979

The principal activities were related to checking of a number of models in MARCH for applicability to the physical processes of interest and verification of programing accuracy. Work was also initiated on the modification of the input and output subroutines.

MAJOR MILESTONES:

MILESTONE DESCRIPTION	SCHEDULED/ACTUAL START	SCHEDULED COMPLETION	ACTUAL/PROJECTED COMPLETION
1. MARCH Testing/ Documentation	4/79-5/79	12/79	
2. MARCH Verification	10/79	9/80	
3.			

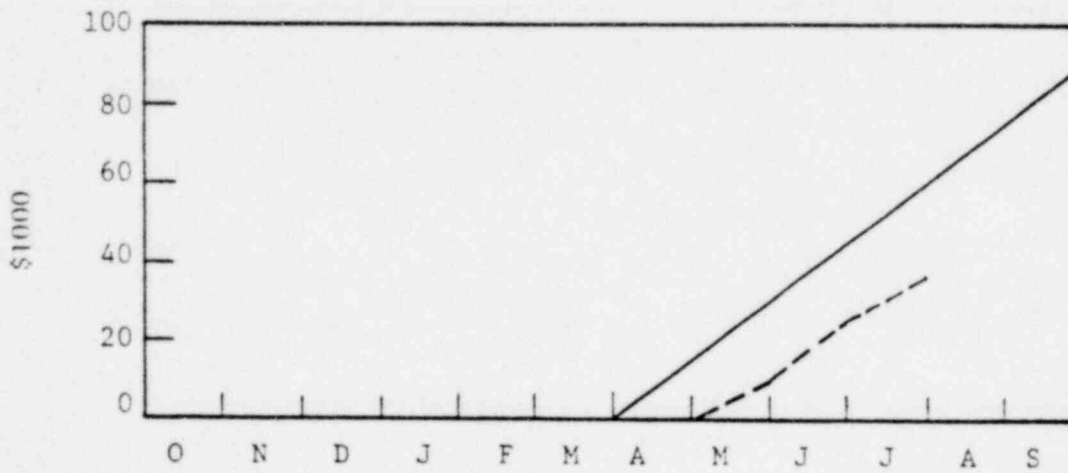
MANAGEMENT AND TECHNICAL ISSUES/POTENTIAL SCHEDULE OR FUNDING PROBLEMS:

972324



EXPENDITURES

PROGRAM: ANALYSIS OF THERMAL-HYDRAULIC BEHAVIOR



RESOURCES EXPENDED:

	JULY, 1979	CUMULATIVE
DOLLARS	10.7 K	35.8 (40%)
MAN-MONTHS	1.4	4.8

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