



PROJECT AND BUDGET PROPOSAL FOR NRC WORK

February 28, 1983

NEW

REVISION NO.

PROJECT TITLE	Safety Evaluation of Core-Melt Accidents: CESSAR-FDA, Westinghouse Standard Plant-FDA	FIN NUMBER	A-3705
NRC OFFICE	Nuclear Reactor Regulation	NRC B&R NUMBER	20-19-40-41-3
DOE CONTRACTOR	Associated Universities, Inc. Brookhaven National Laboratory	CONTRACTOR ACCOUNT NUMBER	New
SITE	Upton, New York	DOE B&R NUMBER	

COGNIZANT PERSONNEL	ORGANIZATION	FTS PHONE NUMBER	PERIOD OF PERFORMANCE
NRC PROJECT MANAGER J. Meyer	DSI/RSB	492-4752	STARTING DATE 04/01/83
OTHER NRC TECHNICAL STAFF			COMPLETION DATE 08/31/85 Est.
DOE PROJECT MANAGER David Schweller	Brookhaven Area Office	666-3424	
CONTRACTOR-PROJECT MANAGER H. J. C. Kouts W. Y. Kato	DNE	666-2815 666-2444	
PRINCIPAL INVESTIGATOR(S) W. T. Pratt	DNE	666-2630	

STAFF YEARS OF EFFORT (Round to nearest tenth of a year)	FY 1983	FY 1984	FY 1985	FY	FY
Direct Scientific/Technical	1.0	2.3	2.0		
Other Direct (Graded)	0.2	0.4	0.3		
<b>TOTAL DIRECT STAFF YEARS</b>	<b>1.2</b>	<b>2.7</b>	<b>2.3</b>		

COST PROPOSAL		FY 1983	FY 1984	FY 1985	FY	FY
Direct Salaries		58	137	131		
Material and Services (Excluding ADP)		5	8	7		
ADP Support		1	2	1		
Subcontracts		0	0	0		
Travel Expenses	Foreign	0	0	0		
	Domestic	5	10	12		
Indirect Labor Costs (Departmental Administration)		7	15	14		
Other (Specify)	Electric Power Distribution	1	2	2		
General and Administrative ( 44% of modified direct cost)		33	76	73		
<b>TOTAL OPERATING COST</b>		<b>110</b>	<b>250</b>	<b>240</b>		
CAPITAL EQUIPMENT FIN CHARGED	8412210174 840621 PDR FOIA SHOLLY84-335 PDR	0	0	0		
<b>TOTAL PROJECT COST</b>		<b>110</b>	<b>250</b>	<b>240</b>		

FY 1983	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
	MONTHLY FORECAST EXPENSE (dollars in thousands)	-	-	-	-	-
	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
	10	10	20	20	20	20

PROJECT DESCRIPTIONa. OBJECTIVE OF PROPOSED WORK(1) Background

Consideration of severe accidents beyond the traditional design basis, including full core melt accidents, is an important part of NRC's overall safety assessment and therefore is becoming an important ingredient in specific licensing actions and in generic rulemaking proceedings. Also the consideration of features to mitigate the consequences of core melt accidents for nuclear facilities continues to be a major specific licensing activity. It is very important that the large amount of technical information available and being developed by, for example, NRC/RES in this area be appropriately assimilated, codified and evaluated in a way that is directly applicable to licensing needs. These needs are in three major areas.

First, there is a need to better understand the progression or core melt accident sequences up to and including associated core melt related phenomenology and the implementation of these processes (and their uncertainties) into an overall assessment of containment loading and failure modes. The impact of mitigation strategies on containment loading and failure modes must also be factored into the assessment.

Second, based on the containment loading histories, there is a need to determine the radiological source term suspended in the containment, the effects on engineered safety features (E.S.Fs) and mitigation features of this source term and finally the release characteristics of this source term following containment failure.

Third, there is a need for an overall capability to assess the radiological consequences as a function of the assumptions regarding accident sequences, phenomenology and mitigation hardware. These radiological consequences must be further analyzed in a licensing context with a full appreciation of its regulatory implications.

(2) Objective

The objective of the activities described in this proposal is to meet the above needs.

The scope of this work will be limited to addressing immediate NRC/NRR licensing concerns using the state-of-the-art codes and the analyses and experimental data developed from NRC/RES and other R&D programs. The scope also includes review and evaluation of licensee submittals and other pertinent information dealing with the subjects described below.

The analyses provided under this contract will form the basis for the licensing decisions required on CESSAR-System 80 FDA review (PRA portion), and the Westinghouse Standard Plant, FDA (PRA portion) with respect to severe accident considerations.

The extensive analysis and assessment to be performed, code capability to be developed and experience to be gained under FIN A-3711 has been taken into account when developing this proposal.

c. WORK REQUIREMENTS (Continued)Subtask I.C - MARCH/MELCOR Code Maintenance and Development

BNL will closely follow RES's MARCH-2 and MELCOR development programs. BNL will follow the development of similar accident analysis codes, e.g., INCORE, foreign and domestic and specialty codes, e.g., CORCON, CONTAIN. BNL will maintain current MARCH code capability with modifications as appropriate to the reactor type under consideration and the containment modifications (mitigation features) being addressed. This subtask supports directly the efforts in Subtask I.D. Starting March 15, 1983, a letter report summarizing subtask status will be provided every three months until the end of the project. (Note: Subtask I.C. of FIN No. A-3711 provides the overall evaluation in this area; the subtask above is limited to specific W and/or CESSAR items. This required letter report input will be combined with the letter report required in FIN No. A-3711).

Completion Date: 8/31/85

Subtask I.D - Accident Analysis: W/CESSAR

For each reactor type under consideration, BNL will analyze the accident progressions up to and including containment failure characterizations based on accident sequences and containment modifications (if any) supplied by the NRC. Particular attention will be given to those containment failure parameters which are input to consequence analysis (CRAC code).

Completion Dates:

I.D.1	CESSAR Preliminary	8/31/84
I.D.2	CESSAR Final	8/31/85
I.D.3	<u>W</u> Preliminary	7/31/84
I.D.4	<u>W</u> Final	7/31/85

Subtask I.E - Accident Assessment: W/CESSAR

BNL will review PRA submittals for those reactors within the scope of Task I as prepared by utilities/vendors. BNL will generate questions to the utilities/vendors as needed. BNL will provide write-ups of relevant areas within the scope of Task I for inclusion in NRC assessments and testimony.

Completion Dates:

I.E.1	CESSAR Q-1's	2/29/84
I.E.2	CESSAR Q-2's	9/30/84
I.E.3	<u>W</u> Q-1's	8/31/83
I.E.4	<u>W</u> Q-2's	8/31/84

(See Continuation Sheet)

c. WORK REQUIREMENTS (Continued)Subtask II.C - Accident Analysis: W and CESSAR

For each reactor type under consideration, BNL will perform analyses of the release fractions and other containment failure parameters important in the subsequent consequence analysis. This effort is closely coupled to Subtask I.D and should be performed concurrent with Subtask I.D.

## Completion Dates:

II.C.1	CESSAR Preliminary	8/31/84
II.C.2	CESSAR Final	8/31/85
II.C.3	<u>W</u> Preliminary	7/31/84
II.C.4	<u>W</u> Final	7/31/85

Subtask II.D - Accident Assessment: W and CESSAR

BNL will review PRA submittals in the areas within the scope of Task II by utilities/vendors. BNL will generate questions to the utilities/vendors based on this review. BNL will participate in meeting with the utilities/vendors as updated. BNL will provide write-ups of relevant areas within the scope of Task II scheduled for inclusion in NRC assessments and testimony, and will conform to schedules provided by NRC staff below:

## Completion Dates:

II.D.1	CESSAR Q-1's	2/29/84
II.D.2	CESSAR Q-2's	9/30/84
II.D.3	<u>W</u> Q-1's	8/31/83
II.D.4	<u>W</u> Q-2's	8/31/84

Task III - Consequence Analysis

Estimated Level of Effort in FY83: 1 MM  
 Estimated Level of Effort in FY84: 3 MM  
 Estimated Level of Effort in FY85: 2 MM

(Note: The AEB of NRR/DSI is responsible for all NRR consequence analyses. As such, Task III will be limited to the following activities related to consequence analyses:

- (1) CRAC analyses in order to determine the impact on risk of variations in the Tasks I & II analyses based on phenomenological uncertainties, engineering uncertainties and the incorporation of mitigation features.
- (2) CRAC analyses determining risk values at the request of AEB through RSB (as a supplement to AEB's own analyses).

c. WORK REQUIREMENTS (Continued)

## Completion Dates:

IV.A.1	Preliminary: CESSAR	8/31/84
IV.A.2	Preliminary: <u>W</u>	7/31/84
IV.A.3	Final: CESSAR	8/31/85
IV.A.4	Final: <u>W</u>	7/31/85

## Subtask IV.B - Integration: Impact on Risk

BNL will present results of analyses and assessment in Tasks I, II and III in terms of risk values (including CCDFs) and changes in risk values due to changes in containment designs (mitigation features) or changes in damage state probabilities.

## Completion Dates:

IV.B.1	CESSAR: Letter Report Review of IPPSS	9/30/84
IV.B.2	<u>W</u> : Letter Report Review of Zion	8/31/84
IV.B.3	CESSAR Final Report (NUREG/CR)	8/31/85
IV.B.4	<u>W</u> Final Report (NUREG/CR)	7/31/85

## Subtask IV.C - Integration: Uncertainty Analysis

BNL will develop a methodology for translating containment matrix element uncertainties and other uncertainties (e.g., in damage states and CRAC analyses) into final uncertainties in final risk and risk reduction values making use of the NRC/RES and industry programs in this area.

## Completion Dates: Quarterly Reports

d. REPORTING REQUIREMENTS

- All products which are required from this proposal (including NUREG/CR reports, and miscellaneous letter reports for input to SERs as well as input to hearing testimony) have been identified specifically under each subtask in the WORK REQUIREMENTS Section. BNL will submit six copies of draft NUREG/CR reports to the NRC Project Manager for staff review and approval. For NUREG/CR reports, within sixty days of receipt of the staff's comments on these reports, BNL will submit one (1) reproducible and six (6) reproduced copies of the final reports in accordance with NRC Manual Chapter 3202, "Publication of Unclassified Regulatory and Technical Reports Prepared by NRC Contractors."

d. REPORTING REQUIREMENTS (Continued)

## Task II: Radionuclide Release Assessment

<u>Facility</u>	<u>Docket #</u>	<u>Period</u>	<u>Cumulative</u>
CESSAR-80	50-470		
Westinghouse Advanced Design	50-668		

## Task III: Consequence Analysis

<u>Facility</u>	<u>Docket #</u>	<u>Period</u>	<u>Cumulative</u>
CESSAR-80	50-470		
Westinghouse Advanced Design	50-668		

## Task IV: Risk Assessment Summary

<u>Facility</u>	<u>Docket #</u>	<u>Period</u>	<u>Cumulative</u>
CESSAR-80	50-470		
Westinghouse Advanced Design	50-668		

e. MEETINGS AND TRAVEL

BNL staff will participate in several meetings at the NRC Headquarters (one one-day meeting each quarter in Bethesda to discuss performance and work progress) and at other locations (one one-day meeting in Bethesda or at licensee/applicant headquarters with licensee/applicant and NRC staff is anticipated) to obtain source material for this program. BNL staff may visit other laboratories or institutions and participate in professional meetings (attendance at two topical professional meetings on relevant topics will be planned and budgeted).

f. NRC-FURNISHED MATERIALS

The NRC will provide any documentation relevant to the above tasks that are submitted by licensees during the course of this project.

g. DESCRIPTION OF ANY FOLLOW-ON EFFORTS

Not Applicable.

BROOKHAVEN NATIONAL LABORATORY  
ASSOCIATED UNIVERSITIES, INC.

Upton, Long Island, New York 11973

(516) 282-3317  
FTS 666

Office of the Director

3

March 7, 1983

Mr. David Schweller, Manager  
Brookhaven Area Office  
U. S. Department of Energy  
Upton, New York 11973

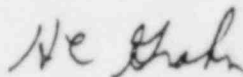
Dear Mr. Schweller:

Enclosed is one copy of a proposal to the Nuclear Regulatory Commission entitled, "Safety Evaluation of Core-Melt Accidents: CESSAR-FDA, Westinghouse Standard Plant-FDA," FIN A-3705, being submitted for your review and approval. The proposal is being submitted in response to a request from NRC dated January 4, 1983. Two copies have been sent to Mr. J. Maher, Department of Energy, one copy has been sent to Mr. B. L. Grenier, Nuclear Regulatory Commission, and two copies have been sent to:

Mrs. Sybil Boyd, Program Assistant  
Division of Systems Integration  
Mail Stop P-1102  
U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

The proposal has been prepared in accordance with the statement of work attached to the aforementioned letter. If there are any questions regarding the document, please call the principal investigator or Mr. A. J. Romano, FTS 666-4024, Department Administrator for the Department of Nuclear Energy.

Sincerely yours,



H. C. Grahn  
Assistant Director  
for Financial Planning

Enclosure

cc: ✓ S. Boyd (2)  
B. L. Grenier  
J. Maher (2)



PROJECT AND-BUDGET PROPOSAL FOR NRC WORK

February 28, 1983

NEW

REVISION NO.

PROJECT TITLE Safety Evaluation of Core-Melt Accidents: CESSAR-FDA, Westinghouse Standard Plant-FDA		FIN NUMBER A-3705
NRC OFFICE Nuclear Reactor Regulation	2	NRC B&R NUMBER 20-19-40-41-3
DOE CONTRACTOR Associated Universities, Inc. Brookhaven National Laboratory		CONTRACTOR ACCOUNT NUMBER New
SITE Upton, New York		DOE B&R NUMBER

COGNIZANT PERSONNEL	ORGANIZATION	FTS PHONE NUMBER	PERIOD OF PERFORMANCE
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CONTRACTOR-PROJECT MANAGER H. J. C. Kouts W. Y. Kato	DNE	666-2815 666-2444	
PRINCIPAL INVESTIGATOR(S) W. T. Pratt	DNE	666-2630	

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FIN. CHARGED						
<b>TOTAL PROJECT COST</b>		<b>110</b>	<b>250</b>	<b>240</b>		

MONTHLY FORECAST EXPENSE (dollars in thousands)	1983						
	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL
	-	-	-	-	-2	10	
	10	10	20	20	20	20	



PROJECT AND BUDGET PROPOSAL FOR NRC WORK

A-3705


DATE  
February 28, 1983

PROJECT TITLE









Safety Evaluation of Core-Melt Accidents: CESSAR-FDA,  
Westinghouse Standard Plant-FDA

DOE PROPOSING ORGANIZATION

Associated Universities, Inc.  
Brookhaven National Laboratory

FORECAST MILESTONE CHART: Scheduled to Start —  — Completed (Shown in Quarter Year)

PROVIDE ESTIMATED DOLLAR COST FOR EACH TASK FOR EACH FISCAL YEAR

TASK		FY 1983				FY 1984				FY 1985				FY			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Task I-Severe Accident Progression Anal.: Reactor Sys./Containment Sys. Loading and Failure Modes	SCHEDULE																
	COST	46K				102K				100K							
Task II-Radionuclide Release Assessment	SCHEDULE																
	COST	28K				46K				50K							
Task III-Consequence Analysis	SCHEDULE																
	COST	9K				28K				20K							
Task IV-Risk Assessment Summary	SCHEDULE																
	COST	27K				74K				70K							
	SCHEDULE																
	COST																
TOTAL ESTIMATED PROJECT COST		110K				250K				240K							

PROJECT DESCRIPTION: (Provide narrative descriptions of the following topics in the order listed. Attach on plain paper to this NRC Form 189. If an item is not applicable, so state.)

1. OBJECTIVE OF PROPOSED WORK
2. SUMMARY OF PRIOR EFFORTS
3. WORK TO BE PERFORMED AND EXPECTED RESULTS
4. DESCRIPTION OF ANY FOLLOW-ON EFFORTS
5. RELATIONSHIP TO OTHER PROJECTS
6. REPORTING SCHEDULE
7. SUBCONTRACTOR INFORMATION
8. LIST NEW CAPITAL EQUIPMENT REQUIRED
9. DESCRIBE SPECIAL FACILITIES REQUIRED
10. CONFLICT OF INTEREST INFORMATION

SEE NRC MANUAL CHAPTER 1102 FOR ADDITIONAL INFORMATION

APPROVAL AUTHORITY-SIGNATURE

*Tractor y kaw*

DATE  
2/28/83

PROJECT DESCRIPTIONa. OBJECTIVE OF PROPOSED WORK(1) Background

Consideration of severe accidents beyond the traditional design basis, including full core melt accidents, is an important part of NRC's overall safety assessment and therefore is becoming an important ingredient in specific licensing actions and in generic rulemaking proceedings. Also the consideration of features to mitigate the consequences of core melt accidents for nuclear facilities continues to be a major specific licensing activity. It is very important that the large amount of technical information available and being developed by, for example, NRC/RES in this area be appropriately assimilated, codified and evaluated in a way that is directly applicable to licensing needs. These needs are in three major areas.

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(2) Objective

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The extensive analysis and assessment to be performed, code capability to be developed and experience to be gained under FIN A-3711 has been taken into account when developing this proposal.

b. SUMMARY OF PRIOR EFFORTS

Not Applicable.

c. WORK REQUIREMENTS

As directed by the technical monitor J. Meyer, BNL will perform the reviews, analyses and assessments, as listed in the Tasks below.

Task I: Severe-Accident Progression Analysis: Reactor  
Systems/Containment Systems Loading and Failure  
Modes

Estimated Level of Effort in FY83:	5 MM
Estimated Level of Effort in FY84:	11 MM
Estimated Level of Effort in FY85:	10 MM

Subtask I.A - Data Acquisition: Phenomenology Programs

BNL will coordinate phenomenological input from FIN No. B-8634. BNL will provide cognizance of phenomenological studies of NRC/RES, IDCOR, and foreign programs. BNL will relate the information gathered to MARCH predictions. This subtask supports directly the efforts in Subtask I.D. Starting March 15, 1983, a letter report summarizing subtask status will be provided every three months until the end of the project. (Note: Subtask I.A of FIN No. A-3711 provides the overall evaluation in this area; the subtask above is limited to specific W and/or CESSAR items. This required letter report input will be combined with the letter report required in FIN No. A-3711).

Completion Date: 8/31/85

Subtask I.B - Data Acquisition: Engineering Programs

BNL will coordinate engineering mitigation feature input from FIN No. B-8625. BNL will provide cognizance of engineering studies on containment and mitigation features of NRC/RES, IDCOR, DOE and foreign programs. BNL will relate the information gathered to MARCH predictions. This subtask supports directly the efforts in Subtask I.D. Starting March 15, 1983, a letter report summarizing subtask status will be provided every three months until the end of the project. (Note: Subtask I.B of FIN No. A-3711 provides the overall evaluation in this area; the subtask above is limited to specific W and/or CESSAR items. This required letter report input will be combined with the letter report required in FIN No. A-3711).

Completion Date: 8/31/85

c. WORK REQUIREMENTS (Continued)

Subtask I.C - MARCH/MELCOR Code Maintenance and Development

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Completion Date: 8/31/85

Subtask I.D - Accident Analysis: W/CESSAR

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I.D.2	CESSAR Final	8/31/85
I.D.3	<u>W</u> Preliminary	7/31/84
I.D.4	<u>W</u> Final	7/31/85

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I.E.4	<u>W</u> Q-2's	8/31/84

c. WORK REQUIREMENTS (Continued)Task II - Radionuclide Release Assessment

Estimated Level of Effort in FY83: 3 MM  
Estimated Level of Effort in FY84: 5 MM  
Estimated Level of Effort in FY85: 5 MM

## Subtask II.A - Data Acquisition: Source Term

BNL will provide cognizance of this activity and proper coupling with CORRAL/MATADOR so that NRC/AED positions on source terms are properly translated into the CORRAL/MATADOR analyses of releases at containment failure. (The AEB branch of NRR/DSI is responsible for providing state-of-technology data on source terms for use in the CORRAL/MATADOR codes).

BNL will provide physical processes data to AEB in order to aid them in their source term evaluation (particle densities and particle sizes for determination of agglomeration rates in containment volumes).

This subtask supports directly the efforts in Subtask II.C. Starting March 15, 1983, a letter report summarizing subtask status will be provided every three months until the end of the project. (Note: Subtask II.A of FIN No. A-3711 provides the overall evaluation in this area; the subtask above is limited to specific W and/or CESSAR items. This required letter report input will be combined with the letter report required in FIN No. A-3711).

Completion Date: 8/31/85

## Subtask II.B - Data Acquisition: Code Development

BNL will maintain close contact with NRC/RES development of MATADOR, NAUA CONTAIN and MELCOR. BNL will provide assessments of progress to date and recommendations for the course of further development and follow EPRI, IDCOR and foreign activities in this area. This subtask supports directly the efforts in Subtask II.C. Starting March 15, 1983, a letter report summarizing subtask status will be provided every three months until the end of the project. (Note: Subtask II.B of FIN No. A-3711 provides the overall evaluation in this area; the subtask above is limited to specific W and/or CESSAR items. This required letter report input will be combined with the letter report required for FIN No. A-3711).

Completion Date: 8/31/85

c. WORK REQUIREMENTS (Continued)

Subtask II.C - Accident Analysis: W and CESSAR

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II.D.4	<u>W</u> Q-2's	8/31/84

Task III - Consequence Analysis

Estimated Level of Effort in FY83: 1 MM  
Estimated Level of Effort in FY84: 3 MM  
Estimated Level of Effort in FY85: 2 MM

(Note: The AEB of NRR/DSI is responsible for all NRR consequence analyses. As such, Task III will be limited to the following activities related to consequence analyses:

- (1) CRAC analyses in order to determine the impact on risk of variations in the Tasks I & II analyses based on phenomenological uncertainties, engineering uncertainties and the incorporation of mitigation features.
- (2) CRAC analyses determining risk values at the request of AEB through RSB (as a supplement to AEB's own analyses).

c. WORK REQUIREMENTS (Continued)

Subtask III.A - Data Acquisition: CRAC Code

BNL will keep abreast of the state-of-technology in the area of consequence analyses including working knowledge of CRAC-II and other related codes (e.g., CRAC-IT). BNL will maintain a CRAC code capability and data files for the sites used in this study. This subtask supports directly the efforts in Subtask III.B. Starting March 15, 1983, a letter report summarizing subtask status will be provided every three months until the end of the project. (Note: Subtask III.A of FIN No. A-3711 provides the overall evaluation in this area; the subtask above is limited to specific W and/or CESSAR items. This required letter report input will be combined with the letter report required in FIN No. A-3711).

Completion Date: 8/31/85

Subtask III.B - Accident Analysis

BNL will perform CRAC analyses consistent with the MARCH/CORRAL analyses performed in Subtask I.D and II.C. BNL will determine changes in risk based on inclusion of mitigation (or prevention) features and on variations due to accident progression uncertainties. (Note Milestone in II.C)

Completion Date: 8/31/85

Task IV - Risk Assessment Summary (Integration of Tasks I, II, and III)

Estimated Level of Effort in FY83: 3 MM  
Estimated Level of Effort in FY84: 8 MM  
Estimated Level of Effort in FY85: 7 MM

Subtasks IV.A - Integration: Containment Matrix

For the reactor being considered in this project, BNL will generate a containment matrix which shows the relationship of damage states (provided by the staff) to release categories, and defend each element of the matrix based on analyses and assessment provided in Tasks I & II. BNL will determine estimates of uncertainties for each containment matrix element (to be used in Subtask IV.C). BNL will compare this matrix to that developed by the utility/vendor, if appropriate.

c. WORK REQUIREMENTS (Continued)

Completion Dates:

IV.A.1	Preliminary: CESSAR	8/31/84
IV.A.2	Preliminary: <u>W</u>	7/31/84
IV.A.3	Final: CESSAR	8/31/85
IV.A.4	Final: <u>W</u>	7/31/85

Subtask IV.B - Integration: Impact on Risk

BNL will present results of analyses and assessment in Tasks I, II and III in terms of risk values (including CCDFs) and changes in risk values due to changes in containment designs (mitigation features) or changes in damage state probabilities.

Completion Dates:

IV.B.1	CESSAR: Letter Report Review of IPPSS	9/30/84
IV.B.2	<u>W</u> : Letter Report Review of Zion	8/31/84
IV.B.3	CESSAR Final Report (NUREG/CR)	8/31/85
IV.B.4	<u>W</u> Final Report (NUREG/CR)	7/31/85

Subtask IV.C - Integration: Uncertainty Analysis

BNL will develop a methodology for translating containment matrix element uncertainties and other uncertainties (e.g., in damage states and CRAC analyses) into final uncertainties in final risk and risk reduction values making use of the NRC/RES and industry programs in this area.

Completion Dates: Quarterly Reports

d. REPORTING REQUIREMENTS

1. All products which are required from this proposal (including NUREG/CR reports, and miscellaneous letter reports for input to SERs as well as input to hearing testimony) have been identified specifically under each subtask in the WORK REQUIREMENTS Section. BNL will submit six copies of draft NUREG/CR reports to the NRC Project Manager for staff review and approval. For NUREG/CR reports, within sixty days of receipt of the staff's comments on these reports, BNL will submit one (1) reproducible and six (6) reproduced copies of the final reports in accordance with NRC Manual Chapter 3202, "Publication of Unclassified Regulatory and Technical Reports Prepared by NRC Contractors."



d. REPORTING REQUIREMENTS (Continued)

2. A monthly business letter report will be submitted by the 20th of the month to the Project Manager, J. F. Meyer (DSI) with copies provided to the Director, Division of Systems Integration, ATTN: W. Houston, S. Boyd, B. Sheron, DSI, and Mr. B. L. Grenier, NRR. These reports will identify the title of the project, the FIN, the Principal Investigator, the period of performance, and the reporting period and will contain 3 sections as follows:

A Project Status Section, which will contain:

- A listing of the efforts completed during the period; milestones reached, or if missed, an explanation provided;
- Any problems or delays encountered or anticipated and recommendations for resolution;
- A summary of progress to date;
- Plans for the next reporting period.

A Financial Status section, which will contain:

- The total cost (value) of the project as reflected in the proposal and the total amount of funds obligated to date;
- The total amount of funds expended (costed) during the period and total cumulative to date under the following categories: Labor-related costs, Computer services, Travel, Subcontracts, Equipment and Total;
- The total amount of funds expended during the period (costed) and cumulative to date for each task, i.e., each plant under each Project.

A Fee Recovery Cost Status Section, which will contain the total amount of funds expended (costed) during the period and cumulative to date for each task in the following format:

FIN: A-3705

TITLE: Safety Evaluation of Core-Melt Accidents: CESSAR-FDA; Westinghouse Standard Plant-FDA

Period:

Task I: Severe-Accident Progression Analysis: Reactor Systems/Containment Systems Loadings and Failure Modes

<u>Facility</u>	<u>Docket #</u>	<u>Period</u>	<u>Cumulative</u>
CESSAR-80	50-470		
Westinghouse Advanced Design	50-668		

d. REPORTING REQUIREMENTS (Continued)

## Task II: Radionuclide Release Assessment

<u>Facility</u>	<u>Docket #</u>	<u>Period</u>	<u>Cumulative</u>
CESSAR-80	50-470		
Westinghouse Advanced Design	50-668		

## Task III: Consequence Analysis

<u>Facility</u>	<u>Docket #</u>	<u>Period</u>	<u>Cumulative</u>
CESSAR-80	50-470		
Westinghouse Advanced Design	50-668		

## Task IV: Risk Assessment Summary

<u>Facility</u>	<u>Docket #</u>	<u>Period</u>	<u>Cumulative</u>
CESSAR-80	50-470		
Westinghouse Advanced Design	50-668		

e. MEETINGS AND TRAVEL

BNL staff will participate in several meetings at the NRC Headquarters (one one-day meeting each quarter in Bethesda to discuss performance and work progress) and at other locations (one one-day meeting in Bethesda or at licensee/applicant headquarters with licensee/applicant and NRC staff is anticipated) to obtain source material for this program. BNL staff may visit other laboratories or institutions and participate in professional meetings (attendance at two topical professional meetings on relevant topics will be planned and budgeted).

f. NRC-FURNISHED MATERIALS

The NRC will provide any documentation relevant to the above tasks that are submitted by licensees during the course of this project.

g. DESCRIPTION OF ANY FOLLOW-ON EFFORTS

Not Applicable.

h. RELATIONSHIP TO OTHER PROJECTS.

This project is related to a number of other NRC projects. Specifically, BNL will coordinate (Subtask I.A) phenomenological input from FIN No. B-8634 and provide cognizance of the phenomenological studies of NRC/RES, IDCOR and foreign programs. BNL will relate the information gathered from these programs to MARCH code predictions. BNL will also coordinate (Subtask I.B.) engineering mitigation feature input from FIN No. B-8625. BNL will provide cognizance of engineering studies on containment and mitigation features of NRC/RES, IDCOR, DOE and foreign programs and relate the information gathered to potential containment building failure modes. BNL will also assess the impact of source term modifications (in particular, RES FIN No. B-6747) on radionuclide release analyses performed for W and CESSAR (Subtask II.C). Finally, some of the activities covered under this project, (namely, FIN No. A-3705) although limited specifically to Indian Point and/or Zion applications, are also relevant to FIN No. A-3711. In particular, Subtasks I.A, I.B, I.C, II.A, II.B and III.A have parallel objectives in the two FIN Nos. A-3711 and A-3705 but with application to different reactors. The overall evaluation in these areas will be carried out under FIN No. A-3711 and will be combined with the work done in these subtasks in FIN No. A-3705.

i. SUBCONTRACTOR INFORMATION

BNL does not intend to subcontract any portion of this work. In the event a subcontract is anticipated, BNL will notify NRC prior to initiating it.

j. NEW CAPITAL EQUIPMENT REQUIRED

None.

k. SPECIAL FACILITIES REQUIRED

None.

l. CONFLICT OF INTEREST

There are no significant contractual or organization relationships of the Department of Energy, BNL and employees, or expected subcontractors or consultants on this proposal, with industries regulated by the NRC and suppliers thereof that give rise to an apparent or actual conflict of interest.