LAWRENCE LIVERMORE LABORATORY

TF80-222
:1156u

August 26, 1980

Mr. James Shapaker
Division of Safety Systems
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Rm. P-904C
7920 Norfolk Avenue
Phillips Building
Bethesda, MD 20014

SUBJECT: FY81 Proposal for SEP Containment Program, FIN #A0241

Dear Mr. Shapaker:

Attached is an advance copy of our FY81; 189 Proposal for the SEP Containment Program. It reflects changes in the program that occurred through May 15, 1980.

Sincerely,

David Vreeland

David Vreeland
Principal Investigator

DV:mr

cc: C. Tinkler
B. Grenier

X003
S
1/1

NUCLEAR REGULATORY COMMISSION **DRAFT** s-1

DATE: May 5, 1980 (2)

1. BUDGET ACTIVITY NO.:	2. OFFICE:	3. PROJECT TITLE:
20 19 02 01	NRR	Containment Analysis Support for the Systematic Evaluation Program

4. METHOD OF REPORTING:
- ☐ 1. MONTHLY LTR.
- ☐ 2. QUARTERLY
- ☐ 3. SEMIANNUAL
- ☐ 4. ANNUAL
- ☒ 5. OTHER: by SEP facility

5. PERSON IN CHARGE: L. L. Cleland
PRINCIPAL INVESTIGATOR(S): D. G. Vreeland, F.J.Tokarz/G.E. Cummings
Administrative Manager: R. D. Bailey

6. CONTRACTOR:	7. WORKING LOCATION—CITY:	8. STATE:
Lawrence Livermore Lab.	Livermore	California

9. TYPE:
- ☐ 1. INDUSTRIAL
- ☒ 2. DOE LAB
- ☐ 3. EDUCATIONAL
- ☐ 4. GOVERNMENT
- ☐ 5. OTHER NONPROFIT

10. CONTRACT NO.:	11. TASK NO.:
W-7405-ENG-48	A0241

12. CONTRACT TERM—BEGIN: MONTH DAY YEAR	13. CONTRACT TERM—END: MONTH DAY YEAR	14. TERMINATION DATE OF FUNDING: MONTH DAY YEAR
FROM 10 01 79	TO 09 30 81	12 30 81

15. ~~MAN-YEARS~~ FTE	FYS0	FYS1	FYS2
Scientific	1.0	1.2	
Other Direct		-0-	
Total Direct	1.0	1.2	
15a PROGRAM SUPPORT OBLIGATIONS			
a) Direct Salaries	44,000	56,000	
b) Materials & Services	20,000	33,900	
c) Subcontracts	137,000	203.200	
d) ~~Miscellaneous~~ COMPUTERS	7,000	45,000	
Total Direct Costs	208,000	338,100	
e) Indirect Costs	36,000	45,900	
f) Fee		N/A	
Total (In Thousands)	244,000	384,000	
15b EQUIPMENT			
Equipment Obligations (In Thousands)		-0-	
Equipment Costs (In Thousands)		8,500	

Shepaker (3)

17. COST AND DEVELOPMENT SCHEDULE DRAFT

a. COST

	Prior Years	Fiscal Years 77	78	79	80	81 82	To Ent C
Obligation Schedule[1]							
Subtask A							
Subtask B							
Subtask C							
					$244K	$384K $628K	
Total Operations (By fiscal year and total cumulative)							

[1] Cost breakdown should be developed such that the detail reflects the components of costs and provides meaningful data for evaluation and long range planning.

[2] The fiscal year in which the project/activity is completed.

b. DEVELOPMENT SCHEDULE

Within this section the contractor is to identify the start and finish dates for each subtask and by year the major events or milestones associated with each subtask.

18. [illegible]erations.

19. Scope (describe work effort). If scope is different from initial authorization, indicate to what extent.

20. Relationship to Other Projects.

22. Expected results in FY 1980

23. Expected results in FY 198[illegible]

24. Expected results beyond budget year.

25. * Description and Justification of Major Materials, Subcontract Items and other unusual significant cost items.

26. * Description, justification, and sequential priority of all equipment items.

27. * Utilization of facilities and test installation.

* If not applicable, place N/A beside item number. Sequence of numbers should be maintained.

DRAFT

17.2 Cost Evaluation

A costing estimate for FY81 is enclosed. The work will include the completion of six tasks as indicated in the enclosed Statement of Work.

The total cost of completing each task is based on an average time of 110 man-days of effort and 6 hours of CDC 7600 computer time. However, these numbers are very approximate because of the uncertainty in the status of each of the SEP facilities and the availability of the necessary information to complete each task. Therefore, the successful completion of this work in the proposed time frame and budget strongly depends on the existence and availability of the required information to perform the analyses.

DRAFT

(5)

Shapiro

A PROPOSAL FOR THE CONTINUATION OF THE CONTAINMENT ANALYSIS SUPPORT FOR THE SYSTEMATIC CONTAINMENT EVALUATION PROGRAM

David G. Vreeland

THERMO FLUID MECHANICS GROUP

Lawrence Livermore Laboratory

Livermore, California

February 11, 1980

DRAFT

(6)

18.0 Publications - None

19.0 Scope

19.1 Background

On January 1, 1980, the Office of Nuclear Regulation (NRR) initiated a two year program with LLL titled Containment Analysis Support for the Systematic Evaluation Program (SEP). This program is directed toward resolution of SEP Safety Topic VI-2.D, Mass and Energy Release for Possible Pipe Break Inside Containment, and Safety Topic VI-3 Containment Pressure and Heat Removal Capability. The containment structure encloses the reactor system and is the final barrier against the release of radioactive fission products in the event of an accident. The containment structure must, therefore, be capable of withstanding, without loss of function, the pressure and temperature conditions resulting from postulated LOCA and steam or feedwater line break accidents. Furthermore, equipment having a post-accident safety function must be environmentally qualified for the resulting adverse pressure and temperature conditions.

This proposal is for continuation of the program into the second year.

19.2 Objective

This program has the objective to perform audit evaluations of the containment functional design capability of each SEP facility. SEP Safety Topics VI-2.D and VI-3 address this issue, which is concerned with the ability of the containment barrier to withstand the increase in containment atmosphere pressure and temperature due to the postulated accident.

The following is a description of the general procedure that will be used to satisfy the requirements of this program. The procedure is broken into subtasks that will be applied to each SEP facility.

Subtask 1: Review the docket information pertaining to mass and energy release analyses for postulated primary system pipe break (LOCA) accidents and determine the appropriateness of the data for use in containment analysis. Review the assumptions used in the mass and energy release calculation to determine any time dependency on the isolation/actuation of systems and components (e.g., reactor coolant pump trip, ECCS actuation). Formulate requests for additional information to be sent to the licensee as appropriate.

Upon completion of this subtask the contractor shall document the status of the LOCA mass and energy release data; i.e., conformance with the current staff criteria.

Subtask 2: Review the docket information pertaining to mass and energy release analyses for postulated secondary system pipe ruptures, and determine the appropriateness of the data for use in containment analysis. Review the assumptions used in the mass and energy release calculation to determine time dependency on

DRAFT Shapiro Ken (7)

the isolation or actuation of systems and components (e.g., MSIV closure, main feedwater isolation, auxiliary feedwater actuation, reactor coolant pump trip, ECCS actuation). Formulate requests for additional information to be forwarded to the licensee, as appropriate.

Upon completion of this subtask the contractor shall document the status of the secondary system pipe break mass and energy release data; i.e, conformance with the current staff criteria.

Subtask 3: Develop suitable mass and energy release data for primary system pipe breaks (if existing data is found unacceptable) using RELAP4 MOD6. Perform plant specific analyses or use using applicable calculational models or data from another facility. In order to perform plant-specific analyses, meetings may be necessary to obtain the requisite input data. Mass and energy release data should be developed for the limiting pipe break size and location. Identification of the limiting pipe break may be accomplished by comparison with licensee analyses where possible; otherwise mass and energy release data will be developed for a spectrum of pipe break sizes and locations. Mass and energy release data shall also consider the limiting single active failure that results in a conservative blowdown for containment analysis. Upon completion of this subtask, the contractor shall prepare a written description of the calculational model, including a listing of the input data and tables of the appropriate mass and energy data.

Subtask 4: Develop suitable mass and energy release data for secondary system pipe breaks (if existing data is found unacceptable) using RELAP4 MOD6. Perform plant specific analyses or use acceptable calculational models or data from another facility. Mass and energy release data should be developed for the limiting pipe break size and location. Identification of the limiting pipe break may be accomplished by comparison with licensee analyses; otherwise, mass and energy release data will be developed for a spectrum of break sizes and locations. Mass and energy release data shall also be developed with consideration to the limiting single active failure.

Upon completion of this subtask, the contractor shall prepare a written description of the calculational model, including a listing of the input data and tables of the appropriate mass and energy data.

Subtask 5: Review the docket information pertaining to the containment response analysis for both primary and secondary system pipe ruptures including the calculational model and assumptions. Formulate any requests for additional information, as needed, to be forwarded to the licensee.

Upon completion of this subtask the contractor shall document the status of the containment analysis provided by the licensee; i.e., conformance of the analysis to current staff criteria.

Subtask 6: As necessary, perform independent analysis of the containment response to postulated pipe break accidents, using the

DRAFT Separation 8)

COMTEMPT-LT (Mod 28) computer code. Perform a single failure analysis to determine the limiting single active failure for the containment analysis (unless a bounding approach is used in calculating the mass and energy release data, the single failure assumption used in the containment analysis should be consistent with that used in the mass and energy release calculation).

Upon completion of this subtask, the contractor shall prepare a letter report describing the containment model, including a listing of the computer input and a discussion of the results. The results provided shall include figures of the containment pressure and temperature transients and a microfiche ouput print-out of the computer analysis.

Subtask 7: Provide a report summarizing the activities described in the preceding subtasks, highlighting deviations from current criteria in licensee analyses, analytical results and conclusions on the acceptability of the containment functional design.

19.3 NRC Furnished Materials

NRC shall supply LLL, for each SEP facility, with the available docket information pertinent to the review of SEP Safety Topics VI-2.D and VI-3. NRC shall also furnish the specific criteria against which the docket information shall be reviewed in order to evaluate conformance to present licensing requirements.

19.4 Reporting

1. LLL shall provide letter reports for each SEP facility upon completion of the subtasks as discussed under objectives. The reports shall be submitted in three copies to the cognizant Branch Chief containing the information described herein.

2. A monthly business letter to be submitted by the 19th of the month to the cognizant Branch Chief with a copy to the Director, Division of Systems Safety. These reports will contain:

   - A listing of any efforts completed during the period, including milestones reached and an explanation for those missed.
   - The amount of funds expended per task during the period and accumulative to date.
   - Any problems or delays encountered or anticipated.
   - A summary of the progress to date.
   - Plans for the next reporting period.

Note: These reports are not intended to be technical in nature.

20.0 Relation to Other Projects

This project is directly related to existing contracts within the Thermo Fluid Mechanics Group here at the Laboratory. We are presently engaged in supporting the TMI - Safety and Relief Valve Testing Program. This program has required the implementation and running of RELAP and TRAC-PD2 at LLL to assess blowdown characteristics of relief valves.

DRAFT Shopton (9)

21.0 N/A

22.0 Expected Results in FY'80

The following is a list of the SEP plant evaluations expected to be completed in FY'80 as outlined under objectives.

Task	SEP Facility	Estimated Date of Completion
1	Palisades	August 1980
2	Ginna	August 1980
3	Dresden 2	September 1980
4	Oyster Creek	September 1980
5	Millstone 1	September 1980

The timely completion of this work will depend in part on the NRC supplying the necessary docket information for each plant. This will include the information pertinent to the review of Safety Topics VI-2.3 and VI-3 and specific criteria which shall be used to evaluate conformance to present licensing requirements.

23.0 Expected Results in FY'81

The following is a list of the SEP plant evaluations expected to be completed in FY'81 as outlined under objective.

Task	SEP Facility	Estimated Date of Completion
6	Haddam Neck	February 1981
7	San Onofre 1	February 1981
8	Yankee Rowe	February 1981
9	Dresden 1	May 1981
10	Big Rock Point	May 1981
11	La Crosse	May 1981

The timely completion of this work will depend in part on the NRC supplying the necessary docket information for each plant. This will include the information pertinent to the review of Safety Topics VI-2.D and VI-3 and specific criteria which shall be used to evaluate conformance to present licensing requirements.

24.0 Expected Results beyond Budget Year 1981 - None

25.0 Subcontracting

Technical Personnel
2 FTE @ $95,000/FTE - $190,000

LBL Computer Terminal Communication (telephone line)
36 hrs @ $365/hr

26.0 Equipment

This program requires a large amount of computer work of which most is being done at Lawrence Berkeley Laboratory (LBL). The computing facility at LBL was chosen because of its accessibility to both LLL

DRAFT Shapter

(10)

and Energy, Inc. and its reduced cost over commercial operations. However, existing easily accessible computer terminals cannot communicate with LBL. For this reason, a remote terminal is needed to communicate efficiently with the LBL system to perform analyses and monitor Energy, Inc. work. The Tektronix 4025 Computer Display Terminal does this at minimal cost.