NRC FORM 189
(3-81)

U.S. NUCLEAR REGULATORY COMMISSION

PROJECT AND BUDGET PROPOSAL FOR NRC WORK

DATE OF PROPOSAL: 8/1/83

☐ NEW

☐ REVISION NO.

PROJECT TITLE: LWR Melt Progression and Accident Sensitivity Study

FIN NUMBER: A1342

NRC OFFICE: Research

NRC B&R NUMBER: 60190201

DOE CONTRACTOR: Sandia National Laboratories

CONTRACTOR ACCOUNT NUMBER: DE-AC04-76DP00789

SITE: Albuquerque, NM 87185

DOE B&R NUMBER: 401001060

COGNIZANT PERSONNEL	ORGANIZATION	FTS PHONE NUMBER
NRC PROJECT MANAGER: J. Han	NRC/RES	427-4260
OTHER NRC TECHNICAL STAFF: R. Wright	NRC/RES	427-4266
DOE PROJECT MANAGER: R. N. Holton	DOE/ERT	846-5208
CONTRACTOR—PROJECT MANAGER: A. W. Snyder	SNL/6400	844-8203
J. V. Walker	SNL/6420	844-2876
PRINCIPAL INVESTIGATOR(S): W.J.Camp (task leader)	SNL/6425	844-3348
M.F.Young	SNL/6425	844-0130

PERIOD OF PERFORMANCE

STARTING DATE: 10/1/83

COMPLETION DATE: 9/30/84

[redacted]

STAFF YEARS OF EFFORT *(Round to nearest tenth of a year)*	FY 83	FY 84	FY 85	FY 86	FY 87
Direct Scientific/Technical	2.2	2.4	6.0		
Other Direct (Graded)					
TOTAL DIRECT STAFF YEARS	2.2	2.4	6.0		
COST PROPOSAL					
Direct Salaries	232	263	733		
Material and Services (Excluding ADP)	105	8			
ADP Support	20	15	14		
Subcontracts			20		
Travel Expenses — Foreign	3	0	2		
Travel Expenses — Domestic	5	6	6		
Indirect Labor Costs					
Other (Specify)					
General and Administrative (%)					
TOTAL OPERATING COST	365	292	775		
CAPITAL EQUIPMENT FIN CHARGED: ________					
TOTAL PROJECT COST	365	292	775		

FY 84 MONTHLY FORECAST EXPENSE

OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
24	24	24	24	24	28
APRIL	**MAY**	**JUNE**	**JULY**	**AUGUST**	**SEPTEMBER**
24	24	24	24	24	24

NRC FORM 189
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U.S. NUCLEAR REGULATORY COMMISSION

PROJECT AND BUDGET PROPOSAL FOR NRC WORK

FIN NUMBER: A-1342

DATE: July 1, 1983

PROJECT TITLE: LWR Melt Progression and Accident Sensitivity Study

DOE PROPOSING ORGANIZATION: Sandia National Laboratories

FORECAST MILESTONE CHART. Scheduled to Start — Completed (Shown in Quarter Year)
PROVIDE ESTIMATED DOLLAR COST FOR EACH TASK FOR EACH FISCAL YEAR

TASK		FY 83	FY 84	FY 85	FY 86	FY
		1st 2nd 3rd 4th	1st 2nd 3rd 4th	1st 2nd 3rd 4th	1st 2nd 3rd 4th	1st 2nd 3rd 4th
Sequence Sensitivity Analysis - PWR	SCHEDULE	———▲				
	COST	120				
Sequence Sensitivity Analysis - BWR	SCHEDULE	———▲				
	COST	140				
Improved Model Development	SCHEDULE	———▲				
	COST	105				
* = final topical report ≠ = interim topicals	SCHEDULE					
	COST					
	SCHEDULE					
	COST					
TOTAL ESTIMATED PROJECT COST		365	292	775		

PROJECT DESCRIPTION: (Provide narrative descriptions of the following topics in the order listed. Attach on plain paper to the 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

				DATE
[signature]	[signature]	[signature]	[signature] 7/83	[signature]
6425	6420	0155	6400	6000

LWR Melt Progression and Accident Sensitivity Study

1. Objective of Proposed Work

The objective of this project is to provide the USNRC with a state-of-the-art, mechanistic analysis tool with which to monitor the progress of a severe LWR accident from the stage of loss of rod geometry, through core melt, internal structure failure, melt-water interactions, up to and including vessel breach and materials ejection. This tool, the MELPROG code, is to link with suitably improved RCS models based on the TRAC and RELAP code families. It is to interface temporally with the SCDAP fuel rod failure and core degradation code, and both spatially and temporally with the CONTAIN containment response code. The integrated code package (SCDAP, MELPROG, RELAP5 and TRAC-PF1) is known as the Severe Fuel Damage Analysis Package, SFDAP. It should be noted that MELPROG is based partially on the MIMAS code, whose capabilities it greatly extends.

A major component of this objective is the use of MELPROG at suitable stages of its development to analyze major LWR accident sequences. This is aimed at providing NRC with timely state-of-the-art accident sequence predictions at all major stages of the project. Principal information produced by the code includes core temperatures, location of materials, steam generation rates, rates of release and transport of fission products and hydrogen to the RCS and through vessel breaches, and the mode and timing of possible vessel breaches as well as the rate of material ejection from the vessel. A further objective of the project is to provide sensitivity analyses of deviations from "best-estimate" code input assumptions and models. This will provide mechanistic delineation of accident uncertainties and definition of follow-on code and experiment needs. Finally the MELPROG effort is intended to provide ongoing guidance to severe fuel damage experiment programs both at INEL and SNL.

2. Summary of Prior Efforts

Until recently analysis of severe accident progression has relied on simplified, parametric codes developed for probabilistic risk assessments, notably the MARCH family of codes. The inadequacy of this type of code for development of "best-estimates" of accident progressions has been noted many times. [See, for example, the Zion-Indian Point Study (Murfin et al., 1980), the MARCH assessment project (Rivard et al., 1981), the SASA project (Haskin et al., 1981) and the Severe Fuel Damage Task Force Report (Silberberg et al., 1981).] A recent important effort has been the Damage Assessment of TMI-2 (Maudlin et al., 1983), for which the MIMAS core damage analysis code was developed at Los

Alamos National Laboratories. This code has been adopted as the basic driver package for MELPROG.

3. Expected Results, 1984

The structure heat-up, loading and mechanical failure package will be completed and compared to detailed finite-element analyses. This subtask involves replacing some simplified structures models with more detailed ones. This is approximately a six man-month effort.

The fourth momentum field, the solid rubble field will be added to the fluids driver--completing that module. (Much of the development work has already been completed for this subtask.) Implementation should involve about three man-months.

The TRAC-PF1 RCS hydraulics code will be fully linked to MELPROG, thus creating a complete primary-system package for PWRs. This is a cooperative effort with Los Alamos National Laboratories and should involve less than six man-months.

Implementation of the VICTORIA fission product release code will be carried out. Work will begin on adapting TRAP-MELT and MAEROS phenomenologies for fission product transport and deposition to MELPROG. This is an involved task because transport is necessarily and automatically carried out by MELPROG's fluids driver. Fission product physical and chemical states will be monitored by bookkeeping within that context. Deposition on solids and phase changes must be modeled by inter-field exchange processes. Thus MAEROS and TRAP-MELT models must be translated into the MELPROG formalism rather than simply carried over mutatis mutandis. This task will involve about one man-year in 1984. However the transport/deposition modeling effort will not be completed until FY1985.

A modest accident analysis effort will be carried out involving detailed studies of one or two severe accidents. This is largely a code exercise effort, rather than the beginning of an overall accident analysis project. It is anticipated that three man-months will be devoted to this effort.

Before describing follow-on efforts, it is worth noting that several tasks important to the completion of the code are being slipped into FY85/86 due to funding constraints. In particular, implementation of the TEXAS melt/water interaction module is now scheduled for FY85. Equally importantly, the development of a SCDAP/MELPROG interface has been slipped into future years. The rationale for choosing which tasks to slip is as follows. TEXAS exists and can be used (albeit in a crippled manner) to run as a stand-alone module in parallel to MELPROG. So accident analysis

using MELPROG, while hindered by this difficulty, can be carried out with considerable effectiveness. On the other hand, the FY84 tasks outlined above are all necessary to a MELPROG code with any pretense of robustness. Thus it makes sense to complete them prior to creating a MELPROG/SCDAP linker. It is also worth noting that MELPROG will be quite capable of experiment analysis and accident progression studies in FY84. However funding constraints limit us to very limited code exercises. Finally, we are not staff limited in this area. Increased funding can be directly translated into more rapid progress during FY84.

4. Follow-on Efforts

(a.) FY85

(i.) Implementation of TEXAS module into MELPROG. This will allow detailed treatment of steam explosions and steam spikes by MELPROG. This is about a 1-1/2 man-year effort, or less.

(ii.) Completion of the fission product transport and deposition models for the fission product modules. This should be a one man-year effort.

(iii.) Commencement of BWR model development. Initial work involves changing details of the PSEUDO-SCDAP module and major changes in the structures module. This represents about a one man-year effort in FY85.

(iv.) Creation of the SCDAP/MELPROG interface. This is a cooperative effort with INEL. Approximately one man-year is involved. A major task is the implementation of the MELPROG/RELAP5 interface.

(v.) Start of an overall accident analysis project. This effort is either to be a joint effort with the SCDAP project at INEL or at least closely coordinated with their efforts. This involves about one man-year in FY85.

(vi.) Detailed PBF/ACRR severe-fuel-damage experiment analysis. This involves six man-months or more of effort in FY85.

(b.) FY86

(i.) Continuation of BWR model development. Possible adoption of a multi-channel hydrodynamics scheme apres SCDAP/BWR MOD. Link to RELAP5 BWR-RCS hydraulics model. This could involve up to two man-years in FY86.

(ii.) Continuation of detailed SFD experiment analysis. (Approximately one man-year).

(iii.) Greatly expanded accident analysis effort aimed at providing a best-estimate analysis for most major accidents in a spectrum of PWR plants. This is a two-plus man-year effort.

(iv.) Sensitivity analysis for selected sequences in a few PWRs aimed at examining uncertainties in best-estimate, mechanistic analyses to changes in input and m modeling assumptions. This is a two man-year effort.

(v.) Begin limited accident analysis for major BWR accidents (one man-year).

5. Relationship to Other Projects

This project is closely tied to the SCDAP fuel rod damage and core degradation code development effort at INEL. Ultimately the two codes are to be two closely linked parts of an integrated analysis package, SFDAP. Similarly the project is related to the LWR CONTAIN code development project at SNL. That project is to provide a containment response model which will be linked to MELPROG to provide an overall analysis of the reactor, the RCS, and the containment building.

In addition, MELPROG is closely related to TRAC-PF1/MIMAS development projects at LANL. That effort has provided part of the basis for MELPROG, and it is currently aiding development of the MELPROG/TRAC-PF1 link. Finally, MELPROG is closely tied to the severe fuel damage experiment programs at INEL and SNL, and is coordinated with the MELCOR risk code development project at SNL.

6. Reporting Schedule

Results from the MELPROG project will be reported in SNL topical reports and journal articles. In addition, monthly management briefs will be provided as part of SNL/ARSR monthly reports. Detailed technical progress will be updated in SNL/ARSR quarterly reports. In addition regular and frequent telecommunications between NRC and SNL project leaders will take place; and staff visits to the site will provide opportunity for detailed briefings.

7. Subcontractor Information

Not applicable.

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(3-81)

U.S. NUCLEAR REGULATORY COMMISSION

PROJECT AND BUDGET PROPOSAL FOR NRC WORK

DATE OF PROPOSAL: 7/83

[X] NEW
[ ] REVISION NO.

PROJECT TITLE: Transient Fuel Response and Fission Product Release	FIN NUMBER: A2016
NRC OFFICE:	NRC B&R NUMBER: 60-19-02-01
DOE CONTRACTOR: Argonne National Laboratory	CONTRACTOR ACCOUNT NUMBER: 8M402
SITE: Argonne, Illinois	DOE B&R NUMBER: 40-10-01-06

COGNIZANT PERSONNEL	ORGANIZATION	FTS PHONE NUMBER	PERIOD OF PERFORMANCE
NRC PROJECT MANAGER: G. P. Marino and L. Chan	NRC/DAE		STARTING DATE: 9/76
OTHER NRC TECHNICAL STAFF			COMPLETION DATE: open
DOE PROJECT MANAGER: R. J. Dalton	DOE/CH	972-2229	[redacted]
CONTRACTOR-PROJECT MANAGER: B. R. T. Frost	ANL/MST	972-4928	
PRINCIPAL INVESTIGATOR(S): J. Rest	ANL/MST	972-5026	

STAFF YEARS OF EFFORT (Round to nearest tenth of a year)	FY 1983	FY 1984	FY 1985	FY	FY
Direct Scientific/Technical	1.3	1.3	1.5		
Other Direct (Graded)	0.2	0.2	0.2		
TOTAL DIRECT STAFF YEARS	1.5	1.5	1.7		
COST PROPOSAL					
Direct Salaries	$57	$61	$104		
Material and Services (Excluding ADP)	16	15	15		
ADP Support	90	74	95		
Subcontracts	—	—	—		
Travel Expenses — Foreign	3	3	3		
Travel Expenses — Domestic	2	2	2		
Indirect Labor Costs: Divisional Overhead	16	18	43		
Other (Specify): Reactor Program Administration 2%	5	4	7		
General and Administrative (%) FY 83 = 17.3%	39	37	56		
TOTAL OPERATING COST	228*	214	325		
CAPITAL EQUIPMENT FIN CHARGED: 2036/2016	20†	40	—		
TOTAL PROJECT COST	$248	$254	$325		

FY 1984 MONTHLY FORECAST EXPENSE

OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH
15	18	17	27	20	20
APRIL	**MAY**	**JUNE**	**JULY**	**AUGUST**	**SEPTEMBER**
20	20	27	20	22	28

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*Includes $14K of FY 1982 carryover. †Includes $10K of FY 1982 carryover.

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U.S. NUCLEAR REGULATORY COMMISSION

PROJECT AND BUDGET PROPOSAL FOR NRC WORK

FIN NUMBER: A2016

DATE: 1/83

PROJECT TITLE

Transient Fuel Response and Fission Product Release

DOE PROPOSING ORGANIZATION

Argonne 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	FY
		1st / 2nd / 3rd / 4th	1st / 2nd / 3rd / 4th	1st / 2nd / 3rd / 4th	1st / 2nd / 3rd / 4th	1st / 2nd / 3rd / 4th
(C) Analytical Studies	SCHEDULE	△ (1st) ———	———	——— △ (4th)		
	COST	$248	$254	$325		
	SCHEDULE					
	COST					
	SCHEDULE					
	COST					
	SCHEDULE					
	COST					
	SCHEDULE					
	COST					
TOTAL ESTIMATED PROJECT COST		$248	$254	$325		

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.)*

See attached sheets for detailed milestone information.

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 | DATE

1. Objective of Proposed Work

The objectives of proposed work are: (a) the development of physically realistic computer-based models (GRASS-SST, FASTGRASS, PARAGRASS) that describe the release of fission products from and the response of irradiated LWR fuel during steady-state operation and hypothetical accident situations; (b) assistance to INEL and BNWL for the incorporation of the models into SCDAP (INEL), FRAP-T (INEL), and FRAPCON (BNWL) fuel-rod codes; and (c) technical assistance to NRC on other fuel-behavior/fission-product release matters.

2. Summary of Prior Efforts

PARAGRASS-MOD 1, a very fast running, semi-mechanistic model for predicting fission-product release during steady-state and transient conditions was developed and verified. PARAGRASS updates (complete interfacing instructions) were written for FRAPCON, FRAP-T, and SCDAP, and were transmitted in tape format to BNWL (FRAPCON) and INEL (FRAP-T, SCDAP). Assistance was provided to BNWL and INEL in the implementation of these new codes on their respective computers, and in the initial code checkout procedures. PARAGRASS is based on analyses in FASTGRASS and GRASS-SST. This model provides FRAPCON, FRAP-T, and SCDAP with an extremely fast running option for fission-product release and swelling. PARAGRASS-MOD 1 has the capability of reproducing GRASS results with good accuracy. A GRASS-SST and FASTGRASS-generated data base is also being used to assess key factors that affect gas release and swelling.

The steady-state and transient gas release and swelling subroutine, FASTGRASS, was modified to include a mechanistic description of volatile fission-product (VFP) behavior. The VFPs I, Cs, CsI, Cs_2MoO_4, and Cs_2UO_4 are included in this analysis (FASTGRASS-VFP1). This work is built on the steady-state analysis of iodine and cesium performed under an EPRI contract, and emphasizes volatile fission-product behavior under severe accident conditions. As the noble gases play a major role in establishing the interconnection of escape routes from the interior to the exterior of the fuel, a realistic description of VFP release must a priori include a realistic description of fission-gas release and swelling. Thus, FASTGRASS provides a natural framework within which the models for the behavior of iodine and cesium can be incorporated. The results of experiments run at ORNL and the examination results of the ORNL high-temperature test specimens obtained at ANL were used to verify and improve the LWR model of transient volatile-fission product (iodine and cesium) release. In the present model, the inclusion of Cs_2MoO_4 and Cs_2UO_4 can provide strong competitive traps for the available Cs. The formation of Cs_2MoO_4 and Cs_2UO_4 can have a crucial effect on the reaction involving CsI which is of major concern for deducing the form of iodine release in LWR power plant accident scenarios. FASTGRASS-VFP1 has undergone preliminary verification for steady-state fission-product release.

Analyses during transient conditions were performed and documented in order to assess the key factors affecting iodine release during accident conditions. A study comparing FASTGRASS predictions with those of the CORSOR code was performed at the request of the NRC.

A computer link between INEL and ANL was initiated. This link will facilitate ANL's task of providing INEL with a fission product source term calculational capability. This link will also enable ANL to assess fission product response during LWR accidents with the FRAP-T/PARAGRASS and the SCDAP/PARAGRASS codes.

Improved mechanistic models for fuel microcracking were developed and included in the FASTGRASS analysis. Fuel microcracking can have an extreme effect on fuel temperatures and fission-product release during accident conditions. The Chen-Argon creep cavitation model was coupled to the FASTGRASS computer code for the prediction of fuel microcracking. Grain-boundary separation (or microcracking) can often short-circuit normal, slower processes of fission-gas release from within the fuel grains to the fuel exterior. The Chen-Argon model is a more mechanistic (realistic) model for grain-boundary cavitation than the DiMelfi-Deitrich model currently used in FASTGRASS. Model predictions for total gas release and radial profiles of separated grain-boundary area per unit volume were compared with results of out-of-reactor direct electrical heating tests on irradiated LWR fuel.

A FASTGRASS users manual was completed. This documentation was supplied with the FASTGRASS code to the ANL National Energy Software Center.

3. <u>Work to be Performed and Expected Results</u>

The development of the fast running PARAGRASS code for the prediction of steady-state and transient fission-product release will continue. Semi-mechanistic models for the prediction of the VFPs Cs, I, and CsI will be included in the analysis. These models will be based on the more complex VFP analysis in FASTGRASS-VFP1. PARAGRASS-MOD 2 will be submitted with documentation to the ANL National Energy Software Center.

The development of models for predicting the behavior of volatile fission products during steady-state and transient conditions will be continued (e.g., the inclusion of the fission product tellurium). These improved models will be included in the FASTGRASS code (FASTGRASS-VFP2).

The FASTGRASS and PARAGRASS development will continue to be coordinated with fuel code developers at INEL and BNWL. Assistance will continue to be provided to these organizations in implementing and using GRASS-SST/FASTGRASS/PARAGRASS. The calculation and documentation of the response of fission products during accident conditions will continue.

ANL will conduct pretest and posttest analysis of fission gas and volatile fission-product release during the ORNL high temperature fission product release tests (FIN No. B0127).

Models will be developed for the behavior of fission products during LWR fuel melting and in LWR fuel in a steam environment. Gross fuel melting conditions can lead to fission gas/molten fuel interactions and enhanced fuel deformation, frothing, and fuel dispersal. The presence of a steam environment can affect the oxygen partial pressure in the fuel and can have a very dramatic influence on the fission gas and volatile fission-product diffusivities. These models will be incorporated into both FASTGRASS and PARAGRASS.

Sensitivity analyses will continue to be performed in order to determine key factors affecting fission product release.

Technical assistance to the NRC/RES/DAE will be provided in the area of fission-product release as requested. The degree to which ANL will be able to respond to this activity is contingent on budget and schedule constraints. Sensitivity analyses to determine key factors affecting fission-product release will be continued.

If additional funding becomes available (100K), ANL will be able to provide the following: assistance to SNL in the interfacing of FASTGRASS/PARAGRASS and Sandia's in-vessel source term model; coordination of programs between ANL and SNL for the development of models describing the release of the lower volatility fission product during accident conditions; in conjunction with SNL, use these models to calculate and document the response of the lower volatility fission products during accident conditions; a higher degree of involvement with INEL in the area of assessing fission product response during LWR accident conditions with the FRAP-T/PARAGRASS, the SCDAP/PARAGRASS, and the FASTGRASS-VFP codes.

4. Description of Follow-on Efforts

Analytical modeling, experimental support, and other technical assistance will be provided at the request of NRC/RSR.

5. Relationship to Other Projects

The results of experiments performed at INEL will be used to verify and improve the LWR model of transient fission-product release and swelling. The results of experiments run at ORNL and the examination results of the ORNL high-temperature test specimens obtained at ANL will be used to verify and improve the LWR model of transient volatile-fission product (iodine and cesium) release. ANL will assist INEL in the incorporation of these models into the SCDAP (INEL) FRAP-T (INEL) and FRAPCON (BNWL) codes. The NRC Fuel Behavior Review Group reviews and coordinates these programs.

6. Report Schedule

FY 1983 - Published

Light Water Reactor Safety Research Program Quarterly Report. (1st-4th Quarter)

FY 1983 - Planned

J. Rest, FASTGRASS, User's Manual (4th Quarter)

Light Water Reactor Safety Research Program Quarterly Report (1st-4th Quarter)

FY 1984 - Planned

J. Rest, PARAGRASS User's Manual (4th Quarter)

J. Rest, Topical Report on Modeling the Release of Volatile Fission Products (4th Quarter)

Light Water Reactor Safety Research Program Quarterly Reports (1st-4th Quarter)

7. Subcontractor Information

N/A

8. Equipment Requirements

Equipment Item	Subtask	Expenditures (in thousands) FY 1982	FY 1983	FY 1984
Graphic Computing System	(C)	$10	-	-
File Managers for Graphic Computing	(C)	-	$10	-
High Speed Printer				$40
TOTAL		$10	$10	$40

Justification: These items are needed to (1) facilitate computer usage and reduce turn-around time by permitting large amounts of computing during off-shift hours; (2) improve turn-around time and reduce costs for the anticipated increasing amounts of graphics work; (3) facilitate ANL assistance to INEL by providing ANL with the capability to receive information generated from FRAP-T and SCDAP simulations on the INEL computer via an ANL/INEL computer link.

9. Special Facilities

N/A

10. Conflict of Interest Information

Argonne National Laboratory presently conducts research for NRC and no conflict of interest is involved.