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ACRS SUBCOMMITTEE MEETING ON
REACTOR SAFETY RESEARCH
JUNE 3, 1980
WASHINGTON, D.C.

The ACRS Subcommittee on Reactor Safety Research held a meeting on June 3, 1980, at 1717 H Street, N.W., Washington, D.C. Dr. Thomas G. McCreless was the Designated Federal Employee for the meeting. A list of meeting attendees in included as Attachment A.

OPEN SESSION - INTRODUCTORY STATEMENT BY THE CHAIRMAN

Dr. Okrent, the Subcommittee Chairman, convened the meeting at 8:40 a.m. and stated that the purpose of the meeting was to review the proposed FY-82 budget for the NRC Safety Research Programs and other related matters. During the course of the meeting, the Subcommittee will gather information for use by the ACRS in its preparation of the annual ACRS report to the Commission and the Congress. He stated that portions of the meeting that deal with budget information will be closed to the public. The Subcommittee had received neither written statements nor requests for time to make oral statements from members of the public.

Dr. Siess stated that the Subcommittee would like to hear the following from the NRC Staff:

1. Description of the new decision units and their relationship to the previous year decision units.
2. Objectives of the research as defined in the Policy Planning and Program Guidance (PPPG).

PRESENTATION BY THE NRC STAFF

Overview of RES Research Programs - Dr. R. Budnitz

Dr. Budnitz reviewed briefly the restructuring of the research programs, indicating that the FY 82 budget request consists of the following eight Decision Units:

1. LOCA & Transient Research
2. LOFT
3. Plant Operational Safety
4. Severe Accident Phenomena & Mitigation
5. Siting & Environmental Research
6. Waste Management
7. Safeguards & Fuel Cycle Safety
8. Systems and Reliability Analysis

The relationship of the new Decision Unit and the previous year Decision Unit is included in Attachment B, page 1.

He stated that the reasons for the Decision Unit modifications are to:

1. provide increased emphasis on plant operational safety, severe accident consequences and mitigation, and system interaction.

2. Necessary management flexibility within associated program areas.
3. More representative grouping of related research areas.

Dr. Budnitz pointed out that, since the NRC Staff had been experiencing difficulty in obtaining adequate funds to carry out the Improved Reactor Safety System programs identified in NUREG-0438, dated April 12, 1978, they have decided to eliminate this program in FY 1982 and distribute the sub-elements of this program to the appropriate Decision Units of the new format.

CLOSED SESSION (10:15 a.m.)

(This portion of the meeting was closed to the public to discuss budget information.)

Dr. Budnitz discussed briefly the RES budget for FY 80 through FY 83 (Attachment B, pages 2 and 3):

FY 80 Budget

For FY 80, the Congress approved a total funding level of $170.9 million for RES. The FY 80 supplemental budget requested an additional $23.9 million, thus bringing the total for FY 80 to $194.8 million. However, Dr. Budnitz expects that the House Appropriation Committee would approve about $10 million out of $23.9 million in the FY 80 supplement, thus bringing the total funding level for FY 80 to approximately $180.9 million.

FY 81 Budget

The original budget request for RES programs was about $260 million. However, the Office of Management and Budget (OMB) reduced it to $217.4 million and submitted to Congress for approval.

Dr. Budnitz stated that out of the $217.4 million, RES may lose about $40 million for the following:

(a) To accommodate for the overall agency cut directed by the Senate Authorization Committee - $17.9M
(b) To provide additional funds for Fast Reactors and Advanced Converters as instructed by the Senate Authorization Committee - $17.5M
(c) To provide funds for the NRC FY 81 needs for the TMI Action Plan and the (Lab Loaner Programs) - $5.0M

FY 82 and FY 83 Budget

The proposed budget for FY 82 is about $283.6 million and about $309.2 million for FY 83.

Comparison of FY 81 and The Proposed FY 82 Funding Levels for Various Decision Units

Dr. Budntiz reviewed briefly how they plan to allocate the funding levels for various decision units in FY 82 (Attachment B, pages 4 and 5).

Dr. Budnitz pointed out that they have proposed approximately a 30% increase in the budget to the Decision Unit associated with Siting & Environmental. This increase in budget will be used mainly to perform research in the environmental area and the results of this research will be used in the siting rulemaking process.

In response to a question from Dr. Okrent as to how the research in the environmental area will support the siting rulemaking, Dr. Budnitz stated that the relationship between the planned research in the environmental area and the siting rulemaking is yet to be defined clearly by the NRC.

Dr. Budnitz indicated that they have proposed a significant increase in the FY 82 budget for the Waste Management Program. This increased budget will be used for field exploration to gather data on the site characteristics to support the DOE's High-Level Waste Management Program.

Dr. Siess commented that the NRC could obtain most of the site characteristics data by merely asking questions of the applicants through a board of experts. Even if the NRC does experimental work at the site, they may need some experts to determine the adequacy of the data. He does not believe that NRC needs to perform site experiments in this area.

Dr. Budnitz stated that the process of obtaining data by asking questions will be very time consuming. They believe that by doing actual site studies they will be able to obtain the necessary data quicker.

Dr. Okrent expressed skepticism, indicating that he does not believe that the NRC will be able to achieve what they intend to through a vague experimental program. He wondered what more the NRC could accomplish through their Waste Mangement program with limited resources, that could not be achieved by DOE through their multi-million dollar program.

Dr. Budnitz stated that they need to do this research not only to determine the adequacy of the site but also to assure themselves and the public that their regulations are adequate to regulate the Waste Management program.

Major Issues That Need To be Resolved

Dr. Budnitz discussed briefly the major issues that they believe should be resolved (Attachment B, page 6).

With regard to the LOFT program, he indicated that if they continue to experience difficulties in obtaining adequate fund for operating the LOFT facility, they plan to phase out the LOFT program in the middle of FY 82. Prior to phasing o the LOFT program, they need to conduct some more tests to get answers to some unresolved issues in the large LOCA and fuel areas.

Dr. Okrent commented that the tests planned to be conducted in the LOFT facility from now until FY 82 may or may not provide adequate answers to the unresolved issues. He stated that the NRC Staff should base their test needs on the basis of the adequacy of the existing Standards. If the existing Standards are adequate to protect the health and safety of the public, there is no need for the NRC to perform additional tests.

Dr. Budnitz stated that they need the LOFT program to develop adequate codes for use in analyzing the behavior of LOCA transients.

In response to questions from Dr. Siess and Dr. Okrent, Dr. Budnitz stated that, if they get adequate funds, they will keep the LOFT program through FY 84; however, if they do not get enough funds, they plan to phase out the LOFT program in the middle of FY 82. To prepare the LOFT facility for standby for future use, initially it may cost about $10-15 million and to maintain it from there on, it may cost about a million dollars per year.

Dr. Budnitz stated that ACRS comments on the appropriateness of the major issues identified by the NRC Staff would be helpful.

Impacts of Budget Reductions To Meet the PPPS Levels

Dr. Budnitz stated that RES has proposed a total budget of about $283 million for FY 82. However, the PPPG level for FY 82 is about $217 million. He stated that the impacts of reducing the research program budget to meet the PPPG guidelines are as follows:

Decision Units	Impact
LOCA & Transient Research	•Phase out separate effects experiment in FY 82
	•Drop ESSOR support
LOFT	•Begin phase out in the middle of FY 82

Decision Units	Impact
Plant Operational Safety	•Slow growth in man-machine, Instrumentation & Electrical Components and Structures
	•Drop High Pressure Thermal Shock tests in FY 82
Severe Accident Phenomena & Mitigation	•No Fast and Gas Reactor research in FY 82
	•Slow growth in Fuel melt, Fission product & Severe Accident Mitigation research
Siting & Environmental	•Hold Site Safety research to FY 81 Level
Waste Management	•No field work to support High-Level Waste program
	•Phase out all Low-Level Waste research in FY 82
Safeguards & Fuel Cycle Safety	•Defer new work on Occupational Protection and Product Safety
Systems & Reliability Analysis	•Slow down extension of IREP to all operating plants
	•Defer application of Reliability Assurance Techniques to Plant Start-up and Operation
	•Reduced effort to apply Risk Assessment Perspective to Regulatory Process.

In response to a question from Dr. Okrent as to whether there is any program to determine the probability and consequences of flooding in nuclear plant sites, Mr. Bernero stated that they have some model calculations under development on this issue and they are waiting to see the results of these calculations. Based on the results of these calculations, they will decide whether to pursue this issue. At present, they do not believe that this issue should be treated as one of the high priority items.

Dr. Okrent stated that he does not understand the basis for Mr. Bernero's optimism that the flooding problem is a low-risk issue and does not need to be included in the high priority list.

Dr. Siess stated that one has to look at the adequacy of the provisions in nuclear plants to handle a severe flood. He added that it is better to include design provisions to handle flood situations rather than to shut the plant down after experiencing severe floods.

Dr. Budnitz stated that they have so far identified only the major programs that will be affected if there is a major reduction in the proposed FY 82 budget. They have yet to identify the impact of the reduced budget on other small programs. They would like to

have the ACRS opinion on the adequacy of the allotment of the funds for various programs and also on the proposed priorities of items that will be slowed or terminated due to budget reduction.

Dr. Budnitz pointed out that the initial EDO markup on the FY 82 budget was scheduled for July 2, 1980; copies of the initial EDO markup will be sent to ACRS as soon as they are available.

With regard to the memorandum from Dr. Budnitz to the Commissioners (SECY 80-253) with regard to the NRC Staff's comments on the ACRS recommendations delineated in the ACRS report to the Commission (NUREG-0657), Dr. Okrent suggested that the Committee should evaluate those comments and include its opinion in the 1980 ACRS report to the Commission.

Dr. Siess suggested that it would be better to have discussions with the NRC Staff on this issue, either during the subject meeting, if time permits, or during the 242nd full Committee meeting to have a clear perspective of the issues between the NRC Staff and the ACRS.

With regard to the coordination between RES and other research user offices, Dr. Okrent stated that it would be appropriate for the Committee to hear from the research user offices about their research needs and priorities either during 242nd full Committee meeting or during the July 8, 1980 Subcommittee meeting.

In response to a question from Dr. Okrent with regard to the role of RES in developing design criteria for future LWRs and Standard plants (if they are required to develop such criteria), Dr. Budnitz stated that RES will play an important role in this area. If the General Design Criteria or Branch Technical Positions have to be modified to reflect operating experiences, RES would have to perform research to provide technical basis for such modifications. Mr. Rowsome added that the Probabilistic Analysis Staff intends to develop a systematic way to identify safety flaws; they also intend to develop deterministic and probabilistic criteria for handling the safety flaw issues. They are doing some work to codify the risk assessment techniques so that it could be used in the licensing process.

In response to a question from Dr. Lawroski as to whether DOE has changed their attitude toward performing work on Class 9 accidents, Dr. Budnitz stated that DOE has agreed reluctantly to perform such work on the vented and filtered containment. However, they are still very reluctant to consider Class 9 accidents in other areas of work.

PROGRAM ELEMENTS - DR. T. MURLEY, MR. ARSENAULT, MR. BASSET AND MR. BERNERO

Dr. Murley reviewed briefly the program elements of some of the Decision Units.

Dr. Murley stated that if the research budget has to be reduced to meet the PPPG levels, the LOFT Program will be phased out in the middle of FY 82. If this happens, NRC would lose the data and understanding to be gained from a number of small and large break LOCA's and operational transient experiments planned for FY 82-84. LOFT could be used for the man-machine research program for testing improved display and diagnostic features under actual transient and accident conditions. LOFT could be used to run fuel damage tests to obtain needed data and understanding of reactor and fuel behavior during severe core damage accidents. LOFT has been endorsed by several user offices. Further the value of LOFT has been recognized throughout the world. He believes that to prematurely terminate LOFT would have repercussions far beyond the loss of important safety information.

In response to a question from Dr. Siess with regard to the proposed man-machine interface work on LOFT, Dr. Murley stated that they plan to connect a Cathode Ray Tube (CRT) display to the LOFT computer to help the operator see what is going on during small transients.

Dr. Siess commented that several vendors have already been working in the man-machine interface area. He does not believe that the proposed LOFT program can provide any better information than the vendor programs. He stated further that simulators could be used to develop such information on transients a lot better than LOFT.

Dr. Murley stated that he does not believe that simulators have adequate models to provide accurate information. He does not believe also that simulators can handle two-phase flow problems.

Dr. Siess commented that he can see using LOFT for checking information provided by Vendors; however, he cannot quite see using LOFT to develop such information.

With regard to the program pertinent to Instrumentation and Electrical, Dr. Murley stated that this program is intended to study the design adequacy of safety-related electrical components, such as connectors, terminal blocks, switches, relays, etc. Under this program, they intend to perform actual tests to determine the failure modes of electrical components.

Dr. Siess commented that instead of actually performing tests on electrical components, the NRC could write criteria for conducting these tests and let the vendors perform the

actual tests. He stated further that NRC should have clear idea about when and where they need to do certain research.

With regard to the Severe Accident Phenomena & Mitigation Research program, Dr. Okrent commented that the proposed level of effort still falls far short of what the NRC needs. The NRC Staff should have a broad program to obtain necessary information on various types of containments. He believes that such information will be helpful for the Commission in its decision-making process. He stated further that long-term research in this area should also be considered.

In response to a question from Dr. Siess with regard to the user endorsement for FY 82 programs, Mr. Scroggins stated that at the time of submitting the FY 82 budget to the Commission, they must have user endorsement for at least 85% of the FY 82 programs.

Mr. Arsenault reviewed briefly some of the program elements associated with the Decision Unit related to Waste Management Research.

In response to a question from Dr. Moeller with regard to Dr. Budnitz's rationale to phase out Low-Level Waste Management Program in FY 82 to meet PPPG Guidelines, Mr. Arsenault stated that he does not agree completely with Dr. Budnitz's decision that all the work pertinent to the Low-Level Waste Management program should be stopped. However, he understands Dr. Budnitz's rationale behind the decision.

In response to a question from Dr. Lawroski as to whether they have any flexibility to reprogram from the High-Level Waste Management program to the Low-Level Waste Management program, Mr. Arsenault stated that, unless they have specific instructions from the Congress, they have complete flexibility for reprogramming within Decision Units.

Dr. Moeller commented that it seems that the Low-Level Waste Management program is necessary to provide information to the Commission in the rule-making process pertinent to the Low-Level Waste Management. He pointed out further that some of the public believes that the issues relevent to the Low-Level Waste Management should be resolved.

Mr. Arsenault stated that it would be better to obtain information through research to support the regulatory decisions. However, under the present circumstances, it is up to the Commission to decide whether they want results of the research as a technical

basis for demonstrating the validity of the regulatory decisions or to use engineering judgment in the decision-making process.

Mr. Basset reviewed briefly the sub-elements of the Safeguards & Fuel Cycle Safety program.

In response to a question from Mr. Mathis as to why such a high priority is given to the Material Control & Accounting program over some other programs, Mr. Arsenault stated that they need to do research in this area to develop a balanced and comprehensive material control and accounting techniques for the nuclear power plants that has been lacking for several years. He believes that this program is important to provide information to resolve several issues in this area that have been in existence for several years.

Mr. Bernero reviewed briefly the elements of the Systems and Reliability Analysis Program.

SUBCOMMITTEE REMARKS

The Subcommittee suggested that the NRC Staff prepare to discuss the following at the 242nd full Committee meeting:

1. Overview of the research programs.
2. FY 80, 81 and 82 budget information including PPPG budget guidelines.
3. Since the programs on LOCA & Transient Research and LOFT consume a major portion of the research budget, coupled with the fact they are also somewhat controversial, the NRC Staff should provide a detailed presentation to the full Committee to enable it to have a clear perspective of the issues.
4. Representatives of the Offices of NRR, NMSS, OSD and other research user offices should give presentations to the Committee with regard to their research needs and priorities.

FUTURE MEETING

Another Reactor Safety Research Subcommittee meeting is scheduled to be held on July 8, 1980 to continue the review of pertinent portions of the NRC research program to gather information for the report to the Commission and the Congress.

Dr. Okrent thanked all the participants and adjourned the meeting at 6:00 p.m.

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NOTE: For additional details, a complete transcript of the meeting is available in the NRC Public Document Room, 1717 H St., NW, Washington, DC 20555 or from Alderson Reporting Company, Inc., 300 7th Street, S.W., Reporters Building, Washington, D.C. 20024 (202) 554-2345.

ACRS SUBCOMMITTEE MEETING ON
REACTOR SAFETY RESEARCH
JUNE 3, 1980
WASHINGTON, DC

ATTENDEES LIST

ACRS

D. OKRENT, CHAIRMAN

C. P. SIESS, MEMBER

S. LAWROSKI, MEMBER

D. MOELLER, MEMBER

W. MATHIS, MEMBER

T. G. MCCRELESS, STAFF*

S. DURAISWAMY, STAFF

*DESIGNATED FEDERAL EMPLOYEE

D. ZUKOR, FELLOW

NRC

R. J. BUDNITZ, RES

R. M. BERNERO, RES/PAS

F. H. ROWSOME, RES/PAS

S. R. STURGES, RES/PAS

J. T. LARKINS, RES

O. E. BASSETT, RES/SAFER

F. J. ARSENAULT, RES/SAFER

R. M. SCROGGINS, RES

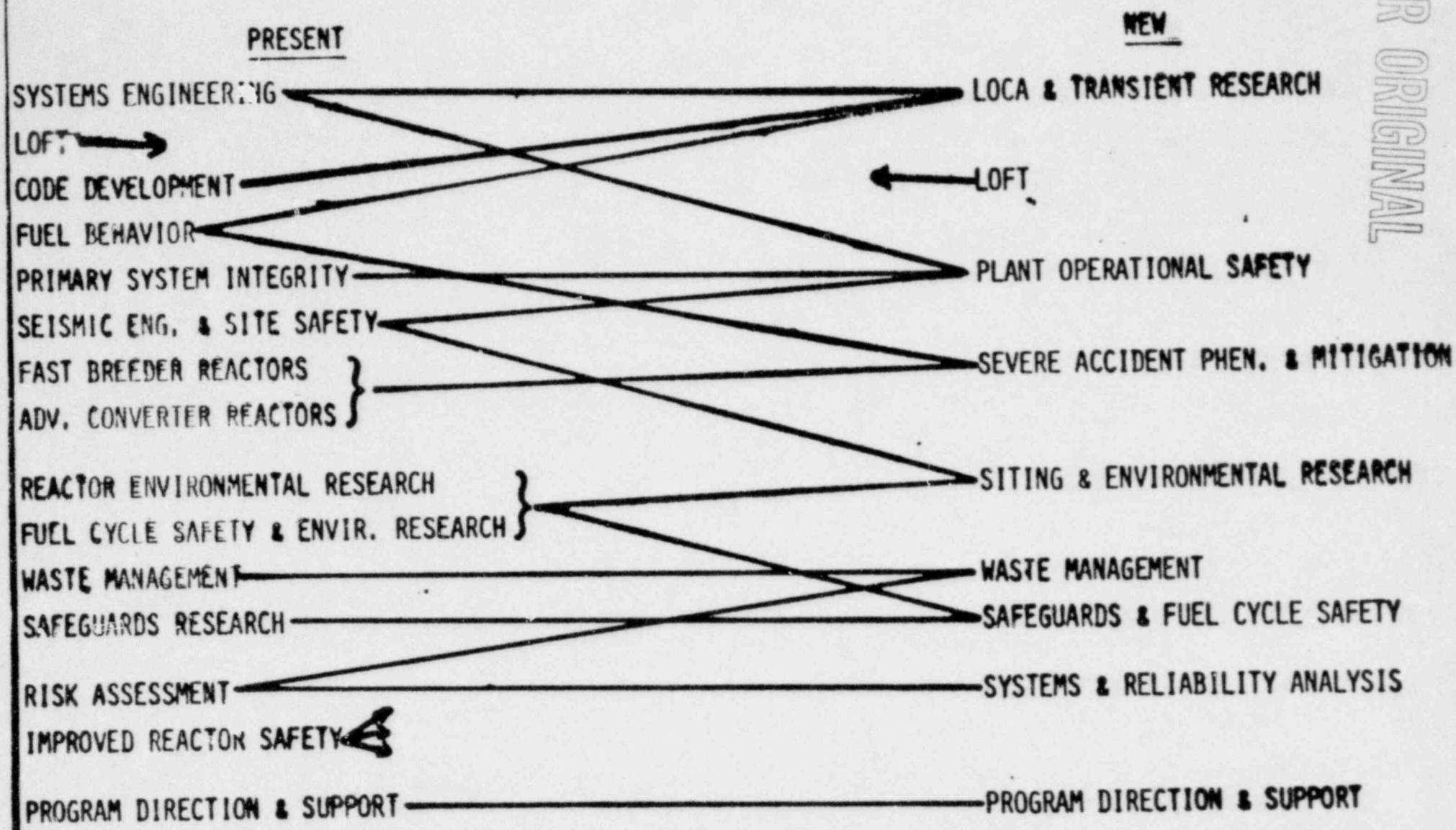
T. MURLEY, RES

M. HAYES, RES

P. COTA, NRR

R. V. VILLAFRANCO, CON

DECISION UNIT - STRUCTURE



NUCLEAR REGULATORY RESEARCH
FY1982 INTERNAL REVIEW
(DOLLARS IN MILLIONS)

DECISION UNIT	'80 BASE	'80 w/SUPP	'81 PRES	RES '82	RES '83
PERSONNEL	(159)	(164)	(178)	(216)	(222)
LOCA & TRANSIENT	$ 61.3	$ 74.8	$ 71.1	$ 59.9	$ 50.9
LOFT	42.3	42.3	43.0	48.0	48.0
PLANT OPERATIONAL SAFETY	15.9	18.0	34.1	48.6	62.9
SEVERE ACCIDENT PHEN. & MITIGATION	17.2	18.5	8.6	30.2	42.2
SITING & ENVIRONMENTAL	9.4	10.1	13.9	16.9	18.5
WASTE MANAGEMENT	6.4	9.4	14.9	27.8	32.8
SAFEGUARDS & FUEL CYCLE SAFETY	6.4	6.4	9.9	13.3	14.7
SYSTEMS & RELIABILITY ANALYSIS	4.3	7.6	11.6	24.8	23.8
PROGRAM DIRECTION & SUPPORT	0	0	0	0	0
TOTAL P.S.	$163.2	$187.1	$207.1	$269.5	$293.8
EQUIPMENT	7.7	7.7	10.3	14.1	15.4
TOTAL	$170.9	$194.8	$217.4	$283.6	$309.2

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NUCLEAR REGULATORY RESEARCH
FY1982 INTERNAL REVIEW
(DOLLARS IN MILLIONS)

DECISION UNIT	'80 BASE	'80 w/SUPP.	'81 HAC (Appeals Supplement)	'81 PRES	RES '82	RES '83
PERSONNEL	(159)	(164)		(178)	(216)	(222)
LOCA & TRANSIENT	$ 61.3	$ 74.8	$ 65.1	$ 71.1	$ 59.9	$ 50.9
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SEVERE ACCIDENT PHEN. & MITIGATION	17.2	18.5	18.5	8.6	30.2	42.2
SITING & ENVIRONMENTAL	9.4	10.1	10.1	13.9	16.9	18.5
WASTE MANAGEMENT	6.4	9.4	6.4	14.9	27.8	32.8
SAFEGUARDS & FUEL CYCLE SAFETY	6.4	6.4	6.4	9.9	13.3	14.7
SYSTEMS & RELIABILITY ANALYSIS	4.3	7.6	7.0	11.6	24.8	23.8
PROGRAM DIRECTION & SUPPORT	0	0	0	0	0	0
TOTAL P.S.	$163.2	$187.1	$173.2	$207.1	$269.5	$293.8
EQUIPMENT	7.7	7.7	7.7	10.3	14.1	15.4
TOTAL	$170.9	$194.8	$180.9	$217.4	$283.6	$309.2

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RES - FY 1982
PROGRAM SUPPORT ($-M)

DECISION UNIT	'81 PRES	'82 RES	▲	COMMENT
LOCA & TRANSIENT RES.	$ 71.1	$ 59.9	$-11.2	• REDUCTION IN LARGE LOCA EXP. • REDUCED CODE DEVELOPMENT • INCREASE CODE APPLICATION & EXP. RELATED TO CORE DAMAGE BEYOND LOCA
LOFT	43.0	48.0	5.0	• INFLATION/HIGH POWER TESTS, STEAM LINE BREAK, SG RUPTURE & OPER. TRANSIEI
PLANT OPERATIONAL SAFETY	34.1	48.6	14.5	• SIGNIFICANT INCREASES IN MAN/MACHINE & I&C. MODEST GROWTH IN MECH COMP. & STRUCTURAL SAFETY & PSI
SEVERE ACCIDENT PHEN. & MITIGATION	8.6	30.2	21.6	• SIGNIFICANT NEW EFFORTS IN FUEL MELT, FISSION PRODUCT RELEASE & TRANSPORT & ACCIDENT MITIGATION TO SUPPORT . . RULEMAKING • MAINTAIN BASE PROGRAM IN FAST/GAS REACTORS
SITING & ENVIRONMENTAL RES	13.9	16.9	3.0	• MODEST GROWTH IN SITE SAFETY RESEARCH • ENVIRONMENTAL IMPACTS OF AIRBORNE EFFLUENTS
WASTE MANAGEMENT	14.9	27.8	12.9	• INCREASED HIGH LEVEL WASTE FOR SITE CHARACTERIZATION FUEL STUDIES • MODEST GROWTH IN LOW LEVEL & URANIUM RECOVERY RESEARCH

RES - FY 1982
PROGRAM SUPPORT ($-M)

DECISION UNIT	'81 PRES	'82 RES	▲	COMMENT
SAFEGUARDS & FUEL CYCLE SAFETY	$ 9.9	$ 13.3	$ 3.4	o INCREASE MC&A RESEARCH o NEW WORK ON PRODUCT SAFETY & OCCUPATIONAL PROTECTION
SYSTEMS & RELIABILITY ANALYSIS	11.6	24.8	13.2	o SIGNIFICANT EFFORT ON SYSTEM ANALYSI o INCREASED CONSEQUENCE ANALYSIS, RELIABILITY STUDIES & HUMAN ERROR DATA ANALYSIS & METHODS DEVELOPMENT
TOTAL	$207.1	$269.5	$+62.4	

BUDGET REVIEW

MAJOR ISSUES

- NEED FOR SIGNIFICANT INCREASE IN FUEL MELT RELATED RESEARCH TO SUPFORT RULEMAKING
- MAINTENANCE OF BASE PROGRAM ON FAST REACTORS AND ADVANCED CONVERTERS
- FIELD WORK TO SUPPORT SITE CHARACTERIZATION REQUIREMENTS FOR HIGH LEVEL WASTE MANAGEMENT
- NEED FOR SIGNIFICANT INCREASE IN SYSTEMS & RELIABILITY ANALYSIS AND RELATED RESEARCH
- ADDITIONAL RESEARCH TO IMPROVE PLANT OPERATIONS AND RESOLVE UNCERTAINTIES RELATED TO MAN-MACHINE INTERFACE, INSTRUMENTATION, CONTROL, ELECTRICAL AND MECHANICAL COMPONENTS AND PLANT STRUCTURES
- MAINTENANCE OF LOFT PROGRAM TO COMPLETE MAJOR LOCA TESTS (HIGH POWER, SG RUPTURE, STEAM-LINE BREAK) AND FOR CONTINUED OPERATIONAL TRANSIENT AND PLANT DIAGNOSTIC STUDIES