April 9, 1998

FOR: The Commissioners

FROM: L. Joseph Callan /s/
Executive Director for Operations

SUBJECT: CORE RESEARCH CAPABILITIES

PURPOSE:

To provide the Commission with the results of the expertise driven part of the core capability assessments performed by the Office of Nuclear Regulatory Research (RES), to obtain the Commission's approval of these assessments and to seek Commission endorsement of staff's plans for related follow-on activities.

BACKGROUND:

On April 2, 1997, SECY-97-075 (Attachment 1) was sent to the Commission requesting approval of a proposed methodology and criteria for evaluating core capabilities in RES. Attachment 2 is the June 6, 1997, Staff Requirements Memorandum (SRM) which approved the proposal in SECY-97-075 and asked the staff to:

1. ensure that the areas of research identified for assessment include those areas that are essential for the support of current and foreseeable future regulatory activities.

2. in addition to the inputs provided from other NRC user offices, also consider areas of research suggested by the industry;

3. make it much more clear as to how the recommended resource levels for each core research area were determined when documenting the core capabilities assessments;

4. analyze the core technical capabilities residing in the Office of Nuclear Reactor Regulation (NRR), Analysis and Evaluation of Operational Data (AEOD), and Nuclear Materials Safety and Safeguards (NMSS) and incorporate the results into the overall scope of activities and integrate the results with the core research capabilities analysis;

5. review the level of resources being applied to research activities that are in a "sunset" state; and,

6. review the weighting of criteria for Support Areas 5 and 6. [RES identified 6 regulatory functions in SECY-97-075 where support from a core capability might be needed. Area 5 addressed cooperative research and Area 6 addressed responses to oversight groups.]

DISCUSSION:

The staff's response to these SRM items is as follows:

1. The staff should ensure that the areas of research identified for assessment include those areas that are essential for the support of current and foreseeable future regulatory activities.
   Through its own examination and through its coordination with both internal and external organizations (as discussed in SECY-97-075--see page 3, Coordination with Others), RES believes it has identified all research areas that are essential for the support of current and foreseeable future regulatory activities. Additionally, RES will soon initiate an effort to explore potential areas of future research with NRC offices and with external stakeholders such as industry and international organizations. Core capabilities could be impacted if these exchanges define new regulatory needs that require the application of research expertise that does not exist within the currently identified core capabilities. Finally, as noted in SECY-97-075, staff did not go beyond the bounds of current planning assumptions, e.g., the staff did not consider core capabilities that might be needed to support the regulation of Department of Energy (DOE) facilities or the preparation for a mixed oxide fuel application. Significant changes to the RES mission could create the need to add or delete core capabilities.

2. In addition to the inputs provided from other NRC user offices, the staff should also consider areas of research suggested by the industry.
   NRC user office input was obtained through their coordination on this paper. In this regard, user offices were not asked to concur on specific skills and resource levels for the core capabilities. Their concurrence was based on agreement that the list of 29 areas (Attachment 4) is correct and that the justification for each of the 29 areas is consistent with their views. On March 25, 1997, the staff met with several industry representatives to discuss opportunities for collaborative research and to obtain their comments on the areas of research the staff had tentatively identified as possible core capabilities. Given that only two areas were added since that time, additional industry input has not been sought. Following the March 25 meeting, Dr. Andrew Kadak, President of Yankee Atomic Electric Company, sent a letter to Dr. David Morrison summarizing industry's views on the meeting topics (Attachment 3). In that letter, he concluded that there was general consensus with the basic competencies (the proposed core research areas) required for NRC to be an effective regulator. Under the recently signed Memorandum of Understanding on cooperative research, RES continues to be in contact with the Electric Power Research Institute through discussions related to the coordination and exploration of cooperative research programs that are of mutual benefit. No new areas for research have been identified as a result of these discussions.

3. The staff should make it much more clear as to how the recommended resource levels for each core research area were determined when documenting the core capabilities assessments.
   The staff has provided, following each resource table, a discussion of the bases for the expertise driven part of the core capability resources that is more detailed than the narrative included in the examples contained in SECY-97-075. More specifically, the need for FTEs for both

in-house staff and for contractor staff have, in most cases, been described for individual or fractional FTEs.

4. The staff should analyze the core technical capabilities residing in the Office of Nuclear Reactor Regulation (NRR), Analysis and Evaluation of Operational Data (AEOD), and Nuclear Materials Safety and Safeguards (NMSS) and incorporate the results into the overall scope of activities and integrate the results with the core research capabilities analysis.
   SECY-98-037, forwarded to the Commission on March 4, 1998, describes the steps to be taken to perform core capability assessments throughout the agency. During this process, the RES core capability assessment results will be integrated into the agency-wide effort. This will include initiating an assessment of the availability of skills relative to the core capability requirements identified in this paper and developing strategies to resolve any skill short falls or overages. It is also anticipated that the research core capabilities may be updated and revised as the agency-wide core capabilities are updated. With respect to the broader effort, the RES core capability assessment methodology is not intended to be a prototype for assessing other offices. For example, the RES focus on areas of highly specialized technical expertise may not be applicable for some other parts of the agency.

5. The staff should review the level of resources being applied to research activities that are in a "sunset" state.
   As discussed in SECY-97-075, core capabilities include consideration of both expertise driven and workload driven resource levels. RES has examined and identified "expertise driven" core capabilities for all areas of research that it believes need a core capability to be maintained. Any area of research with a current budget that is at or below the expertise driven resource level is considered to be sunset as explained on page 8 of SECY-97-075. In other words, the level of resources is driven by the need to maintain expertise, not the need to satisfy regulatory requirements. Nevertheless, resources at the expertise level can and do satisfy regulatory requirements, but the level of resources is not driven by the requirements. Therefore, all activities in a sunset state have been reviewed, along with those that are not yet sunset. There are currently 10 core capabilities that are sunset. These are identified in Attachment 4.

6. The staff should review the weighting of criteria for Support Areas 5 and 6. [RES identified 6 regulatory functions in SECY-97-075 where support from a core capability might be needed. Area 5 addressed cooperative research and Area 6 addressed responses to oversight groups.]
   RES has reviewed Support Areas 5 and 6 in response to the Commission's comment about the relative weight they might receive in making decisions about the need for core capabilities. RES developed the six Areas as a framework to help focus and make more objective its decisions on core capability needs. RES did not intend to use this framework quantitatively and, therefore, did not assign weightings to these areas as a measure of their relative importance. Having said that, RES agrees that if Areas 5 and 6 were the only Areas where a core capability could make a contribution, there likely would not be a need for a core capability in that area of research.

Following is a discussion of the material forwarded by this paper:

Summary of the Expertise Driven Part of the RES Core Capability Assessment:

SECY-97-075 identified 39 areas of research where core capabilities might be needed and stated that the number of areas could be adjusted during the process of conducting the assessments. This paper forwards core capability evaluations for 29 areas of research, Attachment 5. The original 39 areas of research were reduced to 27 as logical combinations were made during the assessment process. None of the original 39 areas was deleted. Additionally, as a result of reviewing the 27 areas, two new areas were added -- Fire Protection and Safety and Materials Criticality Safety. These 29 areas represent the current collective views of RES and NRC user offices. Earlier reviews by outside organizations did not identify any areas beyond these 29. Several areas of possible research were deemed to not need a core capability. These are: material control and accounting, physical security, and environmental sciences (e.g., biology, ecology). The staff believes that if the expertise driven level of resources is maintained in the 29 identified areas, RES will have access to a full range of research expertise that can help respond to any unanticipated technical issues that may arise. This expertise is often shared between RES and contractor organizations. In these instances, there may be opportunities to substitute in-house staff for contractor funding which may prove useful during the budget process. This level of resources is a minimum capability that in most cases would need to be augmented to accomplish certain workloads. Without these minimum capabilities, significant time could be required to respond to issues or overly conservative regulatory decisions may have to be made. The results of the RES core capability assessments are contained in Attachment 5.

The Commission should note that core expertise in the disciplines required for research to support licensing of the Department of Energy's high-level radioactive waste repository at Yucca Mountain, Nevada, are resident within the NRC's Center for Nuclear Waste Regulatory Analyses and NMSS. The need for this expertise is not addressed in this paper.

During the development of the core capabilities, it became apparent that there is an inextricable relationship between the availability of expertise/facilities and the pursuit of meaningful research. Researchers must be actively engaged in their field of expertise to keep their skills sharp, maintain their qualifications, and stay in contact with their peers. If NRC and its contractors are not pursuing relatively stable programs involving challenging work, talented personnel are likely to leave. Another result is the loss of access to facilities and potential elimination of facilities due to lack of support. RES has built what it believes to be a minimum analytical and experimental effort into each core capability to provide reasonable assurance that both expertise and facilities can be retained. However, it should be recognized that, at the expertise level, there will be instances where only a single expert in a specific technical discipline will be available. In these situations, should the individual leave the NRC or one of its contractors, there could be a significant period of time before the necessary expertise could be reestablished.

Expertise Driven Core Capability Resources Versus FY 1998 Budget:

Attachment 6 is a summary showing expertise driven resources for each of the 29 core capability areas. This resource summary compares these resources with the FY 1998 budget. To help relate the core capabilities to areas of the budget, a crosswalk between each core capability and the budget sub-activities they support is provided in Attachment 7. At the end

of the resource summary, other budget activities are listed. The total resources in the FY 1998 budget column equals the current FY 1998 budget for RES. In order to provide a complete financial picture, Attachment 8 contains details on projects for which RES has recently requested more than $3.5M from prior year carryover funds.

One can see from the resource tables that three conditions exist. When the budget and core resources are equal or approximately equal, it indicates that

the current budget is sufficient to sustain the core level of expertise and experimental facilities in that capability. When the budget is less than the core, it means that RES is now positioned to respond in a timely fashion to some, but not all, issues that might arise in that capability. In these instances, the effect of the budget shortfall (if greater than $100K) is described in the last section of the narrative behind the resource tables. These shortfalls will be examined during the upcoming budget cycle relative to other priorities. When the budget exceeds the core level, it means that today's workloads, driven by user needs and/or anticipatory research, dictate the application of resources above the core level. Because the FY 1998 budget was selected as a basis of comparison, resource differences identified in the resource tables may or may not reflect the long term situation.

It should be noted that there is significant ongoing work that would have to be terminated if RES was only funded at the expertise driven level. Some of the areas that are impacted are thermal hydraulic code development, PRA guidance development, fuel behavior experiments, digital instrumentation and control guidance and steam generator tube inspection and analysis. Each core capability assessment answers 5 key questions. The answer to question #4 in each assessment describes the specific work that could not be done in each area.

Differences Between the Assessments Provided in this Paper and those Described in SECY-97-075:

The material provided in this paper and future plans to deal with core capabilities differ in three ways from those described in SECY-97-075. The first difference is related to "workload driven" core capabilities. SECY-97-075 described two types of core capabilities--"expertise driven" and "workload driven."

Expertise Driven: This is a resource that would: stay current with the state of art (new and evolving nuclear related technologies, new research and other related developments) and understand the safety and regulatory significance of this work; provide a level of expertise and interaction such that there is ready access to experts worldwide; understand and maintain NRC's technical knowledge base and analytical tools; provide a nucleus around which a larger capability could be built, if needed; provide an "on-call" resource to help respond to unanticipated technical issues; and, conduct or cooperate in joint research efforts of a limited nature needed to retain expertise or to have access to facilities. This minimum capability is not based on workload. However, meaningful, challenging work is necessary to attract and retain high caliber expertise, both at the NRC and at contractor organizations. Core funding would also be needed to support work at critical or unique facilities, so those facilities are available when needed.

Workload Driven: This is a resource to conduct research in response to recurring demands from the regulatory process, largely from user needs, but it could also include anticipatory research. The resource level is determined based on past experience and the staff's expectation of what would be continuing, relatively steady state workload demands for the foreseeable future. It is not based on temporary or peak workloads that currently exist nor does it anticipate any in the foreseeable future. Peak or temporary work would be accomplished with above core resources provided as part of the RES budget. The functions described above under expertise driven, will also be performed within a workload driven core capability.

The core capabilities assessments in Attachment 5 are expertise driven. As RES started to assess workload driven core capabilities, it was recognized that resources to accomplish workload driven requirements are ultimately determined by the annual budget process. This process starts with RES, in conjunction with other NRC program offices, developing its annual budget request based on an assessment of work that needs to be accomplished. This request is then reviewed by the Program Review Committee, the Executive Council, and the Commission within the context of agency wide priorities and fiscal constraints. The Office of Management and Budget and Congress subsequently influence the size and makeup of the agency's budget, which historically has altered the makeup of the RES budget. The staff does not believe that a separate workload based assessment, performed outside the budget process, would be meaningful and concludes that the annual budget for RES best portrays the agency's position on a resource level to support workload driven core capabilities. Notwithstanding this conclusion, there are currently new user needs and some anticipatory research projects that the FY 1998/1999 budget levels cannot support. These shortfalls will be evaluated and prioritized along with existing research programs for both FY 1999 and FY 2000 during the upcoming internal budget review. It is likely that some work will either continue to be deferred or not be done at all due to existing fiscal constraints. In this regard, RES recently requested more than $3.5M from prior year carryover funds to initiate work in several areas (Attachment 8).

The second difference is that SECY-97-075 stated that after the Commission gave its preliminary approval to the core research capabilities, reviews by internal oversight groups and external stakeholders would "closely follow." Although these reviews will still be performed, RES plans to first complete three related follow-on activities. These are: 1) the internal budget review for FY 2000, 2) prioritization of research program components, and 3) the exploration of potential future research programs. Because these activities could result in changes to the RES core capabilities or the resource levels for core capabilities, staff recommends they should be completed, and core capabilities updated as needed, before any further core capability reviews by stakeholders are solicited. Given the above, external stakeholder reviews would likely take place next fiscal year.

The third difference involves prioritization of international cooperative research. SECY-97-075 stated that international cooperative research efforts would be prioritized during the core capability assessments. RES now proposes to perform this prioritization as it prioritizes its activities during the development and review of the FY 2000 budget. In doing so, senior management in RES, NRR, NMSS and AEOD will do a qualitative prioritization, which will be followed by a more systematic prioritization effort at some future date. The international cooperative research prioritization will be provided to the Commission after the CFO budget recommendations are forwarded to the Commission.

RECOMMENDATION:

That the Commission note the expertise driven core research capabilities provided in Attachment 5 will be considered as part of the Agency-wide effort to perform core capability assessments as outlined in SECY-98-037.

COORDINATION:

This paper has been coordinated with the Office of the General Counsel which has no legal objection. The Chief Information Officer has no objections to this paper. The Office of Chief Financial Officer has reviewed this Commission Paper and has no objections.

L. Joseph Callan
Executive Director for Operations

Attachments:
1. SECY-97-075
2. SRM dtd. 6/6/97
3. Kadak Letter
4. List of 29 Core Research Areas
5. Core Capability Assessments
6. Resource Summary
7. Crosswalk - Core Areas to Budget Sub-activities
8. Mid-Year Request

ATTACHMENT 4

LIST OF RESEARCH AREAS WHERE CORE CAPABILITIES ARE NEEDED

1. Thermal-Hydraulics--Plant Transient Analysis
2. Reactor Physics
3. Thermal Hydraulics--Code Development, Validation and Maintenance
4. Fuel Behavior
5. Digital I&C Systems Technical Basis
* 6. Human Performance
7. Organizational Performance
8. Fire Protection and Safety
9. Radiation Damage
*10. NDE Procedures and Techniques
11. Fracture Mechanics
* 12. Environmentally Assisted Cracking
13. Containment Integrity and Structural Aging
14. Steam Generator Integrity
* 15. Mechanical
16. Electrical
17. Piping Fracture
18. Structural and Civil Engineering
* 19. Fuel-Coolant Interactions and Debris Coolability
* 20. Hydrogen Distribution and Combustion
21. Lower Head Integrity
* 22. Fission Product Chemistry, Release and Transport
* 23. Severe Accident Code Development, Validation and Maintenance
* 24. PRA Methods Development for Assessment
25. PRA Guidance Dev., Risk Analysis Tools, and Decision-Making Under Uncertainties
26. Radiation Dosimetry Research
27. Radiation Health Effects Research (relationship between dose and risk)
28. Radionuclide Transport and Decommissioning
* 29. Materials Criticality Safety

* Areas which are considered to be sunset, i.e., the level of resources in these areas are driven by the need to maintain expertise, not the need to satisfy regulatory requirements. Note: in most cases, resources at the expertise level can and do satisfy regulatory requirements, but the level of resources is not driven by these requirements.

Expertise Driven RES Core Capability Resources vs. FY 1998 Budget									
Research Areas	**Expertise Driven Core Capabilities (A)**			**FY 1998 Budget (B)**			**(A) - (B)**		
	NRC FTE	**Contr. FTE**	**$K***	**NRC FTE**	**Contr. FTE**	**$K***	**NRC FTE**	**Contr. FTE**	**$K**
Thermal-Hydraulics--Code Assessment and Plant Transient Analysis	5	2	340	5	3	505	0	-1	-165
Reactor Physics	2	1	190	1	2	380	1	-1	-190
Thermal- Hydraulics--Code Development, Validation and Maintenance	8	9	3850	6	24	5775	2	-15	-1925
Fuel Behavior	3	4	1830	3	4	2350	0	0	-520
Digital I&C Systems Technical Basis	5	3	1450	6	4	1600	-1	-1	-150
Human Performance	2.5	2	1000	5.5	2	859	-3	0	141
Organizational Performance	2.5	2	600	2.5	3	776	0	-1	-176
Fire Protection and Safety	1.5	1	300	0	0	0	1.5	1	300
Radiation Damage	2	8	2300	2	13.7	3780	0	-5.7	-1480
NDE Procedures and Techniques	1	4.5	950	1	3.75	800	0	0.75	150
Fracture Mechanics	2	6.5	1875	2	8.4	2355	0	-1.9	-480
Environmentally Assisted Cracking	2	7	1800	1.6	6	1586	0.4	1	214
Containment Integrity and Structural Aging	3	5	1700	3	5.5	1949	0	-0.5	-249
Steam Generator Integrity	1	4	1300	1.2	8.2	2140	-0.2	-4.2	-840
Mechanical	3	3	800	3.25	2.85	732	-0.25	0.15	68
Electrical	3	5	1050	3.2	7.7	1835	-0.2	-2.7	-785
Piping Fracture	0.3	0.55	120	0.75	0.75	153	-0.45	-0.2	-33
Structural & Civil Engineering	6	8	2160	6	8	2278	0	0	-118
Fuel-Coolant Interactions and Debris Coolability	1	1.5	950	1	0.25	385	0	1.25	565
Hydrogen Distribution and Combustion	0.5	0.25	200	0.5	0	0	0	0.25	200
Lower Head Integrity	0.5	0.5	400	1	0.25	450	-0.5	0.25	-50
Fission Product Chemistry, Release and Transport	2	1.5	350	2	0.9	215	0	0.6	135
Severe Accident Code Development, Validation and Maintenance	6.5	8	2100	7.5	10.5	1667	-1	-2.5	433
PRA Methods Development for Assessment	6.5	7.5	1975	6.5	7	1776	0	0.5	199
PRA Guidance Development, Risk Analysis Tools, and Decisionmaking under Uncertainties	9	5	1250	7	10	2470	2	-5	-1220
Radiation Dosimetry Reserarch	4	5.5	750	5	5.5	750	-1	0	0

Radiation Health Effects Research	4	4	650	5.5	6	898	-1.5	-2	-248
Radionuclide Transport and Decommissioning Research	8	3	650	12	11.5	2317	-4	-8.5	-1667
Materials Criticality Safety	1	3	600	1	3	692	0	0	-92
Expertise Driven Core Capability Totals	95.8	115.3	33490	102	161.75	41473	-6.2	-46.45	-7983
Other RES Budget Activities									
Decommissioning & Health Effects Rulemaking				0	0	50**			
Regulatory Excellence				2	0	0			
IPE/IPEEE Reviews				5	0	1270			
Reactor Regulatory Standards				0	0	226**			
Reactor Radiation Protection				0	0	22**			
Technical Information Exchange				0	0	247			
RES Program Direction & Evaluation				0	0	100			
International Activities				2	0	0			
Generic Safety Issues/Codes & Standards Coordination				8	0	570			
Material Regulatory Standards				0	0	165**			
Information Technology/Office Overhead FTE				54	0	932			
Travel				0	0	725			
Other RES Budget Activities Subtotal				71	0	4307			
Budget Totals				173	161.75	45780			

** RES obligated funds which are a part of the rulemaking resources transferred out of RES. RES will continue to include these obligated funds as part of the RES budget until expended by NRR/NMSS.

ATTACHMENT 7

Core Research Area	**Budget Subactivity**
1. Thermal Hydraulics--Code Assessment and Plant Transient Analysis	Thermal Hydraulics/Reactor Physics
2. Reactor Physics	Thermal Hydraulics/Reactor Physics
3. Thermal Hydraulics--Code Development, Validation & Maintenance	Thermal Hydraulics/Reactor Physics
4. Fuel Behavior	Fuel Behavior Advanced Instrumentation & Controls
5. Digital I&C Systems Technical Basis	Advanced Instrumentation & Controls
6. Human Performance	Advanced Instrumentation & Controls Human Factors & Organizational Performance
7. Organizational Performance	Human Factors & Organizational Performance
8. Fire Protection and Safety	Reactor Probabilistic Risk Analysis
9. Radiation Damage	Reactor Vessel Integrity
10. NDE Procedures and Techniques	NDE Procedures and Techniques

11.	Fracture Mechanics	Reactor Vessel Integrity
12.	Environmentally Assisted Cracking in LWRs	Environmentally Assisted Cracking
13.	Containment Integrity & Structural Aging	Containment Integrity & Structural Aging
14.	Steam Generator Integrity	Steam Generator Integrity
15.	Mechanical	Mechanical/Electrical Components & Piping
16.	Electrical	Mechanical/Electrical Components & Piping
17.	Piping Fracture	Mechanical/Electrical Components & Piping
18.	Structural and Civil Engineering	Structural and Civil Engineering
19.	Fuel-Coolant Interactions and Debris Coolability	Severe Accident Risk
20.	Hydrogen Distribution and Combustion	Severe Accident Risk
21.	Lower Head Integrity	Severe Accident Risk
22.	Fission Product Chemistry, Release and Transport	Severe Accident Risk
23.	Severe Accident Code Development, alidation and Maintenance	Severe Accident Risk
24.	PRA Methods Development for Assessment	Human Factors & Organizational Performance Reactor Probabilistic Risk Analysis Materials Probabilistic Risk Analysis
25.	PRA Guidance Development, Risk Analysis Tools, & Decision Making under Uncertainties	Reactor Probabilistic Risk Analysis
26.	Radiation Dosimetry Research	Reactor Radiation Protection Materials Radiation Protection
27.	Radiation Health Effects Research	Reactor Regulatory Standards Reactor Radiation Protection Materials Regulatory Standards Materials Radiation Protection
28.	Radionuclide Transport and Decommissioning	Materials Radiation Protection Radionuclide Transport and Behavior In the Environment Decommissioning and Environmental Protection
29.	Materials Criticality Safety	Materials Regulatory Standards

ATTACHMENT 8

Rank	$ (K)	Activity/Subactivity	Explanation of Work
1	280(98) 980(99)	Reactor Materials and Component Behavior Research - Generic Safety Issue Resolution	Funding is needed to respond to an NRR user need on PWR Sump Performance. NRC recently completed an assessment of the effect of debris blockage on BWR suction strainers. The study demonstrated that debris blockage would prevent the operation of the ECCS. The PWR debris blockage study is urgent because we need to determine if debris blockage will prevent the operation of the ECCS following a LOCA in a PWR. Licensees are required to have an ECCS to mitigate the consequences of a LOCA. The specific work is for the review of relevant, existing tests and analysis; and the initial development of models for the phenomena. The specific work will require RES to: select and survey (10) reference plants; travel to reference plants; develop reference plant flow networks; modify BLOCKAGE code IAW QA requirements; perform debris generation, transport, and accumulation calculations; i.e. analyze debris dam formation, seepage through debris dams, debris accumulation, head loss tests on PWR sump screens/trash racks and filtration through PWR sump screens/trash racks; and construction/modification of test facilities. The specific work also includes performing calculations on reference plants; use survey results and reference plant calculations to perform calculations so that generic conclusion can be
2	550(98) 830(99)	Reactor Materials and Component Behavior Research - Generic Safety Issue Resolution	The funding is needed to respond to an NRR user need request on Degraded Containment Coatings. Recently, containment coatings that were qualified to survive DBA conditions have failed under normal operation conditions. The staff needs to assess if the failure of these coatings will prevent or impede the operation of the ECCS. In addition, the results from the RES program will be used to help respond to an allegation concerning coatings and the results are intended to provide the technical basis for NRR to review responses to a forthcoming GL concerning coatings. The specific work is for the development of a coatings failure model, conduct coating failure experiments, and conduct transport and pressure loss tests.
3	200(98)	Reactor & Plant	SECY-97-208, dated 9/12/97, responded to the Chairman's request to assess whether or not the 10

	200(99)	Performance Research - Reactor Probabilistic Risk Analysis	4/RY CDF subsidiary safety goal objective should be elevated to the level of a primary safety goal. In this SECY, the staff discussed a number of other areas that should be considered if the Safety Goal Policy is to be revised. The SECY committed to provide a recommendation to the Commission by 3/31/98 but also pointed out that if a revision of the Safety Goal Policy is undertaken it will mean reprogramming resources from other activities, since this is unfunded. Two FTE and $200K per year for 2 years were estimated to do the analysis, evaluation, public comment review, etc. needed to accomplish the revision. If funding is not provided, work would not be started in this area. This is a task of high regulatory significance (and possibly safety significance) since it would clarify and update Agency policy on reactor safety, relationships among various practices (e.g., defense-in-depth, QHOs, CDF, etc.) and could possibly result in additional policy (e.g. temporary plant configuration risk).
4	400(98)	Decommissioning - Decommissioning and Environmental Protection	An additional $400K is needed in FY 98 to support completion of the regulatory guide being developed to implement the final rule on radiological criteria for license termination. Because of the expedited schedule established by the Commission, the contractor will exhaust the FY 98 funding by the end of March. In order to finish the tasks necessary to meet the Commission's schedule of publishing guidance within one year of the rule's promulgation $400K of additional funding is needed. Without this funding key aspects of the guidance will not be completed this year, and publication of the final guidance will need to be delayed by at least a year.
5	200(98) 500(99)	Reactor & Plant Performance Research - Reactor Probabilistic Risk Analysis	Due to budget cuts in FY 98, no funds are available to expand the Accident Sequence Precursor (ASP) program to cover shutdown conditions or external events. This program is conducted in support of AEOD, and NRR. Additional contract funds are needed to develop additional event assessment models to meet AEOD & NRR user needs. These models are also of general high interest to the agency as a whole. This program has turned up important precursors that were otherwise undetected. If funding is not provided, work to cover shutdown conditions and external events will not be initiated. This will limit the Agency's ability to quantify the safety significance of shutdown and external events which actually occur; thus reducing the agency's ability to understand their safety significance and take corrective action.
6	100(98) 100(99)	Decommissioning - Decommissioning and Environmental Protection	The BEIR committee submitted a letter report to EPA on 1/21/98. The committee chairman stated sufficient information has become available since publication of BEIR V to warrant the initiation of a comprehensive thirty-six month reanalysis of the health risk associated with exposure to low levels of ionizing radiation. A final committee report should be released by the National Research Council at the end of March 1998. Dr. Evan Douple (NAS) intends to submit a study proposal outlining the objectives, milestones, and a proposed budget which reflects the views of the feasibility study committee within the next 4 to 6 weeks. Dr. Douple projects the cost of this reanalysis at $400K per year for each of the three years. Four federal agencies (EPA, DOE, DOD, NRC) have expressed interest in co-sponsoring the study. The NRC portion would be approximately $100K per year. Supporting this effort could enable NRC to adopt more realistic risk estimates in future licensing and regulatory decisions with the potential for significant cost savings for the regulated community.
7	250(98) 250(99)	Reactor & Plant Performance Research - Reactor Probabilistic Risk Analysis	Experience to date with the trial application of the ATHEANA human reliability analysis (HRA) method indicated that a second trial application is necessary to ensure the lessons learned from the first trial application have been addressed. ATHEANA has the potential to be a very useful tool to assess and help prevent errors of commission. No tool exists today to do this. If funding is not provided, the final ATHEANA method would be delayed until the year 2000, thus limiting our ability to assess human reliability as part of risk-informed regulation and limiting our ability to analyze and prevent errors of commission.
8	100(98) 100(99)	Reactor Materials and Component Behavior Research - Mech/Elect Components and Piping	Arrhenius Methodology for Environmental Qualification - Investigate the technical aspects of using Arrhenius methodology for the environmental qualification (EQ) of low voltage instrumentation and control cables during LOCA and post-LOCA environments. NRR assigns a high priority to this issue which involves EQ reviews impacting power updates, re-evaluations of electric equipment due to plant modifications, and license renewal. The impact of not funding this work would be to leave NRR with an inadequate technical basis for the reviews of licensee submittals in this area. Consequently, the aged electrical cable system might not be adequately qualified to resist design accident loads.
9	100(98)	Reactor Materials and Component Behavior Research - Reactor Vessel Integrity	Conduct research into evaluation of weldability for ferritic steel dry storage casks for spent fuel. The impact of not funding this work would be to leave NMSS with a lack of confirmatory information for the assessment of cracking in dry cask welds. Consequently, the NRC would have to assume a potentially unnecessarily conservative basis for regulatory actions. This activity is urgent due to pending licensing actions on the USC -- 24 Dry Cask Storage System.
10	200(98) 200(99)	Decommissioning - Radionuclide Transport and Behavior in the Environment	The estimation of ground-water flow and transport parameters used in dose models for SDMP reviews is a major source of uncertainty. A methodology is needed to assist in reviewing presently-used default values or simple estimates using limited site information and data as input to dose models. This work will assist in developing guidance and resolving public comments on parameter estimation and analysis issues for the ground-water dose pathway as presented in draft Volume 3 of NUREG/CR-5512. There is a critical need to develop guidance for implementing the radiological criteria for license termination at decommissioning sites. If methods for estimating ground-water flow and transport parameters are not improved, uncertainties in estimates will result in overly conservative and costly regulatory actions. Several license termination applications are under NRC's review and the guidance for implementing radiological criteria is urgently needed.
11	150K Co-funded @ $150 by DOE (Initial Demonstrations)	Materials Research and Regulation Development - Materials Regulatory	The need exists to preserve and catalog criticality benchmark experiment log books to maintain an accurate and inclusive data base of the experiments performed that established the bases for current criticality safety. If not systematically preserved, this experiment base will be lost forever. This is evidenced by the loss of all logbooks of the benchmark experiments at Savannah River. Database on

		Standards	criticality benchmark experiments is needed to support criticality evaluations in licensing actions.
12	200(98)	Reactor Materials and Component Behavior Research - Environmentally Assisted Cracking in LWRs	Evaluation of underwater welding of irradiated stainless steel. The impact of not funding this work would be to leave NRR with a lack of confirmatory information to assess expected licensee submittals in this area. The urgency of this effort relates to the expectation of licensee repair submittals on underwater welding of irradiated stainless steels in BWR's in 1998/1999.
13	200(98) 200(99)	Reactor & Plant Performance Research - Human Factors & Organization Performance	Initiate a new project to develop a survey instrument to assess workplace environment at utilities. This relates to WITS 9800020, a GAO report, and is on the Chairman's tracking system as item IE3C. Without funding we would have to delay our implementation of commitments to the Congress in response to the GAO report GAO/HEHS-97-51. RES was asked to initiate this project subsequent to previous budget requests.
14	200(98) 300(99)	Reactor & Plant Performance Research -Advanced instrumentation and Controls	Initiate a new project in response to a High Priority NRR user need listed as #3 in NRR's March 6, 1997, User Need memo. The project is on development of review guidance on Domain Engineering which is used by vendors to facilitate the reuse of software developed for other purposes. Not funding this effort would result in a delay of NRR's ability to review standard software requirements, specifications, and architectures using domain engineering techniques. This effort was going to be performed by in-house staff. However, the staff member with the expertise (L. Beltracchi) has left the agency.
15	150(98) 100(99)	Rector & Plant Performance Research - Reactor Probabilistic Risk Analysis	Earlier this year, NEI proposed a risk-informed pilot program involving three plants where they would do a full scope PRA and compare the risk results to NRC requirements and plant costs. The Agency has agreed in principle that this is a worthwhile effort and we should participate. No resources were included in the FY 98 budget to initiate this review which would likely start in mid-FY 98. If funding is not provided, work would not be initiated in this area, which has the potential to identify areas where NRC requirements are not commensurate with safety or not strong enough. This is the only industry whole plant risk informed initiative and has the potential to provide useful insights on NRC regulatory effectiveness and efficiency.
16	200(98)	Reactor & Plant Performance Research -Reactor Probabilistic Risk Analysis	At the request of A. Thadani, Deputy EDO, RES has developed a statement of work to do a small study using an example plant that compares the NRC inspection program to the plant's PRA results to see where we are and are not inspecting the most risk significant items. If funding is not provided, work will not be initiated in this area.
17	250(98)	Reactor & Plant Performance Research -Thermal Hydraulics/Reactor Physics	Performance Feasibility/Scoping Study to explore the development of simplified thermal-hydraulic code to provide real time information on accident progression during an emergency. If the study reveals that such code is feasible, the development cost is reasonable, and the staff undertake that development, the code will benefit AEOD, NRR, and RES. Such fast running code will be used for drills in the Incident Response Center (IRC), during actual operational events, an for training the IRC staff. The funds can be obligated in FY 98 through a task order under contract W6749.