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BUDGET ESTIMATES FOR U. S. NUCLEAR REGULATORY
COMMISSION, FISCAL YEAR 1977. APPROPRIATION:
SALARIES AND EXPENSES

Bruce A. Cooper

Nuclear Regulatory Commission
Washington, D. C.

21 January 1976

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U.S. NUCLEAR REGULATORY COMMISSION
BUDGET ESTIMATES
FISCAL YEAR 1977

APPROPRIATION: SALARIES AND EXPENSES

OFFICE OF THE CONTROLLER
U.S. NUCLEAR REGULATORY COMMISSION

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PRICES SUBJECT TO CHANGE

U.S. NUCLEAR REGULATORY COMMISSION

BUDGET ESTIMATES

Fiscal Year 1977

Appropriation:

Salaries and Expenses

January 1976

Office of the Controller
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

BUDGET ESTIMATES FOR
U.S. NUCLEAR REGULATORY COMMISSION
FISCAL YEAR 1977

INDEX

General Statement.....	Pages 1 - 9
Nuclear Reactor Regulation.....	Pages 10 - 13
Standards Development.....	Pages 14 - 19
Inspection and Enforcement.....	Pages 20 - 22
Nuclear Materials Safety and Safeguards.....	Pages 23 - 27
Nuclear Regulatory Research.....	Pages 28 - 43
Program Technical Support.....	Pages 44 - 46
Program Direction and Administration.....	Pages 47 - 49
Special Supporting Tables.....	Pages 50 - 52

GENERAL STATEMENT

U. S. NUCLEAR REGULATORY COMMISSION FY 1977 Budget Estimates GENERAL STATEMENT FOR SALARIES AND EXPENSES

(Dollars in thousands, except whole dollars in narrative material)

Estimate of Appropriation

The budget estimates for Salaries and Expenses for FY 1977 provide for total obligations of \$249,430,000 to be funded in total by a new appropriation.

Estimates of Obligations and Outlays

On October 30, 1975 the Office of Management and Budget approved NRC's request to permit justification of the budget on an obligation basis. This section provides for the summary of obligations by program on page 2; the summary of financing these obligations on page 3; the analysis of outlays on page 4; obligations by object class on page 5; the proposed appropriation language on page 6; and the narrative summary of NRC programs on pages 7 through 9.

The summaries which address obligations include the NRC's Reimbursable program. It should be noted that the obligations related to this program are not financed by NRC's appropriated funds, but solely through reimbursable agreements with other Federal agencies.

The NRC will deposit revenues derived from the license fee program and indemnification fees to Miscellaneous Receipt of the Treasury. The revenues are therefore not deducted from total obligations.

The following table summarizes the total obligations for NRC's Direct and Reimbursable Programs for Fiscal Years 1975, 1976, the transition quarter and Fiscal Year 1977. The detailed justifications for direct program activities are presented in the same order as they appear in this summary table.

SUMMARY OF OBLIGATIONS BY PROGRAM

(Dollars in thousands, except whole dollars in narrative material)

Obligations by Activity:				
Direct Program:	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Nuclear Reactor Regulation.....	\$ 29,737	\$ 34,250	\$ 8,690	\$ 38,885
Standards Development.....	6,805	10,145	2,605	11,425
Inspection and Enforcement.....	16,634	21,415	5,525	26,290
Nuclear Materials Safety and Safeguards.....	3,654	13,075	2,395	17,950
Nuclear Regulatory Research.....	67,193	110,640	25,440	122,390
Program Technical Support.....	7,522	10,145	2,380	10,160
Program Direction and Administration.....	11,584	20,535	5,150	22,310
Refunds to Licensees.....	<u>5,000</u>	<u>2,000</u>	<u>0</u>	<u>0</u>
Total Obligations - Direct Program.....	148,129	222,205	52,175	249,430
Reimbursable Program.....	118	125	40	100
Total Obligations.....	\$148,247	\$222,330	\$52,215	\$249,530
Unobligated Balance Carried Forward.....	4,615	-4,615	0	0
Reimbursements Received from Other Federal Agencies.....	-133	-175	-40	-100
Revenues Received from nonFederal Sources.....	<u>-17,564</u>	<u>0</u>	<u>0</u>	<u>0</u>
Budget Authority.....	<u>\$135,165</u>	<u>\$217,590</u> 1/	<u>\$52,175</u> 1/	<u>\$249,430</u>

1/ Includes \$2,167,000 for FY 1976 and \$750,000 for the TQ for the proposed FY 1976 pay raise supplemental.

(Dollars in thousands, except whole dollars in narrative material)

Financing of Obligations

The financing of the estimated total obligations of \$249,530,000 proposed in the budget estimate for FY 1977 is summarized in the following table:

SUMMARY OF FINANCING

	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Sources of Funds Available for Obligations:				
Unobligated balance, beginning of year.....	\$ 0	\$ 4,615	\$ 0	\$ 0
Appropriated to AEC.....	33,891	0	0	0
Appropriated to NRC.....	45,940	217,590 ^{1/}	52,175 ^{1/}	249,430
Transfer from other accounts.....	55,334	0	0	0
Reimbursement received from Federal sources.....	133	125	40	100
Revenues received from non-Federal sources.....	17,564	0	0	0
Total Funds Available for Obligations	\$152,862	\$222,330	\$ 52,215	\$249,530
Less: Unobligated balance, end of year.....	-4,615	0	0	0
Total Obligations	<u>\$148,247</u>	<u>\$222,330</u>	<u>\$52,215</u>	<u>\$249,530</u>

^{1/} Includes \$2,167,000 for FY 1976 and \$750,000 for the TQ for the proposed FY 1976 pay raise supplemental.

(Dollars in thousands, except whole dollars in narrative material)

Outlays for Salaries and Expenses

Outlays for 1977 are estimated at \$236,430,000. The estimated amounts available for outlay in 1975, 1976, and transition

quarter and the remaining unexpended balances for each year are shown in the following table:

OUTLAY ANALYSIS

	<u>Actual FY 1975</u>	<u>Estimate FY 1976</u>	<u>Estimate Transition Quarter</u>	<u>Estimate FY 1977</u>
Funds Available for Outlays				
Unexpended balance, beginning of year:				
Obligated.....	\$ 0	\$ 44,533	\$ 66,474	\$ 66,859
Unobligated.....	0	4,615	0	0
Appropriation to AEC.....	33,891	0	0	0
Appropriation to NRC.....	45,940	217,590 ^{1/}	52,175 ^{1/}	249,430
Transfer from other accounts.....	55,334	0	0	0
Total Funds Available for Outlays	<u>\$135,165</u>	<u>\$266,738</u>	<u>\$118,649</u>	<u>\$316,289</u>
Unexpended balance, end of year:				
Obligated.....	-44,533	-66,474	-66,859	-79,859
Unobligated.....	- 4,615	0	0	0
Total Outlays	<u>\$ 86,017</u>	<u>\$200,264</u>	<u>\$ 51,790</u>	<u>\$236,430</u>

^{1/} Includes \$2,167,000 for FY 1976 and \$750,000 for the TQ for the proposed FY 1976 pay raise supplemental.

SUMMARY OF BUDGET
OBLIGATIONS BY OBJECT CLASS

	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Personnel Services.....	\$ 42,656	\$ 57,439	\$ 15,230	\$ 65,750
Personnel Benefits.....	4,060	5,146	1,362	5,920
Program Support	81,382	128,877	29,702	146,995
Administrative Support	8,140	14,485	3,675	17,300
Travel and Transportation of Persons.....	2,751	4,168	996	4,755
Equipment	3,140	5,990	1,210	8,710
Construction	1,000	4,100	0	0
Refunds to Licensees	5,000	2,000	0	0
Total Obligations - Direct Program.....	\$148,129	\$222,205	\$ 52,175	\$249,430
Reimbursable Program	118	125	40	100
TOTAL OBLIGATIONS	<u>\$148,247</u>	<u>\$222,330</u>	<u>\$ 52,215</u>	<u>\$249,530</u>

U. S. NUCLEAR REGULATORY COMMISSION

PROPOSED LANGUAGE - SALARIES AND EXPENSES

(Dollars in thousands, except whole dollars in narrative material)

The proposed language is as follows:

Salaries and Expenses

For necessary expenses of the Commission in carrying out the purposes of the Energy Reorganization Act of 1974, including the employment of aliens; services authorized by 5 U.S.C. 3109; publication and dissemination of atomic information; purchase, repair, and cleaning of uniforms; official entertainment expenses (not to exceed \$12,000); reimbursement of the General Services Administration for security guard services; hire of

passenger motor vehicles and aircraft; \$249,430,000 to remain available until expended. Provided, that from this appropriation, transfers of sums may be made to other agencies of the Government for the performance of the work for which this appropriation is made, and in such cases the sums so transferred may be merged with the appropriation to which transferred.

U. S. NUCLEAR REGULATORY COMMISSION

PROGRAM STATEMENT

The Nuclear Regulatory Commission (NRC) was established in January 1975 pursuant to the Energy Reorganization Act of 1974. During its initial year the first priorities were establishing, organizing, staffing, and resolving major policy issues. These areas are now essentially complete. The Commission's program for 1977 is designed to provide a responsive and efficient nuclear regulatory process to achieve sounder national policies and needs relating to the supply and cost of energy. Additional responsibilities are specified primarily in the Atomic Energy Act of 1954, as amended and the National Environment Policy Act of 1969 (NEPA).

Organization - The Reorganization Act of 1974 defined three basic organizational units within the Commission: the Office of Nuclear Reactor Regulation; the Office of Nuclear Materials Safety and Safeguards; and the Office of Nuclear Regulatory Research. The Commission has established two additional offices at the same organizational level, the Office of Standards Development and the Office of Inspection and Enforcement. The organizational structure of the Commission also includes two other categories of management and staff entities assigned to support the conduct of NRC's regulatory responsibilities and to perform those other functions normal to the conduct of any independent agency. The first category entitled Program Technical Support includes staff offices that provide direct program support. These are the Office of the Executive General Director, the Office of International and State Programs, the Advisory Committee on Reactor Safeguards, the Atomic Safety and Licensing Board and Licensing Appeal Panels. The second category entitled Program Direction and Administration satisfies the indirect support requirements of the Commission,

those concerned with overall policy, direction, resource management efficiency, and administrative and logistic support. This category includes the staff office of the Commissioners and the Executive Director for Operations as shown below:

The Office of the Commission

The Office of the
Executive Director
For Operations (EDO)

Commissioners
Secretary
General Counsel
Policy Evaluation
Inspector Auditor
Congressional Affairs
Public Affairs

EDO
Administration
Controller
Management Information
and Program Control
Planning and Analysis
Equal Opportunity

The NRC 1977 Budget - The NRC budget estimate reflects the extension of approved 1976 programs. The nuclear industry continues to grow with the number of commercial power reactor construction permits or operating licenses expected to increase from 118 in 1975 to approximately 181 in 1977. There will be an increase in operating fuel facilities in 1977, NRC should receive the initial applications for a gaseous diffusion plant and a laser enrichment R & D facility in the latter part of 1976 and three additional applications for centrifuge demonstration plants in 1977. In 1977, material licensing should

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

remain essentially constant at 8,000 licensing actions. While NRC will continue to expand its activities in fulfillment of its basic responsibilities under the Energy Reorganization Act, the projected growth of the nuclear industry in 1977 will require increased efforts. Improved procedures will be undertaken to assure the public that nuclear power is being effectively regulated. New initiatives in the areas of safety, safeguards, and environmental protection will be vigorously pursued.

Nuclear reactor regulation - The objectives continue to be: the issuance of reactor licenses with adequate safety safeguards and environmental considerations; to work toward maximizing the stability and predictability of the review process and minimizing the licensing time for new reactors; and to continue progress toward licensing of standard plants. Construction application reviews include custom plant applications, reference designs for a standard plant application, and referencing previously approved standardized designs. Standardization offers promise of savings in time and costs to utilities particularly in reducing construction and design costs. It should also offer improved predictability of design and component part reliability.

Standards development - NRC will develop quality assurance standards directly applicable to nuclear component manufacturers. This will minimize conflicting requirements and will provide for improved component quality. By the end of 1976, most of the standards for light-water reactors and the current system of safeguards will essentially be completed. In 1977, emphasis will be on programs related to development of new safeguards systems for the nuclear fuel cycle of the future. There will be a substantial increase in effort on improved material control systems to include the physical protection of special nuclear material in transit.

Inspection and enforcement - 1977 will see increase in the number of its safety inspections to accommodate the increase in operating power plants and new construction of power plants. There will also be an increased inspection effort in

the areas of nuclear fuel cycle facilities and safeguards. The vendor quality assurance program will remain at essentially the same level as 1976.

Nuclear safeguards and safety - NRC's 1977 budget estimate gives high priority to safeguards. This increased effort is reflected in the increased resources requested to establish an effective safeguards organization and to accelerate studies to develop integrated and effective safeguards systems consisting of upgraded material control and accounting measures and physical protection measures. Safeguards research will be expanded to develop a more systematic and comprehensive criteria for NRC safeguards policy and programs, and to improve procedures for licensing review and inspection. The Commission's decision on the widescale use of mixed oxide fuel is scheduled for mid-1977. Resources are required for testimony for hearings and rulemaking.

Research (confirmatory assessment) - The efforts in reactor safety research dedicated to regulation over the past 2 years continue in 1977. NRC will develop independent assessment capability of the safety and environmental impact of activities comprising the nuclear fuel cycle. In the past the biological and environmental programs of AEC had a much broader motivation than specifically serving regulatory needs. They ranged from very basic research to applied research. All these programs remained in ERDA after the division of the AEC. In developing its own mission-oriented program to supply the confirmatory assessment needs in these areas, NRC has started with the extensive data base developed by AEC and is coordinating its efforts with the large ongoing program in ERDA. Initial NRC efforts cover four principal areas: (1) health and environmental impact; (2) fuel cycle assessment research; (3) waste management; and (4) transportation. Confirmatory assessment planned for 1977 will continue and expand on the 1976 program at a modest rate.

Dollar summary - The 1977 budget request for new obligational authority is \$249,430,000. It reflects the President's decision to use nuclear energy as part of the solution to solve the

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Nation's growing energy problem and the resultant requirement to regulate its application to the civil sector. It is an increase of \$27.2 million over 1976. Most of the increase, about \$17.0 million, is for program contractual effort, test facilities and equipment, primarily for confirmatory research. Personnel costs including the recent Federal pay raise, accounts for about \$9.0 million of the increase. The remaining portion of the increase, results primarily from increased housekeeping costs for rents, utilities, communications, publications, transportation, and supplies.

Personnel requirement summary - The FY 1977 budget estimate includes an increase in personnel of 240 over FY 1976 for a new ceiling of 2,529. The major portion of this increase (200 or 83%) is: to accommodate the increase in inspection workload in FY 1977; to deal with the questions that must be resolved relative to safeguards and the fuel cycle, particularly fuel enrichment, fuel storage, and waste management; and to provide adequate program management in confirmatory research. The remaining increase in people (40) is to enable NRC to satisfy workload requirements in Standards Development, the Regulatory Boards, and in several support functions which are currently inadequate as the result of the loss of services provided by the former Atomic Energy Commission.

NUCLEAR REACTOR REGULATION

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Nuclear Reactor Regulation..... \$38,885

Summary of Nuclear Reactor Regulation Estimates by Object Class

	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Personnel Compensation	\$14,636	\$16,930	\$4,248	\$17,700
Personnel Benefits.....	1,340	1,523	379	1,590
Program Support.....	10,331	10,970	2,842	14,325
Administrative Support.....	2,454	4,060	1,029	4,460
Travel and Transportation of Persons.....	707	767	192	810
Equipment.....	269	0	0	0
Total Program	\$29,737	\$34,250	\$8,690	\$38,885
Personnel.....	(582)	(605)	(605)	(613)

The Nuclear Reactor Regulation Program consists of six major tasks detailed as follows:

	<u>Actual FY 1975</u>		<u>Estimate FY 1976</u>		<u>Estimate FY 1977</u>	
	<u>Dollars</u>	<u>People</u>	<u>Dollars</u>	<u>People</u>	<u>Dollars</u>	<u>People</u>
Operating Reactors.....	\$ 1,657	109	\$ 1,495	130	\$ 1,600	140
OL Reviews.....	401	53	440	57	525	71
CP Reviews.....	6,245	237	6,565	228	8,200	79
Technical Projects.....	2,028	104	2,220	105	3,500	81
Standards.....	0	35	0	38	0	22
General.....	0	44	250	47	300	40
Total.....	\$10,331	582	\$10,970	605	\$14,325	613

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

The Office of Nuclear Reactor Regulation (NRR) is composed of several groups which perform the licensing aspects of nuclear power plants. This Office is charged with the responsibility for reviewing applications for construction permits (CP), operating licenses (OL), and changes to operating licenses, and for the licensing of research reactors and critical facilities. Functionally, the licensing effort is divided between four major divisions. One division reviews the design and operational changes in operating reactors. Another division carries out the project management functions for reactor safety reviews of CP and OL applications. A third division is responsible for the detailed safety reviews of reactor applications through the operating license stage. The review and evaluation of all safety and environmental aspects of reactor sites is the responsibility of the fourth division. NRR is also responsible for the antitrust and indemnification aspects of nuclear facilities.

NRR's priorities have been set consistent with the broad national energy goals which include (1) striving for energy independence by 1985, (2) achieving a balance between population and use of resources to permit high standards of living and a wide sharing of life's amenities, (3) balancing of resource utilization against costs, (4) preserving the quality of the environment, and (5) minimizing costs of regulation. In allocating its resources, NRR has set the following general priorities: (1) protecting public health and safety and the environment, (2) permitting maximum near-term energy production, (3) permitting and encouraging intermediate term improvements by utilities in nuclear technology, and (4) fostering long-term nuclear prospects (e.g., LMFBR). Improved management practices and procedures are being implemented to bring increased stability and predictability to the licensing process.

Specific objectives that will be used to accomplish the proposed program are:

1. Provide maximum assurance that operating reactors are kept in safe operation.
2. Assure that reactors under construction are brought into operation with minimum unnecessary interference from the licensing process and continue to strive towards our goal of performing staff safety reviews for custom construction applications in 14 months (with staff environmental reviews conducted in 8 months). Based on FY 1975 experience, typical safety reviews are expected to require about 17 months (with staff environmental reviews conducted in 11 months).
3. Continue toward the goal of expedited reviews for standardized applications. This includes review of reference designs for a standard application, reviews of plant utilizing previously approved complete standardized packages, and review of replicate and duplicate plants.
4. Conduct Early Site Reviews (FSR), Limited Early Site Reviews (LESR), and Designated Site Reviews (DSR) to ensure that site acceptable for nuclear plants are available and site related questions are kept off the critical path towards construction decisions.
5. Carry out Technical Projects to provide new and improved information and techniques required in connection with the licensing of plants with priority given to resolution of acute problems with maximum short term pay-off. Next priority will be given to developing improved methods for evaluating technology for future needs.

To meet these objectives, NRR will largely make use of judicious internal reallocation of resources and therefore, requests only a small increase in resources. These action will permit progress towards attaining the goals while at the the same time assuring that those nuclear power plants now operating and those due to come into operation will produce electricity in a safe manner.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Areas where resource allocation will be adjusted will cause reduction or deferral of work including participation in the preparation of standards and guides and work on generic technical projects that could greatly assist in licensing reviews and potentially expedite construction reviews.

The requested personnel ceiling of 613 for FY 1977, represents an increase of eight above the FY 1976 level. This relatively small increase should be adequate to handle all essential work activities when additional efficiencies are taken into consideration. These efficiencies include the use of Standard Review Plans (SRP) to improve responsiveness by applicants through the use of Standard Format and Content for applications. Both of these key elements will be major factors in attaining additional efficiency in the review process.

In addition, in order to improve all aspects of the licensing process, the conduct of explicit impact-value assessments will continue to provide the basis for assuring that safety requirements are met with minimum regulation.

The following is a summary of the tasks necessary to accomplish the stated goals:

Task 1 - Operating Reactors

The licensing and regulatory activities for operating reactors consist of (1) review of requests for amendments to operating licenses, and the conduct of operator license examination, (2) evaluation of events to assess adequacy of designs and the need for changes in allowable operating conditions, and (3) coordination of licensing activities with the Office of Inspection and Enforcement. Operating reactors contribute directly to the energy supply situation and thus receive highest priority.

FY 1977 projections include reallocation of manpower necessary to be responsive to the increasing number of operating reactors. The projected increase in operating reactors is from 53 at the end of FY 1975 to 75 at the end of FY 1977.

Task 2 - Operating Licenses

The operating license is the second step in the NRC licensing review process. Staff review commences approximately 2 years before the expected fuel load date. Experience to date indicates that the operating license has been ready for issuance prior to readiness for fuel loading. It is anticipated that operating license effort in FY 1977 will be approximately equal to NRR's FY 1976 level of effort. When improved efficiencies in the review process are considered, no additional resources are required for this task.

Task 3 - Construction Permits

The construction permit review is an intensive evaluation by the NRR staff to determine whether the site and plant design selected by the applicant will provide adequate protection of the public health and safety and meet the NEPA requirements.

The resources requested will enable NRR to continue to approach the 14-month safety review goal and conduct, on the average, a 17-month safety review and an 11-month environmental review. The estimates are based on experience gained in FY 1975.

Task 4 - Technical Projects

Technical projects are analyses and studies conducted in direct support of the NRR licensing effort and in most cases can be considered as belonging to effort directly related to a specific plant under review. The balance of the effort is associated with decision features common to multiple plants. While it is not possible to identify all such effort for FY 1977, one of the results of reallocating personnel to higher

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION (continued)

priority tasks will be to cause efforts in this category to be minimized, stopped, or postponed. A slight increase in contractual support is necessary to minimize adverse impacts in this area.

Task 5 - Standards

Standards development for licensing nuclear power reactors is a major effort to improve the stability and predictability of the licensing review process. This requires NRC coordination within NRC as well as with the industry. Development of standards and guides for the internal NRC program will continue. External standards efforts will decrease as the result of reallocation of resources. A major effort in FY 1977 will be the implementation of Standard Review Plans for Environmental Reviews where development began in FY 1976.

Task 6 - General Support

General support activities consist of the more routine activities needed for the orderly and efficient operation of the Office. These activities include both technically-related work and management-related activities.

Specific activities in this Task include technical direction of contracts, training of employees, review of research performed by industry and by the Office of Reactor Regulatory Research, handling of correspondence, participation in international programs (IAEA), and other activities required by Regulations (Freedom of Information Act).

STANDARDS DEVELOPMENT

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Standards Development*\$11,425

Summary of Standards Development Estimates by Object Class

	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Personnel Compensation	\$ 2,670	\$ 3,341	\$ 860	\$ 4,170
Personnel Benefits.....	240	301	80	380
Program Support.....	3,204	5,438	1,397	5,598
Administrative Support.....	528	609	204	1,042
Travel and Transportation of Persons.....	127	256	64	235
Equipment.....	36	0	0	0
Construction.....	0	0	0	0
Total Program.....	\$ 6,805	\$10,145	\$ 2,605	\$11,425
Personnel.....	(112)	(135)	(135)	(153)

The Standards Development Program consists of seven major efforts detailed as follows:

	Actual FY 1975		Estimate FY 1976		Estimate FY 1977	
	Dollars	People	Dollars	People	Dollars	People
Site Standards	\$1,072	19	\$1,786	30	\$1,768	31
Nuclear Power Plant Standards	712	33	974	40	991	48
Fuel Cycle Facility Standards	702	12	761	11	817	12
Safeguards Standards	418	12	1,430	14	1,555	14
Transportation and Products Standards	223	6	350	9	317	13
Radiation Standards	117	7	137	8	150	10
Management Direction and Program Support	10	23	0	23	0	25
Total	\$3,204	112	\$5,438	135	\$5,598	153

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Objectives

The overall Standards Development (SD) objective is to develop the standards which NRC needs to regulate nuclear facilities and commercial uses of nuclear materials. These standards pertain to safety, materials and plant protection (safeguards), environmental protection, and radiation protection. In meeting this objective, NRC works closely with the professional societies in the national standards program to make use of detailed standards on good industry practices.

NRC is entering a new phase of standards development. NRC regulations and related NRC guides and consensus standards are in place to define the basic engineering requirements for nuclear power plant (LWR) safety as well as for present (interim) requirements for materials safeguards. Approximately 200 consensus standards are endorsed or referenced in NRC regulations and guides. In addition industry has produced about 1500 more standards which, although not necessary in the regulatory process, do provide a basis for standardization of industry methods for design, procurement, construction, and operation of nuclear facilities. However, initial experience using these standards both in industry and in NRC has indicated the need for redirected efforts in:

- Evaluation of effectiveness and efficiency of existing regulatory requirements
- Value/Impact assessment of new regulatory requirements
- Improved predictability of regulatory requirements
- Additional effort to obtain input from all sectors of the public
- More attention to enforceability of standards
- Improved standards for resolving siting questions

- Improved coverage of fuel cycle and transportation
- Maintenance of engineering standards
- Standards to provide a basis for standardization

Cost/benefit analysis in support of standards development has in the past been directed primarily toward the development of NRC regulations which affect the environment. A greatly increased effort to analyze the value and impact of each new NRC guide has been initiated during FY 1976 and further improvements in this impact assessment are expected.

In order to increase effort on value impact analysis, the number of guides produced will be reduced, but the quality will be increased. In order to meet these increased needs with minimum Government funded work, increased emphasis is placed on obtaining value-impact information from industry and other affected parties. For example, SD is considering additional procedures such as mailing directly to organizations or individuals a copy of new guides issued for comment with a letter outlining specific questions in which NRC has a particular interest. SD is also considering requesting comments on our impact assessment to obtain feedback on this information.

Three types of standards are used by NRC: NRC regulations; NRC guides; and consensus standards which are developed by the national standards program. Regulations are statements of public policy; they establish acceptable levels of performance and form the basis for enforcement actions. Regulations are implemented by detailed engineering or other technical standards which describe in detail acceptable methods of achieving the required levels of performance. Some of these detailed standards such as accident assumptions, are developed within NRC by the staff and are issued as guides. Others, such as good engineering practice to accomplish a particular task, are

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

developed by the national standards program with participation by the NRC staff. These consensus standards, if found acceptable after a thorough, independent review by the NRC staff, are endorsed in regulations or regulatory guides.

Summary of Major Responsibilities

- a. Site standards are needed for: site designation criteria, site safety requirements, and environmental radiological and nonradiological effects.
- b. Nuclear power plant standards are needed to define safety requirements and acceptable practices for design, procurement, construction, operation, and decommissioning of light water reactors and advanced reactors.
- c. Standards are needed to define safety requirements for fuel-cycle facilities including waste storage and disposal.
- d. Safeguards standards are needed for physical protection and material control.
- e. Transportation and product standards are needed to establish transportation safety requirements in conjunction with DOT, and rules for use of radioactive materials in medical, industrial, and consumer products and applications.
- f. Radiation standards are needed for occupational and radiobiological health effects.

Site Standards (31 staff, \$1768 Program Support)

The site standards program is composed of three complementary efforts: site designation, site safety, and environmental standards.

The FY 1977 work on site designation standards is directed toward separating nuclear power plant site certification and licensing of the nuclear power plants. Within this program lies the responsibility for standards development to implement the "early site review" and "designated siting" concepts of the NRC. The principal work to be addressed during this period will be to identify and resolve, on a regional scale, selected technical and procedural siting issues of concern to local, regional, and Federal levels of government.

The efforts of the site safety standards program during this period will be aimed principally at resolution of the interface between structural design standards and siting criteria related to man-made and natural events which could affect the safe operation of nuclear facilities; e.g., earthquakes, floods, off-site explosions, and air crashes. A systematic examination of the existing regulatory base will be continued to assure that a balanced degree of conservatism and a positive value/impact ratio exists.

The work of the environmental standards program during this period will be directed primarily toward establishing a monetary equivalent for population exposures for the rule-making required by Part 50 Appendix I, issuance of topical reports describing the state of technology of effluent treatment for fuel cycle facilities, and systematic examination of NRC effluent and environmental information needs and value/impact analysis of the associated regulatory requirements. This program also includes coordinating NRC interaction with the International Commission on Radiation Protection, the National Council on Radiation Protection and Measurements, the Environmental Protection Agency, and the National Academy of Sciences in matters concerning environmental protection and radiation standards.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Nuclear Power Plant Standards (48 staff, \$991 Program Support)

A prime portion of the standards for water reactors has been completed including both overall regulatory requirements and detailed engineering standards. This includes over 100 regulatory guides published that are applicable to water reactors.

Considerable manpower is required to maintain these standards to keep them current and useful to reflect changes in technology and to respond to advances in industry and changes in the licensing process.

In FY 1977, the increasing number of standards which must be continually interpreted and updated to reflect current needs and practices will result in an increased manpower need. This work includes both maintaining NRC standards and also participation in updating industry standards like the Boiler & Pressure Vessel Code developed by the American Society of Mechanical Engineers.

In FY 1977, greater efforts will be directed to a more comprehensive approach in solving problems by considering whole areas. We will initiate reviews of existing regulatory practices in selected areas to assure that improper balance, such as over conservatism or omission of important considerations is identified and eliminated by modifying present standards or developing new standards. In addition this approach will identify important considerations that may not have been addressed properly in the past. Examples of areas to be investigated include: requirements for seismic design, quality assurance requirements, prevention and protection against fire and other man-made hazards, electric power requirements, brittle fracture requirements for ferritic steels, and qualification testing of pumps and valves.

There has been an increasing number of petitions for rulemaking resulting in an increased work load and a commensurate need for additional manpower. Examples of petitions for rulemaking which have been received include: operational testing of pilot models or prototypes of nuclear power plants; integrity of engineered safety features of operating units during construction of multiunit sites; and emergency plans for all licensees.

Fuel Cycle Facility Standards (12 staff, \$817 Program Support)

The principal effort in FY 1977 will be to continue development of broad base standards for fuel cycle facilities. Specifically, we will (1) issue for public comment the general design criteria for mixed oxide fuel fabrication facilities and issue as effective general design criteria for fuel reprocessing plants, and (2) issue for public comment the standard format and content of license applications for commercial waste burial grounds. We will also (1) continue development of guidance on classification of structures, systems and components of fuel reprocessing plants and mixed oxide fuel fabrication plants in accordance with their importance to safety; (2) obtain the basic information required to establish decommissioning criteria to be used in the design of fuel reprocessing plants and mixed oxide fuel fabrication plants; and (3) continue to develop the engineering bases for establishing as-low-as-reasonably achievable limits on release of radioactivity in effluents from light-water reactor fuel cycle plants.

We will increase our efforts in the radioactive waste disposal area which will require additional manpower. Specifically, we will develop general design criteria for interim and ultimate waste disposal facilities.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Materials and Plant Protection Safeguards Standards
(14 staff, \$1555 Program Support)

The safeguards standards program is comprised of two complementary efforts: physical protection measures and material control and accounting. By the end of FY 1976 most of the Standards Development activities related to the present system of safeguards will be completed. The emphasis of the FY 1977 program will be on programs which relate to the development of new safeguards systems for the nuclear fuel cycle of the future.

The program includes material accountability and physical protection regulations for the mixed oxide fuel cycle both on an interim basis and for the possible wide scale use of mixed oxide fuels. Additionally, efforts to associate more closely the functions of process control and materials control in facilities which process SNM will be undertaken.

New regulations covering nuclear reactor physical protection anticipated in FY 1977 will require that regulatory guides be issued in FY 1977 concerning such topics as contingency plans, physical security during non-routine plant operations, records and reports, and physical protection hardware and quality control.

Physical protection of SNM in transit will be addressed including such areas as specification of protection systems, operating procedures for communications systems, design specification for shipping containers and transportation vehicles, and standards for planning response mechanisms and procedures.

Transportation and Product Standards (13 staff, \$317 Program Support)

In the transportation areas, our principal effort in Fiscal Year 1977 will be to develop comprehensive standards for the design and quality assurance of the packages used in transporting radioactive material with particular emphasis on packages used in air transport.

We are presently developing an environmental impact statement pertaining to air shipment of plutonium; this statement will form the basis for rulemaking. As a result of this work, we will develop and upgrade standards to assure that plutonium packages are adequate, particularly if the present work indicates that design changes may be necessary. Our overall approach for providing this assurance will be through a qualification testing program for packages combined with design and QA standards to assure that the packages coming off the line will be like those being tested. Specifically, work for FY 1977 will relate to: (1) developing packaging criteria for air shipment of plutonium, (2) defining acceptable level of risk in transport of plutonium, and (3) standardization of package designs to provide improved safety and minimize applicant and licensing safety analysis efforts.

Another prime area of work relates to the problem of responsibility for radioactive material transport through various states.

The increased staff is required to respond to the increased need for transportation standards, particularly to assure adequate packages for transporting plutonium by air.

In the products area, our principal effort in FY 1977 will concentrate on (1) efficient handling of petitions for rule-making, (2) development of criteria on which to dispose of their

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

petitions in a fair, consistent, and timely manner, and (3) development of a generic environmental impact statement directed at cutting down on the need to submit petitions for rulemaking. These are presently handled ad hoc based on criteria that have evolved. We will develop criteria against which they can be evaluated and developed a generic environmental impact statement that will form the basis for future rulemaking directed at eliminating the need to file unnecessary petitions.

Radiation Standards (10 staff, \$150 Contract Support)

The radiation standards program plan for FY 1977 includes: guidance on facility design for making occupational exposures as low as reasonably achievable; instructions for workers and health physicists in fuel cycle facilities.

The occupational health standards program is a continuing effort related to the protection of persons exposed to radiation and their employment in facilities or from materials licensed by the NRC.

A radiobiology standards program will be initiated in FY 1977 and will be directed towards standardization of methods for specifying the health risk associated with radiation exposures. An increase in staff is required as the former AEC expertise in this area remained with ERDA when NRC was formed. This program is especially important as the nuclear fuel cycle expands and increased populations of workers and the public are exposed to the unique radionuclides in the effluents from new kinds of facilities.

INSPECTION AND ENFORCEMENT

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Inspection and Enforcement \$26,290

This Office develops and administers policies and programs for (a) the inspection of materials and facilities licensees to determine whether operations are being conducted in compliance with provisions of the license and the Commission's rules; (b) determination that requirements for the docketing of an application and the issuance of a construction permit have

been met; (c) determination that the requirements for the issuance of an operating license have been met; (d) investigation of accidents, incidents and allegations of improper action; (e) investigation of possible diversion of special nuclear material; and (f) enforcement actions.

Summary of Inspection and Enforcement Estimates by Object Class

	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Personal Compensation	\$ 10,557	\$ 12,210	\$ 3,090	\$ 15,180
Personnel Benefits	1,150	1,100	285	1,370
Program Support	2,000	3,185	850	3,730
Administrative Support	1,732	3,100	789	3,920
Travel and Transportation of Persons	1,082	1,760	461	1,770
Equipment	113	120	60	320
Total Program.....	\$ 16,634	\$ 21,415	\$ 5,535	\$ 26,290
Personnel	(420)	(498)	(498)	(592)

These programs are concerned primarily with the inspection and enforcement aspects of two categories of licensed activities: (1) reactor facilities - nuclear power plants, test and research reactors; and (2) nuclear materials licensees - fuel fabrication, processing and reprocessing plants and users, processors and handlers of byproduct source and special nuclear materials. Moreover, these programs are also concerned with the inspection and enforcement aspects of nuclear steam system suppliers, nuclear facility architect/engineers and other major nuclear system component suppliers and the shipment of byproduct, source and special nuclear material.

A major endeavor of the Regulatory programs is to insure high standards of quality in design, construction, installation and operation of components, systems and facilities. Throughout

the inspection process the NRC staff inspects the Quality Assurance programs of applicants, licensees, and major vendors to see that such programs meet NRC requirements.

As shown below, most of the requested 94 new positions for FY 1977 will be used in the nuclear power plant health and safety inspection program. The remaining new positions will be used in the materials protection and the plant and shipments security (safeguards) programs. About 90% of the new positions will be located in the field. The distribution of Inspection and Enforcement personnel by function is as follows:

	FY 1975	FY 1976	FY 1977	FY 1977 Change
Reactor Health & Safety	268	292	362	+70
Power Reactors	(256)	(280)	(350)	(+70)
Nonpower Reactors	(12)	(12)	(12)	(0)

NUCLEAR MATERIALS SAFETY AND SAFEGUARDS

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

	FY 1975	FY 1976	FY 1977	FY 1977 Change
Nuclear Materials Health & Safety	81	96	96	+ 0
Fuel Facilities & SNM Materials	(23)	(31)	(31)	(+ 0)
Byproduct Materials	(58)	(65)	(65)	(+ 0)
Safeguards	55	73	97	24
Material Accountability & Facility Security	(52)	(68)	(83)	(+15)
Shipments Security	(3)	(5)	(14)	(+ 9)
Vendors	16	37	37	+ 0
Total	420	498	592	+94

All of the \$545,000 increase in program support reflects either inflationary increases, or increased licensee workload. There are no new program efforts and some FY 1976 efforts are being markedly reduced from what was originally expected. The requirements are for (1) concentrators whereby samples are analyzed to verify licensee materials inventories and related safeguards activities (\$955,000); (2) a similar set of contracts on licensee effluent data (\$960,000); (3) provision of computer services for accumulating and evaluating information on inspections, noncompliance and enforcement actions (\$500,000); (4) providing appropriate technical training for inspection personnel (\$350,000); and (5) aerial environmental monitoring and other special surveys (\$370,000). Moreover, a number of studies are being funded to evaluate new inspection concepts and technologies (\$555,000).

The number of power reactors in operation or in the more crucial stages of construction is expected to increase by about 25% by the end of FY 1977 as compared to the end of FY 1976. Inspection and enforcement must ascertain whether these plants are built and operated in accordance with licensee conditions and regulations and meet the required high standards of quality assurance. Where noncompliance with these conditions and regulations is apparent the Office utilizes the enforcement

tools at its disposal - publicly available notices of violation, civil penalties orders, and cease and desist, show cause and other orders - to enforce compliance and assure the licensee's proper attitude towards health and safety issues. During FY 1975 there were about 1740 inspections and over 1800 separate finds of noncompliance. There were no nuclear-related injuries to the public or to industry employees and the few radioactivity releases were within safety limits.

Reviews of most licensee event reports and abnormal occurrences are included within the scheduled routine inspection program. Minor as well as major occurrences are required to be reported by licensees. The majority of the 1950 abnormal occurrences reported in FY 1975 were minor. The more serious occurrences and other events may result in separate and often extensive investigations - there were 18 such investigations in FY 1975.

In order to assure public safety and maintain regulatory credibility, this Office's review and investigation of major abnormal occurrences is expected to require an additional 4% of total effort in FY 1977 as compared to that expected during FY 1976.

Noncompliance findings and abnormal occurrences may exhibit a pattern or reveal a potentiality for generic applicability. Based on this operational experience, inspection coverage is broadened to include areas not presently included, intensified in areas having significant impact on the quality of plant construction and operation, and narrowed or decreased in areas where health and safety compliance appears assured.

To further ensure high quality effort within the nuclear industry, the inspection program was extended in FY 1976 to "vendors": nuclear steam system suppliers, power plant architect/engineers and manufacturers of major components and nuclear-related systems. We are continuing this program to assure a consistent and high level of attention is provided equipment malfunction problems and the quality of design.

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

The numbers of fuel facilities and byproduct material licensees are expected to increase by about 5% by the end of FY 1977 as compared to the end of FY 1976. Inspection and Enforcement efforts in the nuclear material health and safety program have a similar mission as in the reactor health and safety program. The Office utilizes its inspections to routinely review licensee compliance with license conditions and regulations. Where necessary, the enforcement tools are utilized to assure public and employee health and safety and the licensee's proper attitude toward safety. During FY 1975 there were about 1590 inspections and over 2500 separate findings of noncompliance. About 30 investigations were required to evaluate the consequences of significant safety events and allegations.

The increased numbers of operating power reactors having required safeguards/physical security systems, fuel facilities having physical security and material accountability/inventory verification requirements, and shipments of special nuclear materials necessitate the requested 35% increase in the safeguards inspection staff.

NRC inspection and enforcement activities are shown, as follows:

	Actual FY 1975	Estimate FY 1976	Estimate FY 1976T	Estimate FY 1977
Reactor Health & Safety				
Inspections	1,845	1,945	580	2,190
Power Reactor	(1,739)	(1,835)	(550)	(2,070)
Nonpower Reactor	(106)	(110)	(30)	(120)
Nuclear Materials, Health				
and Safety Inspections	1,567	1,650	495	1,700
Fuel Facilities	(148)	(160)	(50)	(180)
Byproduct Materials				
Licensees	(1,439)	(1,490)	(445)	(1,520)
Safeguards Inspections	401	465	140	540
Vendors Inspections	115	150	45	180
Incident Investigations	55	60	20	70
Enforcement Action	1,945	2,090	630	2,340

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Nuclear Material Safety and Safeguards.....				\$17,950
	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Personnel Compensation.....	\$ 1,211	\$ 5,288	\$ 1,345	\$ 6,700
Personnel Benefits.....	136	476	119	600
Program Support.....	1,827	5,871	566	8,400
Administrative Support.....	419	1,191	303	1,720
Travel	42	249	62	530
Equipment.....	19	0	0	0
Total Program.....	\$ 3,654	\$13,075	\$2,395	\$17,950
Personnel.....	(152)	(199)	(199)	(276)

The Nuclear Material Safety and Safeguards program consists of four major efforts detailed as follows:

	Actual FY 1975		Estimate FY 1976		Estimate FY 1977	
	Dollars	People	Dollars	People	Dollars	People
Safeguards.....	\$ 167	27	\$ 1110	61	\$ 3450	106
Materials and Fuel Cycle Facility Licensing.....	1660	103	3055	110	4950	133
Special Studies & Analysis.....	0	14	1706	13	0	22
Program Direction & Support.....	0	8	0	15	0	15
Total.....	\$ 1827	152	\$ 5871	199	\$ 8400	276

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR MATERIAL SAFETY AND SAFEGUARDS - continued

The Office of Nuclear Material Safety and Safeguards (NMSS) was established by the Energy Reorganization Act of 1974, and is responsible for ensuring public health and safety and the safety of the environment in the licensing and regulation of all facilities and materials licensed under the Atomic Energy Act of 1954, associated with the processing, transport, and handling of nuclear materials, including the review and assessment of the safeguard of such material against potential threats, thefts, and sabotage.

NMSS works closely with other organizations within NRC in coordinating overall NRC safety and safeguards programs and in recommending research, standards, and policy options necessary for their successful operation.

Safeguards Objective

Safeguards measures are designed to deter, prevent, or respond to (1) the unauthorized possession or use of significant quantities of nuclear materials through theft or diversion; and (2) sabotage of nuclear facilities. The safeguards program has as its objective achieving a level of protection against such acts to insure against significant increase in the overall risk of death, injury, or property damage to the public from causes beyond the control of the individual. The implementation of this objective is accomplished through the principle of protection in depth. Protection includes measures such as use of threat intelligence, armed guards, alarmed fences and vaults, stringent material accountability, electronic detection devices and organized rapid response resources.

Responsibilities

Within the Office of Nuclear Material Safety and Safeguards, the Division of Safeguards is responsible for developing, implementing and evaluating an overall nuclear safeguards program including: monitoring, testing and recommending

improved programs for the physical protection of nuclear facilities and materials, and for the accounting and control of nuclear materials; developing contingency plans for dealing with threats, thefts, and sabotage relating to nuclear materials, high-level radioactive wastes and nuclear facilities; reviewing physical security and material accountability measures proposed in license applications; developing and maintaining a nuclear safeguards information system; and assisting other U.S. Government agencies, foreign governments, and international agencies in establishing effective international physical security and safeguards programs.

Activities

In meeting these responsibilities, the following activities are being carried out: analysis and evaluation of safeguards systems effectiveness; development of improved systems for physical protection and accountability of nuclear materials; long-range planning and identification of research requirements; development of contingency plans; licensing review of nuclear fuel plant physical security systems; licensing review of nuclear fuel plant material control and accountability systems; development of a comprehensive safeguards information system; and interaction with other Federal agencies, foreign governments and international agencies to promote international standards for physical security and accountability of nuclear materials.

Priority attention has been given to the establishment of an effective safeguards organization, and the acceleration of studies to develop alternative safeguards measures and techniques. In this connection, a comprehensive study is being carried out to develop alternative safeguards programs, including cost/benefit analyses, to serve as a basis for a final decision on wide-scale adoption of plutonium recycle. In addition, the preparation of contingency plans has been initiated; research and development projects for improved safeguards systems have been identified; assessments have been made of foreign physical security programs;

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR MATERIAL SAFETY AND SAFEGUARDS - continued

and upgraded material control and accounting plans for licensed special nuclear materials have been reviewed.

The number of major safeguards licensing case reviews is expected to increase significantly in FY 1977 as compared to FY 1976. Other increases in caseload will occur in safeguards transport plans, environmental impact statements, export license applications, and special safeguards licensing projects. An increase in staff of 17 people and an increase in program support of \$400,000 is required to evaluate fuel cycle facilities and the transportation of strategic nuclear material from a licensing standpoint to determine whether an effective system exists for safeguarding of strategic nuclear materials.

Additional safeguards work is required to examine advanced concepts and methodologies, to develop safeguards systems concepts and requirements for existing facilities apart from the licensing effort, to develop safeguards contingency plans, and to upgrade information requirements and test and evaluate strategic nuclear material facilities and their safeguards systems. An increase in staff of 28 people and \$1,940,000 in program support is required to carry out these responsibilities.

Summary of Safeguards Program Components

Casework
Generic and Programmatic
Program Direction (Supervisory)
Total

Actual FY 1975	Estimate FY 1976	Estimate FY 1977
\$ 0	\$ 0	\$ 400
167	1110	3050
0	0	0
\$ 167	\$ 1110	\$ 3450

Materials & Fuel Cycle Facility Licensing Objective

The Division of Materials and Fuel Cycle Facility Licensing has the objective of and responsibility for protecting public health and safety and the environment through the licensing and regulation of all facilities and materials licensed under the Atomic Energy Act of 1954, which are associated with the processing, transport, and handling of nuclear materials.

Responsibilities

To accomplish this objective the Division of Materials and Fuel Cycle Facility Licensing is responsible for safety and environmental reviews in conjunction with: (1) the licensing of all types of non-reactor nuclear fuel facilities,

(2) the licensing of containers for shipment of spent fuel and other radioactive materials, (3) the licensing of waste disposal facilities, and (4) the administration of the program for cooperation with Agreement States. Additional support is also directed towards assessment of evolving technology for the improvement of safety and environmental protection; the preparation of broad programmatic environmental statements, and the identification and coordination of related standards and research requirements.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR MATERIAL SAFETY AND SAFEGUARDS - continued

Activities

The number of major safety and environmental case reviews completed should nearly double in FY 1977 as compared to FY 1976. Reviews of applications for licenses for fuel fabrication facilities comprise the greatest part of the increased output. Licenses for uranium mills, UF_6 production plants, enrichment facilities, and reprocessing and fuel storage facilities are also expected to add to the casework. A 7 position increase in staff and \$665,000 increase in program support is required to address the increased caseload and to attempt to work off the large backlog.

Nuclear material and fuel cycle facility issues must also be addressed on a generic basis to improve the efficiency of

handling casework, to assess the suitability of existing regulatory material to provide guidance to industry and the licensing staff and to review for adequacy existing policies, regulations, standards, and guides. The increased focus of both industry and environmental groups on the fuel cycle area has required increased staff effort to respond to Congressional and other public inquiries and petitions. Generic issues associated with the use of recycled plutonium, waste management, transportation, enrichment, uranium mill tailings, and the Agreement States program will be addressed. A 16 position increase in staff and \$1,230,000 increase in program support is required to handle the increased workload associated with generic issues.

Summary of Materials and Fuel Cycle Facility Licensing Program Components

	Actual FY 1975	Estimate FY 1976	Estimate FY 1977
Casework	\$ 1602	\$ 2625	\$ 3290
Generic and Program Development	58	430	1660
Program Direction (Supervisory)	0	0	0
Total Materials & Fuel Cycle Facility Licensing Program	\$ 1660	\$ 3055	\$ 4950

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR MATERIAL SAFETY AND SAFEGUARDS - continued

Special Studies and Analysis Objectives

Special studies and analyses are performed on issues of particular importance. In FY 1976, the security agency study and safeguards study have been proceeding. In FY 1977, the special analysis group will perform cost/benefit analyses of all existing and proposed standards, guides, criteria, rules, and regulations of this office to determine the utility of the proposed regulations to the execution of NRC responsibilities. The objective is to assure that the programs of this office are effective without imposing excessive or arbitrary burden on the industry. Work performed in the standards analysis program is applicable to both the materials safety and safeguards programs of the Office of Nuclear Material Safety and Safeguards. An increase of nine personnel is requested to perform the standards analysis function.

Summary of Special Studies and Analysis Program Components:

Total	Actual FY 1975	Estimate FY 1976	Estimate FY 1977
	\$ 0	\$ 1706	\$ 0

Resource Summary

Underlying the FY 1977 request for NMSS are three fundamental goals: (a) staffing to meet the responsibilities of the organization; (b) timely disposition of an increasing licensing caseload; (c) a thorough review and subsequent continuing analysis of the regulatory process toward meeting the President's objective of effective but minimum federal regulation.

Because the FY 1976 budget was prepared prior to passage of the Reorganization Act, and because the magnitude of tasks envisioned under the Reorganization Act was not foreseen, sufficient resources were not requested. In FY 1975 and early FY 1976, the basic function of fuel cycle licensing was accomplished by borrowing resources from other staff components of the NRC.

Also, until additional FY 1976 resources became available, essentially no effort was possible in meeting the responsibilities of contingency planning nor in the development of a suitable regulatory posture for either Safeguards or the commercial fuel cycle, particularly reprocessing, enrichment and waste disposal. The FY 1977 request provides resources to undertake activity in all areas of assigned responsibility. Therefore, FY 1977 is a pivotal year in determining whether the NRC can begin to satisfy the national interests in Safeguards and Fuel Cycle as expressed in the Reorganization Act. The caseload projections have been discussed above in this summary.

Regulatory Base

Three motivations exist for a concerted effort to improve the regulatory base: (1) the President's urging in this regard; (2) the lack of a quantitative basis for evaluating the adequacy of the safeguards posture; and (3) the absence of a suitable regulatory posture for waste management.

The development of a regulatory base requires policy considerations, program (technical) developments and cost/benefit analyses. These three functions are supported by minimal resources in the FY 1977 request. It will not be possible to achieve a complete review of the applicable regulatory codes and guides, but analyses can be accomplished on major regulatory issues and proposed new regulations. For example, the goal is to have an improved approach to material control developed, analyzed, and ready for public review by the end of FY 1977. The Safeguards and parts of the fuel cycle regulatory base are fertile areas for cost/benefit examination because the absence of operating experience has precluded deriving an effective regulatory program by evolution. Cost effective regulation will therefore be a key objective for providing the organization in FY 1977 with specific resources devoted to the detailed analysis of proposed regulations and guides.

NUCLEAR REGULATORY RESEARCH

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Nuclear Regulatory Research..... \$122,390

Summary of Nuclear Regulatory Research Estimates by Object Class

	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Personnel Compensation.....	\$ 2,386	\$ 2,805	\$ 702	\$ 3,660
Personnel Benefits.....	211	251	63	330
Program Support.....	61,233	97,074	23,370	109,255
Administrative Support.....	137	695	180	840
Travel and Transportation of Persons.....	188	215	45	305
Equipment.....	2,038	5,500	1,080	8,000
Construction.....	1,000	4,100	0	0
Total Program.....	\$67,193	\$110,640	\$ 25,440	\$122,390
Personnel.....	(94)	(106)	(106)	(135)

The Nuclear Regulatory Research program consists of three major support efforts and associated Equipment and Construction as noted below:

	Actual FY 1975		Estimate FY 1976		Estimate FY 1977	
	Dollars	People	Dollars	People	Dollars	People
Reactor Safety Research.....	\$57,626	87	\$78,700	77	\$ 85,000	101
Environmental and Fuel Cycle.....	2,348	0	13,700	11	14,800	12
Safeguards Research.....	1,259	0	4,674	9	9,455	11
Management Direction and Program Support.....	0	7	0	9	0	11
Total Program Support.....	\$61,233	94	\$97,074	106	\$109,255	135
Equipment and Construction.....	\$ 3,038		\$ 9,600		\$ 8,000	

PROGRAM TECHNICAL SUPPORT

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

The Office of Nuclear Regulatory Research was established by the Energy Reorganization Act of 1974 in recognition of the importance of research to the nuclear regulatory process. Under the Act, the Reactor Safety Research (RSR) program formerly carried out by the AEC was transferred to NRC. It is planned to increase the research in this program in FY 1977. The Act also provides for contracting for such other research as is deemed necessary for the performance of

NRC licensing and related regulatory functions. In conformance with this provision, a safeguards research program was initiated in FY 1976 along with a research program on environmental and fuel cycle questions which is designed to provide necessary technical information on health effects associated with the nuclear power cycle, the environmental impact of nuclear power, criticality control, waste treatment and disposal and transportation of radioactive materials.

Reactor Safety Research.....

FY 1975 - \$ 57,626 FY 1976 - \$ 78,700 FY 1977 - \$ 85,000

The objective of the Reactor Safety Research program is development of analytical methods that can be confidently used to assess safety of nuclear power reactors. The assured safety of these reactors is of highest importance to the national goal of providing electrical energy in the coming years.

The analytical methods of safety analysis must be established on a good engineering base and must be suitably tested. The conditions that might start a postulated reactor accident and the conditions afterwards are outside ordinary engineering experience, and not much data exist relative to them in normal engineering literature. Research programs to provide them are therefore needed. The analytical methods used to describe hypothetical accidents are also outside ordinary engineering methodology. The methods must also be developed further. Because the analytical methods are complex, realistic tests are needed under the conditions analyzed.

Methods of safety assessment exist now, and these are applied in the course of licensing proceedings. Where data are missing, inadequate, or discrepant, the assessment methods use assumptions generally believed to be conservative. Where the models are simplified or have not been tested adequately, the same principles of conservatism are used. The degree of conservatism has a large margin of uncertainty. This must be

better determined, so that confidence in the methods can be raised and so unnecessary penalties imposed to compensate for inadequate data or uncertainties in methods may be removed. The amount of work to be done is substantial. The rate of progress up till now has been geared to improvement starting late in the 1970's. Because nuclear power is so important to the Nation's economy and welfare, improved understanding of reactor safety should be developed more rapidly.

The momentum of the research program has increased significantly in the past two years. Experimental data are now being produced in nearly all areas of need for water reactor accident analyses. The Power Burst Facility (PBF) has become operative in providing data on fuel rod behavior under accident conditions. The Semicale experiment has achieved a production status in that it is now providing data on a regular basis. The LOFT (Loss of Fluid Test) facility will soon produce its first data from non-nuclear loss-of-coolant tests. The PWR (Pressurized Water Reactor) Blowdown Heat Transfer Experiment is now operative. Construction of the Plenum Fill Experiment (PFE) has been started. Basic understanding of linear elastic fracture analysis of steels has been achieved, and attention has shifted to effects of plasticity, radiation, environment, thermal shock, and welding conditions.

PROGRAM DIRECTION AND ADMINISTRATION

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION- continued

A start has been made for confirmatory safety research required to support licensing of sodium-cooled fast breeder reactors and large HTR's (High-Temperature Gas-Cooled Reactors). Improved analytical methods are being developed in all areas needed.

The general responsibility for providing a dependable basis for safety analysis has been systematized as follows. The program includes measures taken:

- (1) To develop understanding of the basic phenomena involved in hypothetical accidents, as needed for their description in analytical models.
- (2) To develop the basic data on these phenomena so that the analytical models will have the appropriate realism or conservatism over the desired range of application.
- (3) To integrate these data and models into complete analytical descriptions of the hypothetical accidents, accounting for those quantities and parameters important to review of safety.
- (4) To provide integrated experiments that are designed to test the adequacy of the analytical descriptions in their predictions of accident sequences and consequences and to ensure their accuracy and completeness.

- (5) To provide an experimental and analytical basis for criteria and procedures for assessing the safety of the design, fabrication, and operation of the pressure vessel, piping, and associated components of the primary system pressure boundary of light water reactors.
- (6) To develop further the methods of reliability analysis required in the probabilistic analysis of the safety of nuclear reactors.
- (7) To refine the current conclusions from probabilistic analysis of reactor safety.
- (8) To apply probabilistic analysis of reactor safety to other kinds of reactors and other situations than have been analyzed so far.

In accordance with the President's request that the Commission give further attention to the cost/benefit analysis of current and proposed regulations, some early work has been completed with regard to the nuclear regulatory research on light water reactor safety which leads to the conclusion that significant national savings will derive from the program by the early 1980's.

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NUCLEAR REGULATORY COMMISSION - continued

Summary of Reactor Safety Research Program Components:

	Actual FY 1975	Estimate FY 1976	Estimate FY 1977
a. Light Water Reactor (LWR) Safety Research.....	\$ 51,394	\$ 69,400	\$ 69,600
b. Fast Breeder Reactor Safety Research.....	3,318	5,600	11,800
c. HTR Safety Research.....	2,914	3,700	3,600
Total Reactor Safety Research Program.....	\$ 57,626	\$ 78,700	\$ 85,000
a. Light Water Reactor Safety Research.....			\$ 69,600
(1) Primary System Integrity.....	\$ 3,527	\$ 4,550	\$ 5,400
(2) Semiscale.....	3,145	3,700	5,100
(3) Separate Effects.....	13,382	16,950	29,500
(4) Loss of Fluid Test.....	21,997	22,390	11,300
(5) Power Burst Facility.....	6,435	17,460	11,500
(6) Code Development and Application.....	2,908	4,350	6,800
Total Light Water Reactor Safety Research.....	\$ 51,394	\$ 69,400	\$ 69,600

The program includes research on primary system integrity (piping and vessels), mechanisms of fuel damage, thermal hydraulics, heat transfer, and computer code development. It also includes integrated experiments ranging over a spectrum

of complexity, e.g., Semiscale, LOFT, PFE, FLECHT-SET; the Two Loop Test Assembly (PWR Blowdown Heat Transfer Experiment); and the multi-rod cross-flow experiment.

(1) Primary System Integrity..... FY 1975 - \$ 3,527 FY 1976 - \$ 4,550 FY 1977 - \$ 5,400

Research in Primary System Integrity is directed at obtaining an adequate understanding of the hypothetical failures that might initiate a loss-of-coolant accident (LOCA), so that the probability of such an accident can be better known and reduced.

Studies are conducted to determine the conditions that could lead to crack initiation and crack growth in stainless steel piping, including the effects of environment and loading.

A major program is conducted on Heavy Section Steel Technology (HSST). This program is directed at understanding and

ensuring the integrity of thick steel pressure vessels under conditions of startup, operation, and cooldown. Tests have been started with 21-inch cylinders to investigate possible crack growth resulting from thermal shock during ECCS injection.

Linear elastic fracture analysis for failure caused by cracks has been shown to be conservative through tests to failure of small experimental pressure vessels. The empirical rate of crack growth under fatigue cycling has been determined as a function of crack size. Extensive programs are now being conducted to improve the understanding of the effects of

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NUCLEAR REGULATORY COMMISSION - continued

irradiation, chemical environment, and welding in crack initiation, crack growth, failure initiation, and crack arrest. The use of on-line sonic monitoring for crack growth during welding and operation is being tested further to establish its utility.

An increase of \$850,000 in FY 1977 will be needed for more extensive tests of on-line sonic monitoring of pressure vessel integrity, for development of improved methods of testing stainless steel piping for cracks, and for initiating thermal shock tests with 39-inch cylinders, which will be more realistic with respect to actual pressure vessel condition than those with 21-inch cylinders.

(2) Semiscale.....FY 1975 - \$ 3,145 FY 1976 - \$ 3,700 FY 1977 - \$ 5,100

The Semiscale facility is a non-nuclear, loop-scale experiment that is designed to reproduce some of the aspects of a pressurized water reactor which are important to support the licensing review in the analysis of a hypothetical loss-of-coolant accident.

The Semiscale experiments were devised to guide the design and experimental program of LOFT. The experiments conducted over the past year have included a number of blowdowns to guide the non-nuclear phase of the LOFT program and the first LOFT nuclear experiments. Tests have also been performed to provide direct assistance in improving models and codes used in analysis of the hypothetical loss-of-coolant accident. These have led to significant new insights with respect to system flow during blowdown, blowdown heat transfer, and hydrodynamic behavior near the pipe break. Even before the

Sonic monitoring offers to eliminate any concern as to vessel failure if it is practical in application. Improved methods of flaw detection in stainless steel piping could eliminate concerns such as have recently been reviewed relative to BWR (Boiling Water Reactor) pipe cracking. The realistic thermal shock tests would confirm the view that thermal shock of the reactor vessel from an emergency core cooling systems (ECCS) injection is not a concern. A long standing and urgent request by the ACRS (Advisory Committee on Reactor Safeguards) has prompted this work.

first LOFT nuclear experiments are conducted in 1977, important improvements can now be made to best-estimate computer codes to be used in assessing the conservatism of the evaluation model codes used for reactor licensing.

The Semiscale program in FY 1977 will be used in simulating the later high-powered nuclear tests of LOFT. It will be used in tests to guide modification of ECCS codes to enable their use in assessing alternate methods of delivery of emergency cooling water. A 12-foot core will be designed and fabrication started.

It is hoped that these long-core tests can avert the need for more expensive long-core tests of LOFT by showing that the computer models used for analysis describe both long and short cores equally well.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

The funding proposed for FY 1977 exceeds that for the previous year by \$1,400,000. This additional money is needed to modify the experiment to accommodate the alternate ECCS tests, and to complete design and start fabrication of a 12-foot core and related test loop modifications. Proposals for alternate ECCS designs are already being reviewed by the NRC, and the experimental backup for review is urgently needed. The long-

core tests in Semiscale are needed to assure that LOFT tests can be extrapolated to large PWR's. This question has arisen on several occasions--most recently in a review of reactor safety by an American Physical Society study group which drew attention to the need to address the point.

(3) Separate Effects..... FY 1975 - \$ 13,382 FY 1976 - 16,950 FY 1977 - \$ 29,500

Evaluation of the safety of large power reactors requires an engineering understanding of the phenomena occurring during postulated accidents. This understanding must encompass neutronic, thermal-hydraulic, heat transfer, and related phenomena of the plant, when the plant is subjected to the abnormal conditions of the accident and under the influence of safety systems actuated to mitigate the consequences of an accident. The required understanding can only be codified in and made useful through analytical models supported by data obtained from experiments. A major portion of the experiments needed are separate effects tests, with related testing of the codes and models being developed. These experiments have fundamental importance because all the analytical procedures and results depend ultimately on them.

The Separate Effects program includes the generation of basic engineering data to be incorporated in analytical models to be used in support of licensing reviews of the analyses of events during an accident. The principal part of the Separate Effects program consists of parametric tests (conducted in non-nuclear systems) of portions or all of the codes and analytical models. The tests are designed to provide further data regarding various features of the postulated accident as well as information on the effects of coupling of phenomena.

A substantial part of the Separate Effects program is concerned with the postulated loss-of-coolant accident. Separate effects tests are either underway or planned to cover all phenomena of

importance starting from the initiation of a break in the primary system and ending when the emergency core cooling (ECC) systems have reflooded the core. The testing includes: out-of-pile blowdown heat transfer tests with full-length fuel rods, large-scale experiments on steam-water mixing and core flow distribution, ECC bypass, and experimentation on steam binding as it affects the performance of emergency core cooling systems under simulated loss-of-coolant accidents, and scaled non-nuclear tests of ECC system performance for PWR's (boiling water reactors). The tests provide information essential for design of nuclear powered loss-of-coolant experiments and for developing the LOFT experimental program. The program is thus an essential part of achieving the LOFT program objectives.

The program includes the Plenum Fill Experiment (PFE) which is designed to provide data needed to guide improvements in analysis of the effect of ECC injection during the blowdown phase of a hypothetical loss-of-coolant accident. Present analytical models assume a total loss of ECC water injected during this period, thus the removal of unnecessarily harsh aspects of this conservatism is a major objective of the program. A Memorandum of Understanding being developed by ERDA and NRC is expected to provide for ERDA responsibility for the completion of PFE through preoperational testing and verification, with NRC assuming responsibility for system operation. Thus ERDA will be responsible for budgeting for facility construction while NRC will be responsible for budgeting for the test specification preparation and analysis

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

associated with the experimental program in FY 1977. The major construction phase of PFE will occur in FY 1977 and will continue into FY 1978.

Accomplishments have been significant during the past year. An improved analysis of decay heat should shortly lead to an ability to relax some conservatism in ECCS assessment models. BWR blowdown heat transfer tests have been completed at GE, and PWR blowdown heat transfer tests have started at HNL and INEL. Reflood heat transfer experiments have been resumed at Westinghouse at low reflood rates. A number of basic experiments have been conducted pertinent to complex two-phase flow in the downcomer of a PWR during a hypothetical LOCA, and improved correlations have been developed for steam-water mixing in the downcomer. Data on fuel damage from hypothetical reactor accidents are now being produced in experiments at PBF, at Halden (Norway), as well as at several locations in the U.S.

Augmentation of the program in several important ways is projected for FY 1977. Funds of \$3,000,000 are included for start on design and planning of an experiment on three-dimensional, two-phase flow in a large simulated PWR core. The experiments will use electrically heated simulated fuel rods and will require large electrical power supplies. The experiments are vital to the determination as to whether LOFT tests are representative of full-sized PWR behavior in the hypothetical event of a LOCA, a point also being investigated in the Semiscale program.

An additional increase of approximately \$4,300,000 under Systems Engineering is required. Experiments on containment response to a LOCA for both BWR's and PWR's are needed because of uncertainties in the analytical methods now used to calculate this response. A large test of blowdown from a pressurized pipe is also needed because current analytical methods are all extrapolations from smaller tests, and it is necessary to ensure that supercooled discharge does not take place when

large pipes are used. Funds are also included for development of advanced methods of measuring two-phase mass density and mass flow in such complex experiments as LOFT, Semiscale, and PFE because existing methods require improvement. Tests are planned to better determine the effects of pumps and steam generators on the course and outcome of a LOCA. Of particular importance in this respect is testing to determine the influence of steam generator tubes that may be broken during a hypothetical LOCA.

The Fuel Behavior program under "Separate Effects" will be increased by \$3,850,000 to provide for the funding of complex multi-rod burst tests because of the central importance of these tests to coolant flow blockage as a result of fuel damage from a hypothetical LOCA; irradiated fuel to be acquired for tests in PBF; and the inadequate rate of testing of fuel in PBF (Power Burst Facility) will be supplemented by test facilities designed and built for the Engineering Test Reactor (ETR) and ESLOR reactors. Larger scale tests will be started on fission product release from molten uranium oxide to determine to what extent the small-scale tests of the past led to overestimating fractional releases calculated to occur should a substantial amount of fuel melt in a postulated accident. This new work will explore one of the conservatisms in risk analysis of the type included in the Rasmussen Report.

The funding for Separate Effects will also be increased by \$1,400,000 for the probabilistic assessment of risk. The issuance of the revised Rasmussen Report took place in October. Work is now being undertaken to systematize and issue the fault trees, improve the health effects models, and provide input to Regulatory policy. Work will be started on assessing the variability of risk from one reactor to another, to apply the methodology to other reactors such as offshore plants and LMFB's, and to improve the models. This work will continue into FY 1977. The future impact of risk analysis on the Regulatory process and policy is expected to be profound.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

(4) Loss of Fluid Test..... FY 1975 - \$21,997 FY 1976 - \$22,390 FY 1977 - \$11,300

The LOFT facility will be used to provide full system tests of the analytical methods used to assess the effectiveness of emergency core cooling. LOFT is a small pressurized water reactor, which models the features of a large PWR that would be important in a loss-of-coolant accident. LOFT will be used to conduct a series of loss-of-coolant experiments, in which a pipe break is simulated by the sudden opening of a small pipe break, large pipe breaks, and different break locations. In each test measurements will be made of a number of variables, such as temperature, mass flow rate, mass density, stress, etc. Comparison of each of these test measurements with values calculated using a specific calculational model will provide a test of calculational model. LOFT will generate 55 MW(t) of steady state power. Its fuel is 5.5 feet in length. The diameter of the core is about 24 inches. The size is therefore about one sixth that of a large pressurized water reactor. The ability of LOFT to duplicate the behavior of a large PWR has been questioned. In particular, a study group of the American Physical Society has recently questioned the validity of LOFT for testing calculational codes to be used in estimating the consequences of accidents to large reactors. LOFT is still the largest full system LOCA experiment planned today, and current calculations indicate it will in fact be useful in testing the validity of computations for larger reactor systems. Tests planned with Semiscale and a new proposed three-dimensional core flow experiment will be useful in further studying this question.

Construction of LOFT is now under the direction of ERDA, as required by the Energy Reorganization Act of 1974. Construction is nearly complete. The first non-nuclear experiments are now scheduled early this year. Non-nuclear tests will continue until the summer of 1976, when loading of nuclear fuel to criticality will take place. Nuclear tests are expected to start in 1977. The production of useful data will begin with the first non-nuclear test.

The cost of construction and operation has been budgeted for by ERDA in FY 1977. It is hoped that construction and nuclear checkout will be complete before the end of FY 1977 and that nuclear tests can then start. If this occurs, ERDA funds currently scheduled to support construction and operation throughout 1977 will be used to fund the nuclear test operation during the remainder of the fiscal year.

The NRC budget for LOFT for FY 1977 includes provision for fabrication of fuel for the second core, for advanced instrumentation development, for design and fabrication of 17 x 17 fuel rod assemblies, and for planning the experimental program. Funding of these LOFT experimental activities and improvements is an NRC responsibility.

(5) Power Burst Facility..... FY 1975 - \$ 6,435 FY 1976 - \$17,460 FY 1977 - \$11,000

The Power Burst Facility (PBF) is a test reactor at the Idaho National Engineering Laboratory. It is capable of 40 MW(t) steady state power, or of pulsed operation starting from any power level up to the maximum. It contains an in-pile tube,

which is used in testing behavior of commercial nuclear fuel under accident conditions. PBF has been designed for use in determining the effect of a hypothetical accident on the fuel and its cladding. Studies are made of fuel-coolant

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

interaction, fuel-fuel interaction, changes of fundamental quantities such as fuel and gap conductance, fuel redistribution, fuel clad swelling, etc.

Since the consequences of a hypothetical accident are ultimately determined by the effect on the fuel, the ability to cool the fuel, and the continued integrity of the fuel rod, measurements of this kind are imperative. The PBF is at present the only facility available for in-pile testing of this kind for LWR's. No other facility has been proposed that would permit the range of tests provided by PBF. However, the rate at which tests with PBF can be run is quite slow, and efforts are being made to speed the schedule and to provide some parallel capability in testing.

(6) Code Development and Application..... FY 1975 - \$ 2,908 FY 1976 - \$ 4,350 FY 1977 - \$ 6,800

This program is the one into which all experimental programs funnel data, and it provides the ultimate tools of reactor safety assessment. It also provides analytical procedures used for performing calculations by the current "best estimate" methods, as these are required for guidance of system experiments and for interpretation of these experiments.

This confirmatory Code Development is therefore of central importance to the entire NRC licensing program.

The program includes the development of analytical models and computer codes used to predict behavior of nuclear power systems under postulated accident conditions. Important areas to which the present program is directed include: (1) development of computer codes to be used in describing fuel behavior under accident conditions, (2) development of computer codes to describe system response to accident conditions, (3) development of computer codes to describe response of containment structures to accident conditions, and (4) construction of computer codes to describe the events subsequent to a hypothetical core melt accident.

The FY 1976 budget includes an \$8,000,000 obligation for the upgraded core in PBF. Excluding this one-time cost, the experimental program will increase in FY 1977 by \$2,040,000 to \$11,500,000 to (1) pay the expanded operating cost of the facility, (2) provide a second in-pile tube for speedup of the program, (3) augment the data-taking system to permit recording all data generated by the detectors, (4) provide for some system repair and improvement, (5) provide a test train checkout facility, and (6) provide for the procurement of irradiated fuel and the testing of fuel under LOCA conditions. Though PBF is an ERDA-owned facility, its operating costs are borne by NRC on a cost-reimbursable basis.

A multi-directional strategy for improvement of the codes is now being pressed. A start is being made in restructuring the RELAP-4 code to make it more flexible with respect to adding improved models and to reduce the required machine time. RELAP-4 is the only complete computer code system for the blowdown phase of the light water reactor safety analysis code in the public domain; and it is at present being used widely in licensing, experiment planning and analysis, etc. At the same time, an advanced system code has been started, and is expected to be available in about a year. This code treats steam and water separately, with slip allowed between them. More advanced codes are being developed. These will be used partly for checking the validity of the assumptions made in the simpler codes. The increase of \$2,450,000 in FY 1977 is principally to support the enhanced effort.

Codes are being developed to describe the containment response after a LOCA. These codes are much more sophisticated and reliable than older ones. Codes to describe the behavior of fuel in the steady state and under accident conditions have been developed during the past year. These codes will now be refined and improved.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

b. Fast Breeder Reactor Safety Research..... FY 1975 - \$ 3,318 FY 1976 - \$ 5,600 FY 1977 - \$ 12,100

This program is designed to provide the NRC with an independent capability for safety assessment and development of licensing standards for fast reactors. It is important that the pace of this research be sufficient to provide an adequate technical basis for licensing decisions as applications are received. The first application for construction of a sodium-cooled fast breeder has been received (Clinch River Breeder Reactor (CRBR)), and the program must be conducted on a schedule providing for assistance at the operating permit stage of CRBR and the construction permit stage of subsequent fast breeders. A program has been defined to furnish fundamental data methods to use these data. This program also defines the facilities needed for timely performance of proof tests and other large-scale safety tests required for the licensing of commercial plants, and provides for a close correlation with the development being carried out by ERDA and the vendors in other countries.

The program in the previous years has been formative, and has now assumed a structure dictated by the evolving needs of licensing. Program planning has been guided by regulatory reviews of Fast Flux Test Facility and CRBR. A requested increase of \$6,200,000 in FY 1977 will provide for support of extensive experimental research, both in- and out-of-pile. Initial planning of experiments began in FY 1975, and tooling up and initiation of experiments have taken place in FY 1976. The FY 1977 program is to be increased with respect to: fission product release and transport including benchmark tests of fuel-sodium aerosol production and plate-out, and tests involving prototypic amounts of plutonium; in-pile fast reactor safety experiments (Sandia) in the Annular Core Pulsed Reactor (ACPR); electron beam experiments to produce equation of state data; and operational support of the ACPR upgrade.

A safety test facility review will develop detailed design and improved cost estimates of major safety test facilities and related new data acquisition methods. Critical experiments to

establish benchmarks for reactivity calculations related to damaged cores will be increased in FY 1977, as well as development of a comprehensive program to quantify the strength of primary containment designs and the margin to failure under accident conditions and over a plant life of forty years. Other increases in FY 1977 are associated with ongoing code development, increased computing needs, and development of new computational models. This level of activity is geared to providing a strong independent basis for licensing assessments in time for the input to be useful.

Basic analytic methods are being developed to study plant response to transients and the energetics of hypothetical core disruptive accidents. These methods are designed to be accurate enough to assess the adequacy of vendor's models.

A program of small-scale tests both in-pile at the Annular Core Pulsed Reactor (ACPR) at Sandia and out-of-pile, using Relativistic Electron Beams to produce high heating rates, has begun to produce basic data on the behavior of core materials under HCDA (Hypothetical Core Disruptive Accident) conditions.

The assurance of primary system integrity requires a broad analytic program to establish long-term data needs. This program is being started in FY 1976. Current theoretical investigations show that high temperature elastic-plastic creep-fatigue interaction could lead to a considerable degradation in piping strength over the period of reactor life. Methods for inservice inspection and the reliability of these methods are not yet well established. Development of these methods is to be initiated in FY 1977. Studies of the response of heat transport cell liners to sudden spills of hot sodium show that buckling under thermal stress could aggravate the effects of leakage through small holes unless there are adequate venting and anchors. Conventional analysis and tests will probably be sufficient once the nature of the sodium-concrete reaction is established.

(Dollars in the thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Adequate understanding of failure of Liquid Metal Fast Breeder Reactor fuel under plant transients requires tests of prototypical pins in medium-sized bundles (37 pins). Because of this requirement as well as the need to match enrichment, flux-fluence ratio, and fission gas release properties, large tests in new safety test facilities are needed. Proof-tests of computational models of HDCA's are also needed. Detailed design of experiments and data acquisition systems will be conducted in FY 1977. To make effective use of such tests and new facilities, it is necessary to extract data from the reactors via novel means. Several techniques including the fast neutron hodoscope now in use in the Transient Reactor Test (TREAT) Facility appear feasible.

The basic method by which radioactive material would diffuse into the secondary containment after a hypothetical accident

c. High Temperature Gas Cooled Reactor (HTGR) Safety Research..... FY 1975 - \$ 2,914 FY 1976 - \$3,700 FY 1977 - \$ 3,600

The program in research on safety of gas-cooled reactors is designed to provide the regulatory staff with an independent capability for safety assessment and development of licensing standards for gas-cooled reactors. The currently unsettled conditions of the HTGR role in the nuclear marketplace have reduced the urgency but not the need for this capability. The pace of the program is dictated by the need to confirm basic data and methods in preparation for the licensing of lead plants which will follow the near term decision of ERDA concerning the objectives and schedule of its Gas Reactor Development Program.

The only methods now available to analyze plant behavior come from the vendor. Because of the need for independent assessment of these methods, a program has been defined to generate confirmatory methods of assessment, and also fundamental data to use with these methods. The long range program also provides for the scoping of facilities needed for the

(with subsequent leakage to the environment) is via aerosols associated with sodium oxide particles produced in fires. Tests in small-scale vessels and in the Nuclear Safety Pilot Plant (NSPP) should be sufficient to demonstrate the utility of analytic methods in describing these processes, though a large scale proof test with fuel simulants may be necessary. Tests in the smallest vessel (CRI-II) of the NSPP have been initiated and other tests are planned in FY 1976 for the larger vessel (CRI-III). Reactivation of the NSPP has begun in FY 1976 and should be completed in FY 1977. Tests under sodium are scheduled for FY 1977 as are initial tests with prototypical amounts of plutonium.

performance of proof tests and other large-scale safety tests needed to verify the adequacy of models and methods used in safety analysis.

The current emphasis of the program is on safety research which is applicable to a variety of gas-cooled reactor concepts. Stress analyses under development for prestressed concrete reactor vessels are also applicable to containment structures for other reactor types. High temperature materials research is broadly applicable to advanced reactors. Instruments to monitor primary coolant purity can be used with all gas reactors, and some other reactors using cover gas systems. Work on primary coolant chemistry and graphite oxidation will be continued, to emphasize problems applicable to all HTGRs. Analysis and modeling useful for more than one HTGR type are being continued.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Fuel particle failure investigations are coupled with fission product release and transport analyses to narrow the spread in present release estimates. At present, there exists a substantial difference between different estimates of radioactivity release to the public from an HTGR which has experienced a complete loss of forced cooling. This research is expected to be applicable to all coated-particle fuel systems.

The funding requested for FY 1977 will be used to continue the development of an NRC structural code that would provide a capability to predict transient failure and steady state stress in all types of concrete vessels, including containment structures. This development is underway at universities and

ERDA laboratories. High cycle fatigue tests of primary system and high-temperature property investigations of metals and graphite will continue. Primary coolant monitors will be tested at Fort St. Vrain and on test loops to determine accuracy and response to impurity conditions that could lead to safety problems. Small-scale fission product release, transport, and deposition experiments will be coupled with the analysis and evaluation of existing data. Shake table experiments will be used to develop and verify models incorporated in the core seismic analysis codes now under development. A second, more versatile coolant impurities loop will be completed and testing will begin to determine impurity effects on a wide variety of safety materials.

Environmental and Fuel Cycle.....

FY 1975 - \$ 2,348 FY 1976 - \$13,700 FY 1977 - \$14,800

In addition to conducting confirmatory research on reactor safety, NRC's research program must also assess the impacts on the environment and the public and nuclear industry workers from the regulated portion of the fuel cycle process. This includes uranium milling, fuel fabrication, reprocessing, conversion and enrichment, transportation, and waste management. The data and information developed in these programs will provide a principal source of technical information required in NRC for the development of regulatory guides and standards. These data are also needed in the licensing review process where there is a continuing requirement through environmental impact analysis to refine and confirm estimates of the effect of plant operation on man and the environment. The \$1,100,000 increase in FY 1977 is necessary to initiate NRC's base program. It recognizes the increasing importance of evaluating the impact of nuclear facilities on man and his environment as well as the impacts of the environment on such facilities.

The planned program of Environmental and Fuel Cycle research is comprised of five principal areas: (1) health and environmental impact, (2) fuel cycle safety, (3) waste management,

(4) transportation, and (5) site safety. The objective of the Health and Environmental program is understanding the impact of licensed nuclear facilities and products on man and the environment. Included in this activity are projects related to defining and measuring the biological and ecological effects of radioactive, chemical, and thermal discharges; the development of predictive models on pathways, dose conversion and measurement, cost benefit, social value, and risk assessment methodologies; and planning, siting, construction, operation, and decommissioning procedures. Because of the newness of the Commission, the programs are just getting started. The research undertaken in FY 1977 will continue and extend the FY 1976 program in providing the basic information to be used for evaluating the adequacy of current projected technology in regard to environmental impact.

A further program objective is the compilation and analysis of data on performance of facility safety and effluent control systems for comparison with predictions. The data are accumulating at a growing rate, and it is essential to begin making use of them. Such information will provide for more

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

precise estimates of plant performance and environmental impact in licensing and standard-setting activities. Planned studies to be expanded in FY 1977 include verification of the principal sources of radioactivity in operating LWRs and determination of performance of related effluent control systems. Similar studies will be undertaken with respect to fuel fabrication facilities, and criticality studies will be performed to support the safety of transportation and storage and the processing of mixed oxide fuel. In licensing nuclear facilities which generate radioactive waste products, the Commission must provide reasonable assurance that these wastes remain isolated from the environment. A program objective under this activity is to develop an independent basis for appraisal of waste management proposals, their alternatives, relative costs, risks, and benefits. Because of the interface between waste storage/disposal requirements and in-plant waste treatment processes, the program must also provide the data necessary to establish licensing requirements on waste product characteristics and packaging, and on onsite waste storage systems for a wide variety of radioactive waste products. Work will continue in FY 1976 - 1977 to define the cost associated with various waste storage options and combinations and the potential consequences of releases from waste disposal sites. Efforts are also underway to describe the physical and chemical properties of certain low-level wastes which can affect the safety of storage and transportation.

Safeguards Research.....

A broad comprehensive NRC safeguards research program is necessary for timely development of improved safeguards measures which assure adequate nuclear materials and plant protection. This improvement will be responsive to the growing public concern with respect to potential malevolent activities that involve nuclear facilities and material, by the projected near-term use of large quantities of plutonium and other strategic special nuclear materials in private

The projected growth in the transport of radioactive materials requires R&D to assure continued public protection. Work will be expanded in FY 1977 to verify analytical models used to predict shipping container performance and to verify the relationship between required damage tests of containers and actual conditions of transport. Studies on spent fuel element integrity in accident environments will be undertaken within this activity. Investigations to confirm the potential post-accident dispersal of radioactive material, and the mitigating effects of recovery techniques will also be continued.

Continued research in site safety research will be strengthened to assure a continued adequate basis for reactor siting guidelines. Investigations will continue to determine earthquake characteristics and mechanisms in U.S. geographical areas important to reactor siting. Other investigations will evaluate (a) effects of tornadoes, tsunamis, flooding and meteorological phenomena; (b) costs and safety benefits of siting concepts (underground and offshore plants) and (c) structural response of facilities and systems to earthquake and other environmental loads. These investigations are of central importance to the determination of acceptability of reactor sites and designs.

FY 1975 - \$ 1,259 FY 1976 - \$ 4,674 FY 1977 - \$ 9,455

Industry. The safeguards will be directed toward (a) reducing the likelihood of attempts to create nuclear events having adverse societal consequences, (b) reducing the likelihood of an attempt being successful, and (c) reducing the potential consequences of such attempts. Attention will be given to simplifying requirements in ways that will not reduce their effectiveness. The research program is concerned with current and advanced fuel cycles and will provide information important to achieving the following:

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

- (a) A more systematic basis and comprehensive rationale for future NRC safeguards policy and programs.
- (b) Improved regulations and guides to assure effective safeguards implementation in licensed facilities.
- (c) Improved methods and procedures for licensing review, inspection and enforcement, central information processing, and NRC emergency response.

The program objective of safeguards systems development is an improvement in the methodology for systematic design and evaluation of the safeguards system. It involves a comprehensive and detailed parametric description of (a) potential malevolent events within the scope of NRC safeguards program, (b) adversary action sequences that could result in these events, and (c) the nature and effectiveness of safeguards mechanisms that can be used to protect against successful adversary action. Further program investigations will be directed at systematic characterization and analysis of potential current, and future, adversary types. The analyses will key on the motivation and resources of such elements. A basis will be sought for ordering, or ranking, potential targets and modes of attack in terms that would be relevant to safeguards system design and evaluation.

Safeguards research during FY 1976 will provide an initial assessment of the social, industrial and economic impact of possible safeguards options as a basis for determining the safeguards strategy to be developed in subsequent work. The objective will be to provide a systems and technology base for future regulations. Full account will be taken of the results of the special safeguards studies being conducted by the Office of Nuclear Materials Safety and Safeguards which are directed toward an assessment of the policy options identified in "Generic Environmental Statement - Mixed Oxide Fuel" and the development of early policy and program recommendations

relating to the initiation of longer term research programs. These special studies cover a broad spectrum of tasks and include the safeguards work necessary as input to the Security Agency Study and the Nuclear Energy Center Site Survey being done by NRC in accordance with the Energy Reorganization Act of 1974.

Development of an Integrated Safeguards Information System will be undertaken to satisfy the NRC program requirements for collecting, storing, analyzing and communicating information relevant to safeguards. The system will provide a basis for safeguards management decisions, inspection and enforcement activities, and appropriate contingency plans. The information will include, but not be limited to, that generated by licensees in the implementation of safeguards regulations, including physical protection as well as nuclear material control and accountability data.

Research and inspection and enforcement techniques will be undertaken to provide improved concepts, criteria, and procedures to assure compliance of licensees with regulations and provide effective safeguards implementation. The work will involve the development of inspection procedures, instrumentation, and acceptance criteria to determine the effectiveness of physical protection and internal controls and accountability at licensed facilities. The applicability of new inspection concepts will be evaluated, including inspection of psychological reliability testing and use of adversary testing as an inspection tool.

Safeguards research in support of regulations and standards will develop the technical basis necessary to effect NRC policy through licensing and regulation and will assess the effectiveness of systems and methods proposed as a basis for the regulations. This work will involve the cost-benefit evaluation of individual safeguards measures in terms of their contribution to overall safeguards system effectiveness.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Because the entire safeguards research program was developed and initiated during the course of FY 1976, the increase of \$4,781,000 will be necessary to maintain the level of effort reached at the beginning of FY 1977. This will be directed toward the two general categories of regulation: (a) physical protection against unauthorized access to, introduction of contraband into, or unauthorized removal of nuclear material from a protected area, vital area, or material access area, or unauthorized activities involving nuclear material during any phase of transportation; and (b) internal controls and

accounting to protect against activities within a protected area, vital area, or material access area that are directed toward sabotage or theft of nuclear material. The work involves the investigation and assessment of a wide variety of systems and methods, including perimeter and area protection; timely and sensitive methods, including nuclear materials accounting for detecting illicit activities; internal controls to deter and limit such activities; and measures for appropriate reaction when illicit activities are detected.

4. Equipment and Construction..... FY 1975 - \$3,038 FY 1976 - \$ 9,600 FY 1977 - \$ 8,000

Significant items of equipment will be required for the Nuclear Regulatory Research program. In FY 1977 it will be necessary to procure capital equipment in support of the programs in fuel behavior, primary system integrity and systems engineering. Other equipment will be required to support such major facilities as LOFT, PBF, PFE, Semiscale, and thermal-hydraulic heat transfer experiments. Capital equipment will also be required for research and development to support IMFRR and gas reactor safety assessment programs, environmental and fuel cycle, and safeguards research program. Moreover, additional equipment will be required in support of new and increased functions necessitated by the objectives of the nuclear regulatory research program as outlined by increases in operating funds. Major examples are such items as a large, non-nuclear experiment on three-dimensional core flow during blowdown, investigations of reflooding a full-length core (12'), fuel handling and examination systems for LOFT, and heat transport systems experiments.

The technology programs for primary system integrity and fuel behavior will require equipment for the study of thermal shock, such as high-pressure pumps and instrumentation and equipment for evaluation of crack growth rate and for pneumatic testing of intermediate-sized vessels. Specific items include an autoclave for the crack growth rate studies and a pumping

capacity facility for the pneumatic testing of intermediate-sized vessels. Instrumentation such as densitometers, an oscilloscope, and a digital voltmeter are needed to improve transient flow data obtained in the PWR blowdown heat transfer measurements. High temperature furnace power supplies and tube burst apparatus are required to test zircalloy fuel cladding and ultrasonic thermometers are planned for the in-pile fuel test program.

The LOFT experimental program will require significant amounts of equipment for data measurement during nuclear testing. Other equipment is also required to support the LOFT operations, and facility modifications are needed to permit the conduct of tests to simulate steam line breaks and primary-to-secondary system breaks. Capital equipment requirements for LOFT in FY 1977 also include the handling and post-test disassembly of LOCE fuel elements. This includes equipment for remote holding, cutting, measuring, and examination of radioactive fuel elements. Radioactive off-gas storage equipment will also be provided for the LOFT facility.

Equipment modifications in FY 1977 are also required to support improved PBF operation. A fully instrumented high-temperature, high-pressure loop is planned for testing assembled test trains prior to installation in the PBF in-pile tube. A fission

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

product monitoring system will be provided, capable of transient measurement of fission product release from test fuel. The existing system for damping experimental burst pressure pulses in PBF will be replaced with an improved system including a steam generator to attenuate system pressure pulses. The Plenum Fill Experiment will require a data acquisition system, a signal conditioner, and an experiment control system including photographic recording. The Semiscale experiment requires such equipment as power supplies, gamma density measuring systems, and a blowdown loop pump.

The liquid metal fast breeder reactor (LMFBR) safety program requires such equipment as test vessels, aerosol generation system components, and electrostatic samplers for the aerosol transport program; sophisticated high-temperature measurement devices for the in-pile molten fuel experiments, and neutron holography components for fuel motion diagnostics.

The gas-cooled reactor safety program will require major units of equipment to simulate reactor accident conditions. Examples include a data acquisition system, recorders, and monitoring systems associated with examination of primary coolant interactions and servo hydraulic controls and instrumentation channels associated with investigation of seismic response. In addition, material testing equipment is needed, such as a tensile tester, a fatigue-test control console, and creep-rupture measuring machines.

The Environmental and Fuel Cycle and Safeguards program will require nuclear material containers, equipment associated with the conduct of critical experiments, laboratory bench equipment; data recording devices, and other items associated with the handling of radioactive materials; standard sources, special test fixtures, and instrumentation for the development of inspection methods and to evaluate the effectiveness of safeguards measures implemented by licensees.

EQUIPMENT - CONSTRUCTION

	FY 1976	FY 1977
Equipment		
Water Reactors	\$ 3,738	\$ 4,500
Advanced Reactors	1,680	2,500
Environmental-Fuel Cycle, Safeguards	82	1,000
Total	\$ 5,500	\$ 8,000
Construction		
Modifications to Advanced Core Pulse Reactor	\$ 3,000	
Modifications to Power Reactor Facility	1,100	
Total, Power Reactor and Conc.	\$ 9,600	\$ 8,000

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Program Technical Support..... \$10,180

Summary of Program Technical Support Estimate by Object Class

	Actual FY 1975	Estimate FY 1976	Estimate Transit'on Quarter	Estimate FY 1977
Personnel Compensation.....	\$ 3,823	\$ 5,150	\$ 1,525	\$ 5,980
Personnel Benefits	333	462	131	540
Contract Support	1,762	2,385	236	1,387
Administrative Support	970	1,430	360	1,538
Travel	404	718	128	735
Equipment	230	0	0	0
Total Program.....	<u>\$ 7,522</u>	<u>\$ 10,145</u>	<u>\$ 2,380</u>	<u>\$10,180</u>
Personnel	(199)	(231)	(231)	(212)

This budget activity includes salaries and other costs for the staff offices that provide direct program technical support. These are the Office of the Executive Legal Director, the Office of International and State Programs, the Advisory Committee on Reactor Safeguards, the Atomic Safety and Licensing Board, the Licensing Appeal Panels, and the Office of Special Studies.

- a. The Office of the Executive Legal Director is responsible for providing legal advice and services to the Executive Director for Operations and the programmatic offices and activities reporting to him. These responsibilities include representation of the NRC Staff in administrative proceedings involving the licensing of nuclear facilities

and materials, and the enforcement of license conditions and NRC regulations; counseling with respect to safe-guards matters, contracts, security, patents, administration, research, personnel, and the development of regulations to implement applicable Federal statutes. The FY 1976 staff totals 88 positions. An increase of 2 positions is requested to accommodate the increased workload in FY 1977 associated with the increase in activities projected for various NRC programs.

- b. The Office of International and State Programs (ISP) provides direct program support to the NRC staff for international relations, state relations, and emergency

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

preparedness programs. A number of bilateral regulatory information exchange arrangements were negotiated with foreign countries in FY 1976 including specific foreign reactor data exchanges which will be implemented primarily in FY 1977. Additionally, in FY 1976, an NRC representative office was established in Europe and licensing activities on all exports and imports of all non-reactor facilities and source and special nuclear materials were transferred to ISP.

ISP, in its State relations program, manages a joint surveillance program with selected States and the Department of Transportation to evaluate the effectiveness of transportation regulations for radioactive materials, conducts programs to strengthen the licensing process through State-Federal cooperation, and supports State activities in radiation control, and serves as the central source of information on State legislation and activities relating to the NRC regulatory role. The NRC emergency preparedness (EP) program provides support for the training of State radiological emergency-preparedness personnel.

In FY 1977, ISP will expand NRC's international regulatory information exchanges; accelerate joint NRC/State planning efforts, including coordination of NRC/State power plant siting regulations to streamline the licensing process; coordinate and develop NRC/State policy to insure maximum integration of safety and licensing issues; determine State radiological emergency instrumentation needs; and carry out radiological emergency preparedness programs, as assigned by the Federal Preparedness Agency, General Services Administration, including the development of state guidance for emergency response to transportation accidents involving radioactive materials. The FY 1976 staff totals 26 and remains unchanged in FY 1977.

c. Advisory Committee on Reactor Safeguards as required by Statutes reviews and reports on safety studies and facility license applications referred to it; advises the Commission on the hazards of proposed or existing reactor facilities and the adequacy of proper safety standards; and performs such other duties as the Commission may request. The ACRS reviews each application for a construction permit, an operating license for a facility, and any application for an amendment to an operating license. The Committee's report on applications for facility licenses becomes a part of the record of the application and is made available to the public, except for security material. The FY 1976 staff totals 36 and an increase of one position is requested to accommodate the FY 1977 work load.

d. Atomic Safety and Licensing Board Panel conducts adjudicatory hearings through its hearing boards who issue intermediate and final decisions according to authority delegated by the Commission with respect to granting, suspending, revoking, or amending licenses or authorizations under provisions of applicable regulations of the Commission or laws. This includes determinations relating to the construction or operation of nuclear power plants and separate hearings on antitrust issues relating to the operation of such plants. Three-man Boards appointed from the members of the Panel are required to conduct hearings which review environmental issues involved in any such proceeding as well as to separately consider issues of health and safety, national defense, financial qualifications and economic considerations that might be involved, and to resolve issues related to these matters that may arise from interventions by members of the public

(Dollars in Thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

or any other party. Accordingly, the Panel also has authority as delegated by the Commission to appoint Boards to Rule on Petitions for Intervention. The Panel also appoints Boards to conduct rulemaking hearings as designated by the Commission. The Boards are required by law to initiate most of the hearings in the vicinity of the plant site. The FY 1976 staff totals 40 and an increase of 2 positions is requested to accommodate the FY 1977 work load.

- e. Atomic Safety and Licensing Appeal Panel is delegated the authority to perform the review functions that would otherwise be performed by the Commission in: (a) proceedings on applications for licenses under 10 CFR Part 50; (b) proceedings on applications for authorizations under 10 CFR Part 115; and (c) such other licensing proceedings as the Commission may specify.

This panel is organizationally separate from the Atomic Safety and Licensing Board Panel. The ASLAP is composed of members designated by the Commission who are assigned to appeal boards for specific licensing proceedings. The Panel's activities are supervised by a permanent Chairman and Vice-Chairman. The FY 1976 staff totals 15 and an increase of 2 positions is requested to accommodate the work load.

- f. The Office of Special Studies will complete the Congressionally mandated Nuclear Energy Center Site Survey (NECSS) in FY 1976. The Commission is not requesting any funds at this time for any NECSS follow-on study. Thus, the Office of Special Studies which is staffed at 26 in FY 1976 will be eliminated.

(Dollars in thousands, except for dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

Program Direction and Administration.....\$22,310

Summary of Program Direction and Administration Estimate by Object Class

OBJECT CLASS	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Personnel Compensation.....	\$ 7,373	\$11,715	\$ 2,460	\$12,360
Personnel Benefits.....	650	1,033	305	1,110
Program Support.....	1,025	3,954	441	4,300
Administrative Support.....	1,900	3,200	810	3,780
Travel.....	201	263	44	370
Equipment.....	435	370	70	390
Total Program.....	<u>\$11,584</u>	<u>\$20,535</u>	<u>\$ 5,130</u>	<u>\$22,310</u>
Personnel.....	(447)	(515)	(515)	(548)

Program Direction and Administrative Offices provide overall policy direction, resource management effectiveness, administrative and logistic support, and includes the staff offices of the Commissioners and the Executive Director for Operations as shown below:

The Commission:

Commission
Secretary
General Counsel
Policy Evaluation
Inspector and Auditor
Congressional Affairs
Public Affairs

EDO:

EDO
Administration
Controller
Planning and Analysis
Management Information
and Program Control
Equal Employment Opportunity

- a. The Commissioners - Are the governing body who must exercise the overall responsibilities of the Energy Reorganization Act of 1974 and the Atomic Energy Acts of 1946 and 1954 as Amended. They provide the fundamental policy guidance and the administration and management direction necessary to assure that the civilian use of nuclear energy is developed in a manner consistent with the public health and safety, environmental quality, national security and antitrust laws. The FY 1976 staff totals 28 and remains unchanged in FY 1977.

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

- b. The Office of the Secretary develops policies and procedures for the provision of complete secretariat services required for the discharge of Commission business and implementation of Commission decisions; advises and assists the Commission, Offices reporting directly to the Commission, the Executive Director for Operations and his subordinate offices on the scheduling and conduct of Commission business; records Commission meetings; plans, directs and operates the NRC papers system; supervises and administers the Commission's Public Document Room; directs and operates the Commission Correspondence and Records Facility; maintains the Commission's official docket; coordinates protocol activities at Commission level; provides liaison for boards and committees reporting directly to the Commission; performs services relating to the functions of the Federal Advisory Committee Management Officer; operates a reproduction and distribution facility; plans and directs the NRC Historical Program; operates the classified document control system for Commissioners and offices reporting to the Commission; and provides general administrative and logistical support service to the Commission. The FY 1976 staff totals 30 and remains unchanged in FY 1977.
- c. Office of the General Counsel is the chief legal officer and legal advisor to the Commission. The General Counsel provides legal opinion, advice, and consultations to the Commission in connection with the quasi-judicial responsibilities of the Commission and in the development of substantive policy matters. It represents the Commission in matters relating to litigation, and, in cooperation with the Department of Justice, represents the Commission in court proceedings affecting the NRC program. The office also provides legal advice with respect to legislative matters of concern to NRC, including drafting of legislation, preparation and review of testimony, and preparation and transmission of statements of views requested on proposed legislation. The FY 1976 staff totals 17 positions and remains unchanged in FY 1977.
- d. Office of Policy Evaluation advises the Commission on a broad range of substantive policy matters to enhance the information base on which Commission decisions are made. The FY 1976 staff totals 18 positions. An increase of one position is requested in FY 1977 to accommodate the increased workload of the Commission.
- e. Office of the Inspector & Auditor conducts investigations and inspections to verify the integrity of all NRC operations; investigates allegations of NRC employee misconduct, and equal employment opportunity and civil rights complaints; assists the Commission in carrying out its financial management responsibilities; administers the Commission's day-to-day audit activities; serves as the point of contact with the General Accounting Office on matters affecting the agency's financial and management audit functions; and maintains liaison with the Department of Justice and other law enforcement agencies, including the coordination and handling of criminal referrals. The FY 1976 staff totals 25 and remains unchanged in FY 1977.
- f. The Office of Congressional Affairs provides assistance to the Commission and senior staff on congressional matters, coordinates interagency congressional relations activities, and is the principal liaison for the Commission with congressional committees and members of Congress. The FY 1976 staff totals 5 and remains unchanged in FY 1977.
- g. The Office of Public Affairs plans and administers NRC's coordinated and comprehensive program to inform the public of Commission policies, programs and activities, as appropriate, and for informing NRC management of public affairs activities of interest to the Commission. The FY 1976

(Dollars in thousands, except whole dollars in narrative material)

NUCLEAR REGULATORY COMMISSION - continued

- staff totals 17, and an increase of one position is requested to accommodate the FY 1977 Commission's workload.
- h. The Executive Director For Operations coordinates and directs the Commission's operational and administrative activities and is responsible for coordinating and developing policy and program options generated by the directors of the program offices. The FY 1976 staff of 23 remains unchanged in FY 1977.
- i. Office of Administration provides the personnel administration; security and classification; technical information; facilities and materials license fees; contracting and procurement; rules, proceeding and document services; data processing; building management; printing, reproduction, records management; a variety of other housekeeping functions, and support for the local public document rooms. Additionally, they are responsible for directing the activities of management and administrative support programs, and for developing policy options for Commission consideration. The FY 1976 staff total 229. An increase of 18 positions is requested primarily to assure that the NRC offices for which programmatic growth is planned are adequately supported in such areas as personnel, reproduction, security, contracts, etc.
- j. Office of the Controller provides budget and financial management organization, including development and maintenance of a system of accounting and financial controls which conforms to the standards prescribed by the Comptroller General; provides a resource planning and evaluation function to evaluate the critical relationship between resource allocation and program performance; and develops a coordinated and comprehensive Five-Year Program Plan. The FY 1976 staff totals 57 positions. An increase of 8 positions in FY 1977 is required to bring the manning level to the minimum needed to meet the needs of sound financial management.
- k. The Office of Management Information and Program Control (MIPC) provides an integrated and comprehensive management information and control system for program planning and the reporting and analysis of schedule and performance of NRC programs accomplished by the Offices of Nuclear Regulatory Research, Standard Development, Inspection and Enforcement, Nuclear Reactor Regulation, as well as Nuclear Materials Safety and Safeguards. The FY 1976 staff totals 48 positions. An increase of 3 positions is requested to accommodate additional information system requirements including those set forth in Section 208 of the Energy Reorganization Act of 1974 wherein NRC must report all licensee events and abnormal occurrences within 15 days of occurrence. This includes the technical assessment and evaluation of performance and failures of nuclear reactors and nuclear fuel cycle facilities.
- l. The Office of Planning and Analysis provides an overall independent analysis of programs, issues, policy options and alternatives, and coordinates and improves NRC's cost-benefit policy. The FY 1976 staff totals 14 positions. An increase of 2 positions is requested to accommodate the FY 1977 effort.
- m. The Office of Equal Employment Opportunity plans and administers the NRC Equal Employment Opportunity program. The FY 1976 staff totals 4 positions and remains unchanged in FY 1977.

SPECIAL SUPPORTING TABLES

U. S. NUCLEAR REGULATORY COMMISSION FY 1977 Budget Estimates

(Dollars in thousands, except whole dollars in narrative material)

ALL PROGRAMS - NRC DIRECT EMPLOYMENT

Year-end strengths and average employment for permanent full-time employees and total personal services costs of the various programs are shown in the table below.

The basis for the increases in year-end strengths projected are discussed in the narrative justification of the respective programs.

Comparison of Employment and Personnel Compensation Obligations

Program	Actual FY 1975			Estimate FY 1976			Estimate FY 1977		
	Employment			Employment			Employment		
	End Strength	Av. Full Time	Obligations	End Strength	Av. Full Time	Obligations	End Strength	Av. Full Time	Obligations
Nuclear Reactor Regulation...	582	528	\$ 14,636	605	594	\$ 16,930	613	609	\$ 17,700
Standards Development...	112	110	2,670	135	124	3,341	153	144	4,170
Inspection and Enforcement...	420	385	10,557	498	459	12,210	592	545	15,180
Nuclear Materials Safety and Safeguards.....	152	122	1,211	199	175	5,288	276	238	6,700
Nuclear Regulatory Research..	94	74	2,386	106	100	2,805	135	121	3,660
Program Technical Support....	199	170	3,823	231	215	5,150	212	221	5,980
Program Direction and Administration.....	447	382	7,371	515	481	11,715	548	531	12,360
TOTAL NUCLEAR REGULATORY COMMISSION.....	2,006	1,772	\$ 42,656	2,289	2,148	\$ 57,439	2,529	2,409	\$ 65,750

U. S. NUCLEAR REGULATORY COMMISSION
FY 1977 Budget Estimates

(Dollars in thousands, except whole dollars in narrative material)

NRC DIRECT TRAVEL

	Actual FY 1975	Estimate FY 1976	Estimate Transition Quarter	Estimate FY 1977
Nuclear Reactor Regulations	\$ 707	\$ 767	\$ 192	\$ 810
Standards Development	127	265	64	235
Inspection and Enforcement	1,082	1,700	461	1,770
Nuclear Materials Safety and Safeguards	42	249	62	530
Nuclear Regulatory Research	188	215	45	305
Program Technical Support	404	718	128	735
Program Direction and Administration	201	263	44	370
Total	\$ 2,751	\$ 4,168	\$ 996	\$ 4,755

This estimate covers the cost of official travel of Government employees while discharging assigned NRC duties away from official duty stations. The travel costs reflect the travel of three principal classes of personnel: (1) NRC permanent full-time employees, (2) NRC intermittent employees such as members of advisory groups and individual consultants, and (3) NRC trainees.

The majority of the planned travel is required to maintain a satisfactory degree of technical and administrative supervision over Commission offices and projects and liaison with contractors and to provide for attendance of technical and scientific personnel at important domestic and foreign conferences and symposia.

A significant position of the travel is required in connection with the discharge of NRC's responsibilities associated with the health, safety, and the licensing and compliance functions under the Advisory Committee on Reactor Safeguards, the Atomic Safety and Licensing Board Panel, and Nuclear Reactor Regulation; inspection of licensed facilities; shipment of nuclear materials; nuclear materials safeguards activities; international cooperation activities; environmental affairs; and waste management activities.

U. S. NUCLEAR REGULATORY COMMISSION
FY 1977 Budget Estimates
(Dollars in Millions, except whole dollars in narrative material)

LEGISLATIVE PROGRAM PROJECTIONS

	<u>Actual FY 1975</u>	<u>Estimate FY 1976</u>	<u>Estimate Transition Quarter</u>	<u>Estimate FY 1977</u>	<u>Estimate FY 1978</u>	<u>Estimate FY 1979</u>	<u>Estimate FY 1980</u>	<u>Estimate FY 1981</u>
NRC Total								
Budget Authority	\$135	\$218 ^{1/}	\$ 52 ^{1/}	\$249	\$250	\$255	\$260	\$265
Budget Outlays	\$ 86	\$200	\$ 52	\$236	\$240	\$250	\$255	\$260

^{1/} Includes \$2,167,000 for FY 1976 and \$750,000 for the Transition Quarter for the proposed FY 1976 pay raise supplemental.

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