DEPARTMENT OF ENERGY
FY 1999 CONGRESSIONAL BUDGET REQUEST
OTHER DEFENSE ACTIVITIES
(Tabular dollars in thousands, Narrative in whole dollars)

NAVAL REACTORS

PROGRAM MISSION

Naval Reactors maintains "cradle to grave" responsibility for Naval nuclear propulsion work, beginning with technology development and continuing through reactor operation and, ultimately, ensuring appropriate and responsible reactor plant disposal. The Program's efforts have ensured, and continue to ensure, the safe operation of the many reactor plants in operating nuclear powered submarines and surface ships -- comprising over 40% of the Navy's major combatants, the successful development of the advanced fleet reactor for the SEAWOLF class, the ongoing development of the reactor plant for the new attack submarine, development efforts to meet U.S. Navy needs, and the safe final disposition of over 70 reactor plants.

The GOAL of the Naval Reactors program is to:

Facilitate U.S. national security by providing and ensuring the safe and reliable operation of Naval nuclear reactor plants.

The OBJECTIVE related to this goal is to:

- Meet requirements for nuclear propulsion by providing the Navy with advanced, long-lived, militarily effective reactor plants and ensuring their continued viable operation and their operators' proficiency.

The STRATEGIES employed to realize this goal and objective are:

- Maintain an integrated, comprehensive, and far-sighted analytical, developmental and testing effort for existing and future reactor plants:

  — continuously test, verify, and refine reactor technology, and integrate new technologies and techniques into existing system and component designs, to improve overall reactor plant performance, reliability and longevity;
  — rigorously test materials, fuel, cores, components and systems;
  — develop simplified, more affordable reactors with improved power capabilities, increased endurance, and added dependability.

- Ensure continued technical excellence and high quality in all Naval Nuclear Propulsion Program work.

PROGRAM MISSION — NAVAL REACTORS (Cont'd)

- Maintain proven safety and environmental protection record essential to ensure national and worldwide acceptance of U.S. nuclear powered warship operations.

- Maintain a quality industrial base to provide materials, fuel, components, and cores meeting Navy standards.

- Stress efficient use of facility and personnel resources to ensure requirements are met at minimum cost.

- Ensure non-proliferation of Naval nuclear technology.

PERFORMANCE MEASURES:

Naval Reactors is principally a technology program in the business of power generation for a military application. The Program's far-sighted development work ensures nuclear propulsion technology provides options to maintain/upgrade current capabilities as well as meet future threats. Work is integrated as advances in various functional disciplines coalesce into the technology applicable to a Naval nuclear plant. The presence of radiation dictates a careful, measured approach to developing nuclear technology, evolving needed components and systems, and implementing them into existing or future plant designs. Intricate engineering challenges and long lead time to fabricate the massive, complex components require many years before introduction into the fleet. Decades will pass before overall success can be assessed, due to the inherent intervals between the time a technology is conceived, developed, applied in the fleet and proven over the operating life of the ship. With this in mind, the following high-level success indicators are representative of the outputs/outcomes of Naval Reactors' work:

- Conduct planned development, testing, and evaluation in the areas of nuclear physics, steam generators, instrumentation and control, materials, reactor and reactor plant design, and manufacturing and inspection methods to ensure reactor plant service life meets Navy goals for extended warship operation.

- Complete scheduled reactor and reactor plant analyses and analysis methods improvements to ensure safety and reliability of the reactor plants in the Navy's nuclear powered warships so they can fulfill their national defense mission.

- Accomplish planned core and reactor component/system design and technology development efforts to support the Navy's acoustic requirements.

- Maintain a utilization factor of at least 90% for prototype plants, ensuring their availability for scheduled testing, training, and servicing needs.

PROGRAM MISSION — NAVAL REACTORS (Cont'd)

- Meet FY 99 cost and schedule goals to safely and responsibly inactivate six shutdown test reactor plants in support of the Department's environmental clean-up goals.

- Attain goal of zero personnel exceeding Federal limits for radiation exposure and no significant findings resulting from environmental inspections by state and federal regulators.

- Complete 85% of New Attack Submarine plant development and testing work by the end of FY 1999.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- With the declining number of ships, the Navy's dependence on each ship grows as they are called upon to rapidly respond to crises world-wide. Nuclear-powered warships, which will continue to comprise 40% of the Navy's major combatants, offer significant advantages in dealing with widely dispersed crises and threats with fewer ships -- their stealth, firepower, versatility, virtually unlimited high-speed endurance, and independence from logistics support make these ships especially well-suited to the future missions of the Navy. For example, in a single six month period in 1995 the aircraft carrier USS THEODORE ROOSEVELT deployed to the Arabian Gulf to deal with renewed Iraqi threats; sailed to the Mediterranean to conduct exercises with our allies there; supported NATO's Deny Flight operation enforcing a no-fly zone over Yugoslavia; rushed to the Eastern Mediterranean to support Jordan against potential hostilities from Iraq; and rapidly returned to the Adriatic Sea in a show of force response to Bosnian Serb shelling of Sarajevo. The advantages nuclear power offers made this rapid response to diverse and distant dilemmas possible. Similarly, nuclear powered submarines are typically the first U.S. forces to arrive on scene. They reconnoiter and secure the area for following forces. In 1996, submarines were an essential component of the Navy force deployed to the Taiwan strait, chosen for their surveillance capabilities and specialized, hard-to-detect weaponry. The President also ordered two aircraft carriers to the Taiwan strait, the USS NIMITZ steaming from the Persian Gulf, and the USS INDEPENDENCE.

- Naval Reactors' careful engineering and approach to safety ensured the Program has never had a Naval nuclear accident or significant release of radioactivity to the environment. This environmental and safety record has endured over 40 years and has been essential to nuclear-powered warships safely steaming over 110 million miles. This accomplishment is the result of thorough development, testing, and analysis of cores, components, and systems; stringent quality standards and rigorous training; and detailed analysis of operating components/plants to verify expected performance. The former Soviet Navy's nuclear propulsion safety record offers a stark contrast — they suffered casualties because of risks and inadequacies the U.S. would not tolerate.

PROGRAM MISSION — NAVAL REACTORS (Cont'd)

- As the operating lives of Naval nuclear plants are extended beyond their original design lifetimes, Naval Reactors' efforts are intended to ensure these plants continue to perform safely and reliably. Careful, detailed validation and improvement efforts are necessary to support the Navy's decision to keep ships in service for up to 40-50 years vice original expectations.

- Continuing development efforts are yielding greater capabilities. Ongoing efforts in metallurgy, thermal hydraulics, manufacturing and chemical processes, physics, and nuclear design/analysis methods provide the base for future propulsion plant development and improvements to existing ones. Naval Reactors is investigating new structural materials, coolant chemistries, reactor plant arrangements, core configurations, manufacturing techniques, plant and facility monitoring equipment, and heat exchange methods. Features sought are enhanced power density, longer life, decreased weight, increased resilience, reduced corrosion, ease of operation, and affordability. Major efforts for the near future include upgrades to existing components and equipment to help extend operating ship lifetimes and improve overall reactor plant performance, and development/testing of the next generation reactor components and systems for the Navy's new attack submarine -- including the first true life-of-the-ship core, which will obviate the need for expensive refuelings, and the new concept steam generator, which should greatly reduce corrosion concerns.

- The Program's cost-saving initiatives have led to shutting down six of eight land-based prototype plants. Naval Reactors is inactivating and laying up the shutdown plants to place them in an environmentally benign state pending full dismantlement at some future date.

- In accordance with new Departmental guidance, this budget includes funds for contractor security clearances. The estimated FY 99 cost is $1.4M. Funding for federal clearances is to be provided by the Office of Security Affairs.

NAVAL REACTORS

PROGRAM FUNDING PROFILE

(Dollars in thousands)

	FY 97 Current Appropriation	FY 98 Original Appropriation	FY 98 Adjustments	FY 98 Current Appropriation	FY 99 Request
Naval Reactors Development					
Reactor Technology & Analysis	$ 194,000	$ 192,000	$	$ 192,000	$ 192,000
Materials Development & Verification	110,000	115,000		115,000	119,500
Plant Technology	116,000	112,900		112,900	111,100
Evaluation & Servicing	180,130	166,020		166,020	158,900
Program Direction	18,902	20,080		20,080	20,100
Facilities Operations	49,200	50,000		50,000	51,100
Subtotal, Operations & Maintenance	$ 668,232	$ 656,000		656,000	$ 652,700
Construction	13,700	14,500		14,500	12,800
Subtotal, Naval Reactors	$ 681,932	$ 670,500		670,500	$ 665,500
Adjustment a/		- 148		- 148	
TOTAL, Naval Reactors	$ 681,932	$ 670,352		670,352	$ 665,500

a/ Use of prior year balances

Public Law Authorizations:

P.L. 83-703, "Atomic Energy Act of 1954"

E.O. 12344 (42 U.S.C. 7158), "Naval Nuclear Propulsion Program"

NAVAL REACTORS
(Dollars in thousands)

PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 97 Current Appropriation	FY 98 Original Appropriation	FY 98 Adjustments	FY 98 Current Appropriation	FY 99 Budget Request
Bettis Atomic Power Laboratory	$ 339,400	$ 324,200		$ 324,200	$ 315,300
Idaho National Engineering & Environmental Lab	47,900	50,500		50,500	46,700
Idaho Operations Office	900	900		900	900
Knolls Atomic Power Laboratory	274,700	273,200		273,200	280,700
Pittsburgh Naval Reactors Office	5,500	5,800		5,800	6,000
Schenectady Naval Reactors Office	4,900	4,900		4,900	5,200
All Other	8,632	11,000		11,000	10,700
Subtotal	$ 681,932	$ 670,500		$ 670,500	$ 665,500
Adjustment a/	0	- 148		- 148	0
TOTAL	$ 681,932	$ 670,352		$ 670,352	$ 665,500

a/ Use of prior year balances

NAVAL REACTORS DEVELOPMENT

REACTOR TECHNOLOGY & ANALYSIS
(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals and Objectives: Ensures the continued safe operation of existing reactors, and develops new reactors with improved power capabilities, endurance, reliability and efficiency, and greater simplification. This is accomplished through development and analysis in the areas of nuclear physics, reactor configuration and design, analytical modeling, manufacturing, and inspection methods. Cost savings and waste reduction are achieved through improving and streamlining the manufacturing process. Thermal hydraulic and mechanical analyses are conducted to evaluate reactor performance and to verify and improve the accuracy of computer models which enable reactor optimization through improved predictive capabilities and reduced margin contingencies. Radiological control and monitoring efforts ensure development work does not have an adverse impact on personnel or the environment.

II. Funding Schedule:

Program Activity	FY 1997	FY 1998	FY 1999	$ Change	% Change
Reactor Technology and Analysis	$194,000	$192,000	$192,000	$ 0	0%

III. Performance Summary - Accomplishments:

	FY 1997	FY 1998	FY 1999
• Conduct planned development, testing and evaluation to ensure reactor plant service life meets Navy goals for extended warship operation: 50 years for aircraft carriers, 40 years for strategic submarines, and 30 years for attack submarines.			
- Develop and qualify improved core and reactor component designs to satisfy service life requirements. Work includes:			
Initiate shock and vibration testing of the next generation reactor mechanical test cell; evaluate variant core designs for increased heat capability; initiate conceptual design for prototype thermal-hydraulic test; and initiate analyses to validate advanced fleet reactor prototype operation to end of reactor life.	$ 64,000		

PERFORMANCE SUMMARY — REACTOR TECHNOLOGY & ANALYSIS (Cont'd)	FY 1997	FY 1998	FY 1999
Conduct shock and vibration testing of the next generation reactor mechanical test cell; test core design with improved heat capacity; develop detailed design of test program to qualify fluid mechanics and thermohydraulic models; and conduct end-of-life reactor systems performance analysis.		$ 61,000	
Test new next generation reactor features resulting from resolution of design process issues; initiate qualification of code and design procedures using thermal-hydraulic data; and conduct analysis to extend protection basis to end-of-life.			$ 58,000
- Analyze and test improved control drive mechanisms. Work includes:			
Perform lead unit control rod drive mechanism testing including life and thermal performance tests; conduct design/structural analysis validation and perform fitup and alignment studies of reactor equipment.	$ 33,000		
Test and resolve issues for extended life of control rod drive mechanisms; carry out design/structural analysis validation and continue fitup and alignment studies of reactor equipment; and conduct analysis of stress-strain relationships and cyclic loading.		$ 29,000	
Conduct control rod drive mechanism lead unit extended wear tests including life, thermal performance, shock and vibration testing; continue testing to resolve issues for extended life and update analytical tools based on analysis/test experience; and verify dynamic structural load calculations.			$ 28,000
- Evaluate and test core designs and manufacturing processes to confirm satisfactory performance through end of life. Work includes:			
Fabricate fuel test specimens to assess advanced fuel manufacturing process characteristics; develop ceramic /composite sealing and joining methods; and develop technology for an improved fuel system with reduced cost and minimized hazardous waste.	$ 18,000		

PERFORMANCE SUMMARY — REACTOR TECHNOLOGY & ANALYSIS (Cont'd)	FY 1997	FY 1998	FY 1999
Establish manufacturing capability to pilot advanced fuel process concepts; continue development of advanced fuel systems.		$ 20,000	
Conduct initial demonstration of the new fuel system manufacturing process; continue development of advanced fuel systems; and investigate new manufacturing and inspection technologies to reduce core cost and improve core operation.			$ 22,000
- Perform physics testing and analysis to confirm expected fuel system and core lifetime performance. Work includes:			
Continue analysis of advanced fleet reactor core physics testing; perform early-in-life qualification of the next generation reactor model based on comparisons of accumulated data with analytical predictions.	$ 9,000		
Analyze physics results from middle-of-life operation of the advanced fleet reactor prototype core; evaluate prototype middle-of-life measured data to expand model qualification base.		$ 10,000	
Evaluate advanced fleet reactor prototype physics data for the most reactive time in life.			$ 10,000
• Complete scheduled reactor and reactor plant analyses and analysis methods improvements to ensure the safety and reliability of the reactor plants in the Navy's nuclear powered warships so they can fulfill their national defense mission.			
- Improve reactor analysis methods for predicting core performance and reduce design approximations, uncertainties and associated conservatism. Work includes:			
Automate a common procedure for modeling both Monte Carlo and diffusion theory computations; perform core sizing studies and life study analysis to identify affordable core physics design concepts.	$ 10,000		
Achieve 4X improvement in speed for deterministic solution of neutron transport equation; establish core design concepts to support design basis decisions; and establish production level use of FY98 supercomputer.		$ 11,000	

PERFORMANCE SUMMARY — REACTOR TECHNOLOGY & ANALYSIS (Cont'd)	FY 1997	FY 1998	FY 1999
Achieve speed up factor of two in the Monte Carlo solution technique for the neutron transport equation; develop affordable core design concepts to support design basis; and program and verify a method for fine flux reconstruction in the 3D nodal model method.			$ 12,000
- Conduct reactor safety and shielding analyses for all nuclear cores to ensure containment of radiation and proper protection of personnel. Work includes:			
Develop code models and evaluate tests which support qualification of safety codes; evaluate no-lead primary shield design and alternatives for eliminating lead from shielding.	$ 10,000		
Improve analysis methods; continue no-lead shield design with evaluation of alternatives for eliminating lead from shielding.		$ 11,000	
Further develop analysis methods; continue no-lead shield design; develop radiation source data for shield design; and complete the CVN77 primary and secondary shield design.			$ 11,000
• Accomplish planned core and reactor component/system design and technology development efforts to support the Navy's acoustic requirements.			
- Develop and qualify improved core and reactor component designs. Work includes:			
Validate and qualify the advanced computational fluid dynamics code; evaluate potential improvements to enhance core power capability based on modified hydraulic design flow and power distribution test results.	$ 17,000		
Initiate model and code development and fundamental testing to extend the advanced computational fluid dynamics code; and evaluate application of modified hydraulic design code to future core designs.		$ 18,000	

PERFORMANCE SUMMARY — REACTOR TECHNOLOGY & ANALYSIS (Cont'd)	FY 1997	FY 1998	FY 1999
Develop model and perform fundamental testing for the application of the advanced computational fluid dynamics code to the safety and design areas; develop model and conduct testing for extension of modified hydraulic design code to future core designs; and develop standard testing for selected components.			$ 19,000
• Attain goal of zero personnel exceeding Federal limits for radiation exposure and no significant findings resulting form environmental inspections by state and federal regulators.			
- Conduct radiological control, environmental and safety operations necessary to protect laboratory employees, minimize release of hazardous effluents to the environment, and comply with all applicable regulations. Includes monitoring, surveys, training, procedures development and emergency response services.	$ 33,000	$ 32,000	$ 32,000
Total	$194,000	$192,000	$192,000

Explanation of Funding Changes FY 1998 to FY 1999:
Though the budget does not decrease in then-year terms, the effects of inflation cause a 3% decline ($5M) which reflects progress on new plant development work.

NAVAL REACTORS DEVELOPMENT

PLANT TECHNOLOGY

(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals and Objectives: Development, testing, and analysis of improved components and systems which transfer, convert, control, and measure power created by the reactor. Work focuses on reducing life cycle costs while enhancing reliability, efficiency, and operational performance by evaluating existing components, integrating new technologies into current and new equipment designs and systems, and demonstrating concepts through testing. Key areas include steam generator technology; instrumentation and control technology; plant arrangement and component development; and primary chemistry and plant performance.

II. Funding Schedule:

Program Activity	FY 1997	FY1998	FY 1999	$ Change	% Change
Plant Technology	$ 116,000	$ 112,900	$ 111,100	- $ 1,800	- 2%

III. Performance Summary - Accomplishments:

	FY 1997	FY 1998	FY 1999
• Conduct planned development, testing and evaluation to ensure reactor plant service life to meets Navy goals for extended warship operation: about 50 years for aircraft carriers, 40 years for strategic submarines, and 30 years for attack submarines.			
- Ensure satisfactory reactor plant operation throughout life and improve steam generator, heat transfer, and chemistry technology to enhance performance and reduce operating costs. Work includes:			
Perform testing of scaled steam generator units and in-plant monitoring devices to improve thermal-hydraulic performance; conduct 1,500 hours of a 30,000 hour test; fabricate the new concept steam generator manufacturing demonstration unit; and perform heat source to energy conversion testing to assess power conversion concepts.	$ 37,000		

PERFORMANCE SUMMARY — PLANT TECHNOLOGY (Cont'd)	FY 1997	FY 1998	FY 1999
Test steam generator performance and commence design of advanced in-plant monitors for fleet use; complete an estimated 6,500 more hours of a 30,000 hour test; complete manufacturing demonstration unit full assembly and prepare for performance testing; and evaluate and test power conversion concepts to confirm efficiency.		$ 35,000	
Perform steam generator thermal-hydraulic testing and continue design and testing of in-plant monitors; continue validation of data by performing about 14,500 cumulative hours of a 30,000 hour chemistry test; perform structural and functional analysis of the demonstration unit to address technical issues arising during performance testing; and develop power conversion technologies.			$ 33,000
- Develop instrumentation and power distribution equipment to replace obsolete equipment, improve reliability and performance, and reduce development time for future specific ship class applications. Work includes:			
Begin testing of standardized instrumentation and control engineering models; fabricate and begin qualification of plant monitoring equipment.	$ 45,000		
Modify standardized instrumentation and control design to incorporate lessons learned from testing programs and begin design and development of qualification hardware; continue qualification testing of plant equipment.		$ 46,000	
Design standardized instrumentation and control qualification hardware and initiate development of qualification software; evaluate results of plant monitoring equipment qualification testing and incorporate changes for shipboard design as necessary.			$ 41,000
- Develop and test reactor plant components and component technologies which address known limitations and improve performance and reliability of components. Work includes:			
Analyze next generation reactor components and arrangements to resolve emergent design problems; design and develop replacement components for use in existing plants.	$ 26,000		

PERFORMANCE SUMMARY — PLANT TECHNOLOGY (Cont'd)	FY 1997	FY 1998	FY 1999
Conduct next generation plant qualification testing.		$ 23,000	
Evaluate fluid system designs to improve flow and efficiency in reactor plants; develop technologies having potential for increased power, efficiency, reliability and affordability.			$ 28,000
• Complete scheduled reactor and reactor plant analyses and analysis methods improvements to ensure safety and reliability of the reactor plants in the Navy's nuclear powered warships so they can fulfill their national defense mission.			
- Perform reactor plant analyses to assure safe operation and reduce corrosion and plant radiation levels. Work includes:			
Initiate protection analysis necessary for extended-life operation of the advanced fleet reactor; and develop design basis for next generation reactor performance analysis.	$ 8,000		
Conduct protection analyses for extended-life advanced fleet reactor core operations; and initiate reactor system protection analysis for next generation reactor.		$ 9,000	
Continue protection analysis of advanced fleet reactor core and resolve emergent issue during initial fleet operation; and perform next generation reactor protection analysis and develop design basis analyses for normal operating procedures.			$ 9,000
Total (numbers may not add due to rounding)	$116,000	$112,900	$111,100

Explanation of Funding Changes FY 1998 to FY 1999:

The $1,800,000 decrease reflects further progress on new plant development work.

NAVAL REACTORS DEVELOPMENT

MATERIALS DEVELOPMENT & VERIFICATION

(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals and Objectives: Provide high performance materials necessary for Naval reactor applications. The harsh environment existing in an operating nuclear reactor demands materials which can maintain their structural and mechanical integrity up to fifty years, while being subjected to high temperatures, high pressures, and corrosion. Meeting this demand requires testing and analysis of nuclear fuel, poison, cladding, structural and component materials. Efforts focus on verifying the safe performance of existing materials over a component's lifetime and identifying new applications for these materials. Work is also aimed at developing and qualifying materials with improved performance capabilities -- such as increased strength, endurance at high temperature, or enhanced corrosion resistance -- which will improve plant integrity and open new design opportunities. Quality control is an integral part of all materials work, and manufacturing processes are developed and refined to ensure materials are produced efficiently and to stringent specifications.

II. Funding Schedule:

Program Activity	FY 1997	FY 1998	FY1999	$ Change	% Change
Materials Development and Verification	$ 110,000	$ 115,000	$ 119,500	+ $ 4,500	+ 4%

III. Performance Summary - Accomplishments:

	FY 1997	FY 1998	FY 1999
• Conduct planned development, testing and evaluation to ensure reactor plant service life to meets Navy goals for extended warship operation: about 50 years for aircraft carriers, 40 years for strategic submarines, and 30 years for attack submarines.			
- Test and evaluate core and reactor structural materials to verify acceptable performance throughout life, and at accelerated rates to reduce uncertainty and identify potential problems quickly. Develop improved predictive capabilities and materials given operating experience or testing results. Work includes:			
Conduct post-irradiation testing to support new stress corrosion cracking predictive models; develop a method to reduce fuel processing costs and environmental wastes; and develop candidate materials capable of reliable performance at higher temperatures.	$ 33,000		

PERFORMANCE SUMMARY — MATERIALS DEVELOPMENT & VERIFICATION (Cont'd)	FY 1997	FY 1998	FY 1999
Complete initial phase of post irradiated crack growth rate testing of X750 and Aged 625 materials; analyze materials endurance at higher temperatures; and evaluate environmental test results of an alternate weld filler material for improved welding of A690.		$ 37,000	
Complete post irradiation crack growth rate testing to determine effect of fluence on stress corrosion cracking resistance of A625 and X750 fastener materials; conduct initial confirmation of structural materials and fuel systems for higher performance reactors; and complete environmental testing of EN82H weld material.			$ 41,000
- Test and evaluate plant materials to characterize effects of the harsh operating environment and qualify improved materials and processes to ensure endurance requirements will be met. Work includes:			
Develop predictive models and conduct confirmatory testing to determine factors contributing to stress corrosion cracking; qualify an improved welding process for use in reactor vessels; and conduct destructive and non-destructive examinations of component samples removed from operating plants.	$ 40,000		
Refine the stress corrosion cracking model to include corrosion resistant materials; perform post irradiations testing of reactor vessel material for characteristics such as embrittlement and fracture toughness; and examine components removed from operating plants to obtain data on irradiation effects.		$ 40,000	
Complete preliminary version of a model for stress corrosion crack advance; continue testing to develop understanding of environmentally assisted cracking in pressure vessel steels and qualify material for pressure vessel application; and perform materials examinations on components removed from operating plants to obtain performance data.			$ 39,000

PERFORMANCE SUMMARY — MATERIALS DEVELOPMENT & VERIFICATION (Cont'd)	FY 1997	FY 1998	FY 1999
- Conduct reactor and reactor plant testing under operating conditions and correlate performance with predictions.			
Irradiate material test specimens to provide for prototypical analyses of material behavior in a reactor environment, including designing and preparing test trains, irradiating specimens, and conducting post-irradiations destructive and non-destructive testing.	$ 37,000	$ 38,000	$ 39,500
Total	$110,000	$115,000	$119,500

Explanation of Funding Changes FY 1998 to FY 1999:

The $4,500,000 increase reflects primarily an allowance for inflation necessary to maintain the appropriate level of materials analysis and testing as ships are kept in service longer, and materials are called upon to perform safely and reliably over longer time periods.

NAVAL REACTORS DEVELOPMENT

EVALUATION & SERVICING

(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals and Objectives: Evaluation and servicing work encompasses the operation, maintenance, and servicing of land-based Naval nuclear propulsion plants, the examination of expended cores to validate end-of-life predictions, and the preservation of environmental quality at all Naval Reactors' sites. Information obtained provides valuable feedback for designing new cores and supporting operating fleet reactor plants. Testing of materials, components, cores, and systems in these reactor plants provides important technical data and experience under actual operating conditions.

The accumulation of operational data on reactor plants and increases in the capability of computer reactor plant modeling have enabled Naval Reactors to shut down six of the Program's eight test reactor plants resulting in substantial cost savings. Work in this budget is aimed at inactivating and laying up the shutdown plants to place them in an environmentally benign state pending full dismantlement at some future date.

II. Funding Schedule:

Program Activity	FY 1997	FY 1998	FY 1999	$ Change	% Change
Evaluation & Servicing	$ 180,130	$ 166,020	$ 158,900	- $ 7,120	- 4%

III. Performance Summary - Accomplishments:

	FY 1997	FY 1998	FY 1999
• Meet cost and schedule goals to safely and responsibly inactivate six shutdown test reactor plants in support of the Department's environmental clean-up goals.			
- Continue inactivation work, including:			
Perform S3G test reactor off hull systems and engine room removal and cease inactivation efforts, conducting partial reactor plant dismantlement.	$ 7,000	$ 5,000	$ 3,000

PERFORMANCE SUMMARY— EVALUATION & SERVICING (Cont'd)	FY 1997	FY 1998	FY 1999
Perform off hull system and engine room structures removal at S1C. Continue demolishing remaining Windsor site buildings and removing underground structures. Begin preparations for disposal of the pressure vessel and dismantlement of the reactor compartment.	$ 17,000	$ 26,000	$ 22,000
Defuel the D1G test reactor plant and cease inactivation efforts, conducting partial dismantlement.	$ 23,000	$ 10,000	$ 10,000
Defuel A1W-B, complete preparations for and commence defueling of A1W-A test reactor plant, and perform limited related inactivation activities;	$ 26,000	$ 20,000	$ 21,000
Defuel the S5G test reactor plant and perform limited related inactivation activities;	$ 14,000	$ 11,000	$ 1,000
Develop test reactor defueling and servicing systems;	$ 9,000	$ 9,000	$ 2,000
• Maintain a utilization factor of at least 90% for prototype plants, ensuring their availability for scheduled testing, training and servicing.			
- Operate and service land-based test reactor plants to provide for prototypical testing, reactor plant operator training, and core depletion analysis.			
Operate the MARF and S8G test reactor plants to deplete their test cores and for training at a utilization factor greater than 90% and perform core depletion of approximately 5000 effective full power hours per year;	$ 27,000	$ 29,000	$ 31,000
Perform yearly preventative and corrective maintenance on operating test reactors to ensure continued safe operation, perform periodic major servicings including steam generator cleanings and inspections, and continue to develop and refine servicing equipment and techniques.	$ 2,000	$ 2,000	$ 12,000

PERFORMANCE SUMMARY — EVALUATION & SERVICING (Cont'd)	FY 1997	FY 1998	FY 1999
Continue efficient operation of the Advanced Test Reactor;	$ 15,000	$ 15,000	$ 16,000
- Examine removed fuel cells at the end of life to confirm predicted performance and validate design methods.	$ 14,000	$ 14,000	$ 16,000
• Attain goal of zero personnel exceeding Federal limits for radiation exposure and no significant findings resulting from environmental inspections by state and federal regulators.			
- Conduct ongoing clean-up of test facilities to reduce hazards to personnel, and reduce potential liabilities due to changing conditions or accidental releases. Includes clean-up of asbestos, heavy metals, chemicals or radioactivity, and handling of special nuclear materials.	$ 26,000	$ 25,000	$ 25,000
Total (numbers may not add due to rounding)	$180,130	$166,020	$158,900

Explanation of Funding Changes FY 1998 to FY 1999:
The $7,120,000 decrease reflects a reduction in inactivation work on the shutdown prototype reactor plants.

DEPARTMENT OF ENERGY
FY99 CONGRESSIONAL BUDGET REQUEST
OTHER DEFENSE ACTIVITIES
(Tabular dollars in thousands, Narrative in whole dollars)

NAVAL REACTORS PROGRAM DIRECTION

I. Mission Supporting Goals/Ongoing Responsibilities:

Due to the critical nature of nuclear reactor work, Naval Reactors is a centrally-managed organization. This places a heavy burden on the Federal employees who oversee and set policies/procedures for developing new reactor plants, operating existing nuclear plants, facilities supporting these plants, contractors, and the Bettis and Knolls Atomic Power Laboratories, as well as interface with other DOE offices and local, state, and Federal regulatory agencies. 10 FTE's at the Idaho Operations Office oversee operation of the advanced test reactor, which Naval Reactors uses for materials irradiation and testing. Program direction has been grouped into four categories:

Salaries and Benefits provides for Federal personnel compensation, including awards, lump sum leave payments, and employer contribution to employees' benefits.

Travel includes necessary trips to our various sites to carry out the mission of the Naval Reactors Program.

Support Services are not used by Naval Reactors.

Other Related Expenses include training, building occupancy, telecommunications, postage, payroll outsourcing, ADP maintenance, and other miscellaneous expenses associated with the Working Capital Fund, and Program operation.

II. Funding Table:

	FY1997 Current Appropriation	FY1998 Original Appropriation	FY1998 Adjustments	FY1998 Current Appropriation	FY1999 Budget Request
Headquarters					
Salary and Benefits	7,010	7,190		7,190	6,935
Travel	490	490		490	500
Support Services	0	0		0	0
Other Related Expenses	132	820		820	650
Total	7,632	8,500		8,500	8,085
Full Time Equivalents	54*	57		57	57
Pittsburgh Naval Reactors					
Salary and Benefits	4,800	5,020		5,020	5,170
Travel	100	100		100	105
Support Services	0	0		0	0
Other Related Expenses	640	660		660	685
Total	5,540	5,780		5,780	5,960
Full Time Equivalents	68*	73		73	72
Schenectady Naval Reactors					
Salary and Benefits	4,205	4,400		4,400	4,555
Travel	80	80		80	85
Support Services	0	0		0	0
Other Related Expenses	575	420		420	490
Total	4,860	4,900		4,900	5,130
Full Time Equivalents	65*	67		67	65

* NOTE: FY 97 Full Time Equivalents shown represent actual employees on board on 9/30/97.

II. Funding Table: (continued)

	FY1997 Current Appropriation	FY1998 Original Appropriation	FY1998 Adjustments	FY1998 Current Appropriation	FY1999 Budget Request
Idaho Operations Office					
Salary and Benefits	830	855		855	880
Travel	30	30		30	30
Support Services	0	0		0	0
Other Related Expenses	10	15		15	15
Total	870	900		900	925
Full Time Equivalents	10	10		10	10
Total Naval Reactors Program					
Salary and Benefits	16,845	17,465		17,465	17,540
Travel	700	700		700	720
Support Services	0	0		0	0
Other Related Expenses	1,357	1,915		1,915	1,840
Total	18,902	20,080		20,080	20,100
Full Time Equivalents	209	207		207	204

III. **Performance Summary**:	FY 1997	FY 1998	FY1999
Salaries and Benefits: Federal Staff continue to direct technical work, provide management/oversight of laboratories and facilities to ensure safe and reliable operation of Naval nuclear plants and the advanced test reactor.	16,845	17,465	17,540
Travel: FY 1999 funding supports trips required to provide management and oversight of the Naval Reactors Program.	700	700	720
Support Services: Naval Reactors does not have any Support Services contracts.	0	0	0
Other Related Expenses: FY's 1998 and 1999 include provision for Working Capital funds which were predominantly budgeted for by the Office of Nuclear Energy in FY 1997. Funding also supports training, and ADP maintenance.	1,357	1,915	1,840

IV. Explanation of Funding Changes FY 1998 to FY 1999:

Salaries and Benefits:

Increase due to salary adjustments in accordance with allowable inflation, offset by reduced staffing of three FTE's from FY 1998-1999. Staffing reductions are being achieved through attrition and buyouts.

Travel:

Increase due to allowable inflation.

Other Related Expenses:

Decreases reflect a decrease in Working Capital Fund expenses due to more accurate estimates from Human Resources, offset by necessary upgrades and replacements to ADP systems, as well as inflation.

● **Other Related Expenses:** FY98-99 decrease is primarily due a decrease in Working Capital Fund expenses due to more accurate estimates from Human Resources, offset by necessary upgrades and replacements to ADP systems, as well as inflation.

Other Related Expenses	FY1997 ($000)	FY1998 ($000)	FY1999 ($000)	FY 1999/ FY 1998 Change ($000)
Training	115	118	122	4
Working Capital Fund	32	720	550	-170
Printing and Reproduction	15	15	15	0
Rental Space	48	49	50	1
Software Procurement/Maintenance Activities/ Capital Acquisitions	486	350	392	42
Other	661	663	711	48
Total	1,357	1,915	1,840	-75

NAVAL REACTORS DEVELOPMENT
CAPITAL OPERATING EXPENSES & CONSTRUCTION SUMMARY

Capital Operating Expenses	FY 1997	FY 1998	FY 1999	$ Change	% Change
Capital Equipment (total)	$ 41,000	$ 41,000	$ 42,100	$ +1,100	+3%
GPP (total)	8,200	9,000	9,000	0	0%
Project Related Costs					
Other Project-Related Costs	$ 700	$ 486	$ 500		

Construction Project Summary

Project Number	Project Title	TEC	Previous Approp.	FY 1997 Approp .	FY 1998 Approp.	FY 1999 Request	FY 00 - 02 Advanced Approp Rqst
98-D-200	Site Laboratory/Facility Upgrade, Various Locations	15,700	0	0	5,700	7,000	3,000
97-D-201	ATR Secondary Coolant System Refurbishment, INEL	5,000	0	400	4,600	0	0
95-D-200	Laboratory Systems and Hot Cell Upgrades, Various Locations	19,600	13,700	4,800	1,100	0	0
95-D-201	ATR Radioactive Waste System Upgrades, INEL	6,000	5,500	500	0	0	0
90-N-102	Expended Core Facility Dry Cell, Bettis	84,946	39,146	8,000	3,100	5,800	28,900
Total Naval Reactors Major Construction		$ 131,246	$ 58,346	$ 13,700	$ 14,500	$ 12,800	$ 31,900

CAPITAL OPERATING EXPENSES & CONSTRUCTION SUMMARY - NAVAL REACTORS (Cont'd)

Detailed Breakouts

Other Project-Related Costs (Op. Exp. Funded) Exceeding $3 Million	Previous Approp.	FY 1997 Approp.	FY 1998 Request	FY 1999 Request
1 ECF Dry Cell/Bettis: Environmental Doc., D&D, Other Project	$ 3,245	$ 700	$ 486	$ 500
Total (enter amount on page one)	$ 3,245	$ 700	$ 486	$ 500

Major Items of Equipment (CE $2 Million and Above)	TEC	Previous Approp.	FY 1997 Approp.	FY 1998 Approp.	FY 1999 Request
1. ATR-ECF Transfer Casks	$ 9,100	$ 2,900	$ 4,100	$ 1,100	$ 1,000
2. Corrosion/Chemistry Test Equipment Upgrade	$ 5,800	$ 3,300	$ 1,400	$ 1,100	
3. Next Generation Scalable Supercomputers	$ 8,000		$ 8,000		
4. Post-Irradiations Evaluation Laboratory	$ 7,400		$ 1,400	$ 3,000	$ 3,000
5. Thermal-Hydraulic Test Equipment	$ 2,900		$ 100	$ 200	$ 1,100
6. Component Performance Test Facility Upgrade	$ 2,100		$ 800	$ 1,300	
7. Test Facility Upgrades	$ 5,700			$ 5,000	$ 700
8. Scalable Parallel Computers	$ 12,000			$12,000	
9. Local Area Network Replacement	$ 4,900			$ 500	$ 1,000
10. Scalable Parallel Upgrade	$ 12,000				$ 12,000
11. Metal Processing Equipment	$ 4,200				$ 2,500
Total			$ 15,800	$24,200	$ 21,300

DEPARTMENT OF ENERGY
FY 1999 CONGRESSIONAL BUDGET REQUEST
OTHER DEFENSE ACTIVITIES
(Dollars in Thousands)

PROPRIETARY RECEIPT ESTIMATES

Naval Reactors

Departmental Administration	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002
Fuel Burnup	$11,700	$12,500	$11,300	$10,400	$10,000	$ 9,600
Residual Fuel	6,200	8,200	11,700	9,500	1,800	$19,200
Idaho Chemical Processing Plant	11,400	10,000	12,300	11,000	9,400	$ 8,500
TOTAL	$29,300	$30,700	$35,300	$30,900	$21,200	$37,300

Note: The estimates shown above are projections only; they are subject to variation if fleet overhaul/defueling schedules change and/or if the value of residual uranium in expended Navy cores differs from predicted amounts.

DEPARTMENT OF ENERGY
FY 1999 CONGRESSIONAL BUDGET REQUEST
(Changes from FY 1998 Congressional Budget Request are denoted with a vertical line in left margin.)

OTHER DEFENSE ACTIVITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

NAVAL REACTORS DEVELOPMENT

1. Project Title and Location: Site Laboratory and Facilities Upgrade Project, Various Locations

2a. Project Number: 98-D-200
2b. Construction Funded

	Preliminary Schedule	Title I Baseline	Current Baseline Schedule
3a.Date A-E Work Initiated, (Title I Design Start Scheduled):	1st Qtr. FY 1998		
3b.A-E Work (Titles I & II) Duration:	10 months		
4a.Date Physical Construction Starts:	1st Qtr. FY 1999		
4b.Date Construction Ends:	4th Qtr. FY 2001		
	Preliminary Estimate	**Title I Baseline**	**Current Baseline Estimate**
5.Total Estimated Cost (TEC) --	$15,700		
6.Total Project Cost (TPC) --	$18,660		

7.Financial Schedule (Federal Funds):

Fiscal Year	Appropriation	Adjustments	Obligations	Costs
1998	$5,700	$0	$5,700	$1,161
1999	7,000	0	7,000	9,565
2000	3,000	0	3,000	4,574
2001	0	0	0	400

1. Project Title and Location: Site Laboratory and Facilities Upgrade Project Various Locations

2a. Project Number: 98-D-200
2b. Construction Funded

8. Project Description, Justification, and Scope

The Site Laboratory and Facilities Upgrade project will upgrade various support systems and facilities at the Bettis Atomic Laboratory in West Mifflin, PA and the Knolls Atomic Power Laboratory in Schenectady, NY. The following are the principal areas.

Upgrading materials and chemistry facilities at both laboratories to develop, test, and evaluate high temperature advanced metals, metal and ceramic alloys; analyze and certify the quality of nuclear fuel; and improve radioactive specimen preparation and examination work.

At the Knolls Site existing space will be upgraded to include new energy efficient lighting, new heating, ventilation, and air conditioning systems, and energy efficient windows. A shielded sample storage area, containments and hoods, glove boxes, and a transmission electron microscope will be installed for preparation of radioactive test samples. Examination of these samples is needed to support core and structural materials work. An inductively coupled plasma mass spectrometer will be installed to determine trace element composition at levels 10 to 50 times lower than present capability.

At the Bettis site about 5,000 square feet of existing space will be upgraded to include installation of new heating, ventilation and air conditioning equipment, high efficiency/alternating current melting furnaces for high temperature alloy fabrication, powder metallurgy equipment for fabrication of ceramic and metallic materials, and materials evaluation equipment for analyzing the mechanical, chemical, and material properties of the developed materials.

Replacing the main outdoor substation at the Bettis laboratory which is approaching 50 years of age. The normal useful life for a substation is 30 years. Replacement is necessary to maintain a reliable source of electrical power distribution at the site. Also, projected increased power demands to support development and testing programs require an increased in the load capacity of the substation.

The Bettis-Pittsburgh site distributes all electrical power received from the local utility company through the existing main outdoor substation which consists of four 23,000 volt transformers, three 23,000 volt circuit breakers, aerial switches and lightning protectors, and 13,200 volt circuit breakers and switchgear. The upgraded main outdoor substation will replace

8.Project Description, Justification, and Scope(continued)

the existing transformers and switchgear with 138,000 volt equipment. The modern switch gear will use vacuum breaker technology. Land improvements include grading of a 34,000 square foot plot of ground, installation of fencing and structural supports, and installation of a 200 foot access road.

9. Details of Cost Estimate	Item Cost	Total Cost
a. Design Phase		$852
(1) Preliminary and Final Design costs, (Design, Drawings, and Specs)	$708	
(2) Design Management Costs @ 20% of a. (1)	144	
b. Construction Phase		13,050
(1) Land and Land Rights	$0	
(2) Buildings and Improvements to Land	2,093	
(3) Specialized Equipment	1,125	
(4) Other Structures	2,366	
(5) Utilities	3,191	
(6) Standard Equipment	3,060	
(7) Major Computer Items	0	
(8) Removal Cost Less Salvage	80	
(9) Inspection, Design and Project Liaison, Testing, Checkout	165	
(10) Construction Management @ 6% of b.	750	
(11) Project Management @ 2% of b.	220	
c. Contingencies at approximately 13% of above costs		1,798
(1) Design Phase	135	
(2) Construction Phase	1,663	
d. Total line item cost (section 11.a.1.(a))		$ 15,700
e. LESS: Non-agency contribution (Define in Section 12)		$0
f. Total Agency Requirement (TEC)		$15,700

10. Method of Performance

Contracting arrangements are as follows:
a. Construction design will be performed under an Engineering Services subcontract. Equipment will be designed by the operating contractor.
b. Construction and procurement will be accomplished by fixed price contracts awarded on the basis of competitive bidding.
c. Title III Inspection: By operating contractor surveillance supported as required by the Engineering Services subcontractor.

11. Schedule of Project Funding and Other Related Funding Requirements

	Previous Years	FY 1997	FY 1998	FY 1999	Outyears	Total
a. Total Project costs						
1. Total Facility Costs						
(a) Line Item (Section 9)		$0	$0	$1,161	$9,565	$4,974 $15,700
(b) Plant Engineering and Design	0	0	0 0		0 0	0
(c) Operating Expense Funded Equipment		0	0	0	0	0 0
(d) Inventories		0	0	0	0	0 0
(e) Total Facility Cost		0	0	$1,161	$9,565	$4,974 $15,700
2. Other Project Costs						
(a) R&D necessary to complete project		$0	$0	$0	$0	$0 $0
(b) Conceptual Design Costs		0	260	0	0	0 260
(c) Decontamination and Decommissioning		0	500	1,200	700	300 2,700
(d) NEPA Documentation Costs		0	0	0	0	0 0
(e) Other ES&H costs		0	0	0	0	0 0
(f) Other project related costs		0	0	0	0	0 0
(g) Total other project costs		$0	$760	$1,200	$700	$300 $2,960
Total Project Costs		$0	$760	$2,361	$10,265	$5,274 $18,660
3. LESS Non-Federal Contribution		0	0	0	0	0 0
Net Federal Total Project Cost (TPC)		$0	$760	$2,361	$10,265	$5,274 $18,660

11. Schedule of Project Funding and Other Related Funding Requirements(continued)

b. Related Annual Funding (estimated life of project - 30 years)

1. Facility operating costs	$400
2. Facility maintenance costs	10
3. Programmatic operating expenses	500
4. Capital Equipment not related to construction	200
5. GPP or Other Construction related to the programmatic efforts in the facility	0
6. Utility Costs	380
7. Other Costs	0
Total Related Annual Funding	$1,490

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total Project Costs
1. Total Facility Costs
(a) Line item - Narrative not required
(b) PE&D - None.
(c) Expense Funded Equipment - None
(d) Inventories - None
(e) Non Federal Contribution - None
2. Other Project Costs
(a) R&D necessary to complete construction - None.
(b) Conceptual Design - Narrative not required.
(c) Decontamination and Decommissioning - Radiological decontamination and hazardous material remediation
(d) NEPA Documentation costs - None
(e) Other ES&H Costs - None
(f) Other Project Related Costs - None.

b. Related Annual Costs - The facilities are expected to be used 30 years for their intended purposes.
1. Facility Operating Costs - Major elements comprising the annual operating costs are maintenance items such as utility lines, valves, piping, instrumentation, pumps, motors, and support systems
2. Programmatic operating expenses - based on labor cost for operators
3. Capital Equipment not related to construction - includes replacement of selected equipment on a 5 to 15 year cycle
4. Utility Costs - Based on current usage projection.

13. Design and Construction of Federal Facilities

All DOE facilities are designed and constructed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and DOE Orders. The TEC of the project includes the cost of measures necessary to assure compliance with Executive Order 12088, "Federal Compliance with Pollution Control Standards"; Section 19 of the Occupational Safety and Health Act of 1970, the provisions of Executive Order 12196, and the related Safety and Health provisions for Federal Employees (CFR Title 29, Chapter XVII; Part 1960); and the Architectural Barriers Act, Public Law 90-480, and implementing instructions in 41 CFR 101-19.6.

This project will be located in areas not subject to flooding determined in accordance with Executive Order 11988.

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OTHER DEFENSE ACTIVITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

NAVAL REACTORS DEVELOPMENT

1. Project Title and Location: Expended Core Facility Dry Cell Project Naval Reactors Facility, Idaho	2a. Project Number: 90-N-102 2b. Construction Funded

SIGNIFICANT CHANGES

- A June 1993 court injunction stopped work on the ECF Dry Cell Project until an agreement was reached in October 1995 between the State of Idaho and the Department of Energy. At that time the project was rebaselined to reflect the current Dry Cell Task completion date of fourth quarter 1998.

- The October 1995 agreement also precludes wet storage of spent nuclear fuel at the Idaho National Engineering and Environmental Laboratory. Naval Reactors determined construction of a dry loading facility would be necessary to comply with this requirement for Naval spent nuclear fuel. The most efficient fuel handling arrangement and the most cost effective means to provide dry loading capability for Naval spent nuclear fuel at the Expended Core Facility (ECF) was to modify the dry cell project to include additional equipment and space needed for dry loading, handling, and temporary storage of spent nuclear fuel. As a result, Naval Reactors FY 1998 budget request modified the Dry Cell project to include a dry loading station as the East End Modification task.

- An environmental impact statement (EIS) for the selection of a container system to be used for management of naval spent nuclear fuel was issued in November, 1996. Based on the findings of this EIS, a record of decision was issued in April, 1997 which determined return of Naval spent nuclear fuel currently stored in water pits at the Idaho Chemical Processing Plant to ECF for loading into dry storage containers and temporary storage was the preferred course of action. This decision results in the need to add a second dry loading station, the West End Modification task, to allow timely transfer of the spent fuel.

- As a result, the total estimated cost increases $22,900,000 from $62,046,000 to $84,946,000.

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OTHER DEFENSE ACTIVITIES
(Tabular dollars in thousands. Narrative material in whole dollars.)

NAVAL REACTORS DEVELOPMENT

1. Project Title and Location: Expended Core Facility
Dry Cell Project
Naval Reactors Facility, Idaho

2a. Project Number: 90-N-102
2b. Construction Funded

	Preliminary	Title I Baseline	Current Baseline
3.a. Date A-E Work Initiated, (Title I Design Start Scheduled):			
Dry Cell Task	1st Qtr. FY 1990	1st Qtr. FY 1990	1st Qtr. FY 1990
East End Modification Task	1st Qtr. FY 1998	N/A	N/A
West End Modification Task	1st Qtr. FY 1999	N/A	N/A
3.b. A-E Work (Title I & II) Duration:			
Dry Cell Task	16 Months	21 Months	21 Months
East End Modification Task	18 Months	N/A	N/A
West End Modification Task	18 Months	N/A	N/A
4.a. Date Physical Construction Starts:			
Dry Cell Task	3rd Qtr. FY 1991	3rd Qtr. FY 1991	2nd Qtr. FY 1993
East End Modification Task	1st Qtr. FY 2000	N/A	N/A
West End Modification Task	1st Qtr. FY 2001	N/A	N/A
4.b. Date Construction Ends:			
Dry Cell Task	4th Qtr. FY 1995	4th Qtr. FY 1995	4th Qtr. FY 1998[(1)]
East End Modification Task	4th Qtr. FY 2001	N/A	N/A
West End Modification Task	4th Qtr. FY 2002	N/A	N/A

[(1)] Due to duration of spent fuel injunction.

1. Project Title and Location: Expended Core Facility
Dry Cell Project
Naval Reactors Facility, Idaho

2a. Project Number: 90-N-102
2b. Construction Funded

	Preliminary	Title I Baseline	Current Baseline
5.[1] Total Estimated Cost (TEC):			
Dry Cell Task	$48,000	$48,000	$48,646
East End Modification Task	$13,400	N/A	N/A
West End Modification Task	$22,900	N/A	N/A
6.[2] Total Project Cost (TPC):			
Dry Cell Task	$49,936	$49,936	$51,027
East End Modification Task	$28,577	N/A	N/A
West End Modification Task	$16,513	N/A	N/A

(1) The overall project TEC is derived from the current Baseline for the Dry Cell task, the preliminary cost estimates for the East End Modification task, and the preliminary cost estimates for the West End Modification task.

(2) The Total Project Cost (TPC) for the overall project is derived from the current Baseline for the Dry Cell task, the preliminary cost estimates for the East End Modification task, and the preliminary cost estimates for the West End Modification task.

7. Financial Schedule (Federal Funds):

Fiscal Year	Appropriation	Adjustments	Obligations	Costs
1990	$3,546	$0	$3,546	$1,564
1991	4,000	0	4,000	3,129
1992	15,000	0	15,000	4,238
1993	13,600	0	13,600	10,078
1994	0	0	0	2,410
1995	0	0	0	555
1996	3,000	0	3,000	7,557
1997	8,000	0	8,000	13,908
1998	3,100	0	3,100	5,878
1999	5,800	0	5,800	3,538
2000	10,100	0	10,100	10,802
2001	13,400	0	13,400	9,321
2002	5,400	0	5,400	11,968

1. Project Title and Location:	Expended Core Facility Dry Cell Project Naval Reactors Facility, Idaho	2a. Project Number: 90-N-102 2b. Construction Funded

8. Project Description, Justification, and Scope

The Expended Core Facility (ECF) Dry Cell Project will consist of a dry shielded fuel handling, disassembly, examination and loading facility, a decontamination shop, and a shielded repair shop, equipment to load spent fuel in dry storage containers, an area for overpack assembly, and an interim storage pad. Two dry storage container loading stations will be constructed, one at the east end and one at the west end of the shielded cell. The shielded facility and shops will be located in the existing ECF building South Bay and will be connected to the existing ECF water pits. The west end loading station, a fuel receipt transfer bay, spares storage, control room, and a mockup training area will be included as an approximately 22,300 square foot addition to the west and south of the existing 215,000 square foot ECF building. The addition will be of concrete and steel construction, steel reinforced concrete floor, and metal deck roof with a built-up elastomeric covering. A temporary shield wall will be constructed at the west end of the repair cell to provide for expansion of the shielded cell for the west end dry loading station in parallel with fuel handling operations in the east end loading station.

The dry shielded facility design will incorporate high density concrete radiation shielding and highly filtered air ventilation for radiological contamination control. Shielded lead glass windows and viewing aids will be provided at the various stations. The facility will include automated equipment for fuel module disassembly, examination, and interim dry storage. Features of the production line include the water pit to dry cell delivery system, the examination system, the cutting system for separation of modules, and the prepared fuel loading station. The dry (unmoderated) environment of the hot cell allows efficient material handling with a high degree of safety. The dry cell and interim storage pad will have a design life of 40 years.

The Dry Cell Project consists of three separate tasks: the Dry Cell task; the East End Modification task; and the West End Modification task.

The Dry Cell task provides work areas and equipment needed to more efficiently handle expended nuclear cores. Existing ECF underwater equipment was not capable of handling the larger and heavier modules now received at ECF. These underwater fuel disposal methods are personnel intensive and have significant technical disadvantages. These technical disadvantages include extremely difficult equipment and facility maintenance; poor visibility; time-consuming shipping cask loading; and a significant burden of deliberately redundant administrative and physical controls for nuclear safety. The use of a dry cell significantly reduces these disadvantages. This task is approximately 80 percent complete and, therefore, there are no significant risks or uncertainties with meeting cost or schedule goals.

8. Project Description, Justification, and Scope (Continued)

The East End Modification task provides facilities and equipment for loading dry storage containers. An interim storage pad will be provided for in-process handling, staging, and interim storage of naval spent nuclear fuel. Adjacent to the interim storage pad, an area for assembly of overpacks will be constructed.

The West End Modification task increases the TEC by $22,900,000. The additional cost is for the design and fabrication of the equipment to handle the spent fuel and container components and design and construction of a second loading station and support systems. The West End Modification task will provide an approximately 60 foot extension to the Dry Cell shielded cell, a cask transfer pit below the west extension, and a building addition.

A two loading Station arrangement will allow for processing fuel returned from ICPP in the West End Loading Station while concurrently processing spent fuel received directly from the fleet for dry storage in the east loading station. The increased capacity of the overall Dry Cell operations will facilitate a more rapid return of spent fuel from ICPP (8 versus 13 years). In addition, the arrangement allows future packaging of special case waste through one of the loading stations without interruption of dry storage container loading.

The project is scheduled to complete in September 2002. Through FY 1999, 86% of the project is expected to be completed.

1. Project Title and Location: Expended Core Facility
Dry Cell Project
Naval Reactors Facility, Idaho

2a. Project Number: 90-N-102
2b. Construction Funded

9. Details of Cost Estimate	Item Cost	Total Cost
a. Design Phase		$16,250
1.Preliminary and Final Design Costs (design, drawings, and specifications)	$11,270	
2.Design Management Costs at 44.2% of item 9.a.1	4,980	
b. Construction Phase		61,940
1.Land and Land Rights	0	
2.Buildings and Improvements to Land	24,310	
3.Specialized Equipment	13,310	
4.Other Structures	4,270	
5.Utilities	0	
6.Standard Equipment	7,650	
7.Major computer items	0	
8.Removal cost less salvage	0	
9.Inspection, Design, and project liaison, testing, checkout, and acceptance	1,510	
10.Construction Management Costs	7,570	
11. Project Management at 5.4% of item 9.b	3,320	
c. Contingencies at approximately 8.6 percent of above costs		6,756
1. Design Phase	500	
2. Construction Phase	6,256	
d. Total line item cost (Section 11.a.1.(a))		$84,946
e. LESS: Non-Federal Contribution		0
f. Net Federal TEC		$84,946

10. Method of Performance

Contracting arrangements are as follows:

a. Construction design will be performed under an Engineering Services Subcontract. Equipment will be designed by the operating contractor.
b. Construction and procurement will be accomplished by fixed price contracts awarded on the basis of competitive bidding.
c. Title III Inspection: By Engineering Services Subcontractor under operating contractor surveillance.

11. Schedule of Project Funding and Other Related Funding Requirements

a. Total project costs	Previous Years	FY 1997	FY 1998	FY 1999	Outyears	Total
1.Total facility costs						
(a)Line item (Section 9.)	$ 29,531	$13,908	$5,878	$3,538	$32,091	$84,946
(b)Plant Engineering & Design	0	0	0	0	0	0
(c)Op. Exp. funded equipment	0	50	380	1,296	2,149	3,875
(d)Inventories	0	0	0	0	0	0
(e)Total facility cost (Fed and non-Federal)	$29,531	$13,958	$6,258	$4,834	$34,240	$88,821
2.Other project costs						
(a)R&D necessary to complete project	$0	$0	$0	$0	$0	$0
(b)Conceptual design costs	1,400	100	200	0	0	1,700
(c)Decontamination & Decommissioning	0	0	250	500	265	1,015
(d)NEPA documentation costs	2,000	500	0	0	0	2,500
(e)Other project-related costs	1,245	200	236	0	400	2,081
(f)Total other project costs	$4,645	$800	$686	$500	$665	$7,296
(g)Total project cost	$34,176	$14,758	$6,944	$5,334	$34,905	$96,117
(h)LESS: Non-Federal contribution	0	0	0	0	0	0
(i)Net Federal TPC	$34,176	$14,758	$6,944	$5,334	$34,905	$96,117

11. Schedule of Project Funding and Other Related Funding Requirements (Continued)

b. Related annual costs (estimated life of project - 40 years)

1. Facility operation costs	$2,820
2. Facility maintenance and repair costs	40
3. Programmatic operating expenses directly related to the facility	260
4. Capital Equipment not related to construction but related to the programmatic effort in the facility	710
5. GPP or other construction related to the programmatic effort in the facility	0
6. Utility costs	488
7. Other costs	0
Total related annual funding	$4,318

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project costs

1. Total facility costs

(a)Line item: Narrative not required.

(b)PE&D: None.

(c)Expense-funded equipment: Includes costs for adaptation of existing storage overpacks and transportation casks for the selected dry storage container; development of container welding systems; and procurement of two sets of dry storage containers and overpacks for facility and system testing and checkout. Also, includes the costs for the design and fabrication of the temporary west shield wall.

(d)Inventories: None.

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (Continued)

2. Other project costs

(a)R&D necessary to complete construction: None.

(b)Conceptual design: No narrative required.

(c)Decontamination and Decommissioning (D&D): Costs for removal of existing structures and removal of the temporary west shield wall.

(d)NEPA: Includes cost for preparation of Environment Impact Statement.

(e)Other project-related funding: Costs for the procurement of several prototype items to support equipment design and confirm system operations, for facility startup, and for operator training.

b. Related annual funding: The facility is expected to be used 40 years for its programmatic purposes.

1.Facility operating costs: Based on manpower required to operate the facility.

2.Facility maintenance and repair costs: Based on manpower to maintain transfer casks systems and shielded overpack transporter systems.

3.Programmatic operating expenses directly related to the facility: Includes fixtures, tools, operational supplies, and expendables.

4.Capital equipment not related to construction but related to the programmatic effort in the facility: Estimated cost includes replacement of operating equipment on a 15-year cycle.

5.There are no GPP or other construction related costs.

6.Utility costs: Includes electrical power, steam heat, and maintenance items such as utility lines, valves, and pumps.

7.There are no "other" annual costs.

13. Design and Construction of Federal Facilities

All DOE facilities are designed and constructed in accordance with applicable Public Laws, Executive Orders, OMB Circulars, Federal Property Management Regulations, and DOE Orders. The total estimated cost of the project includes the cost of measures necessary to assure compliance with Executive Order 12088, "Federal Compliance with Pollution Control Standards", Section 19 of the Occupational Safety and Health Act of 1970, the provisions of Executive Order 12196, and the related Safety and Health provisions for Federal Employees (CFR Title 29, Chapter XVII, Part 1960); and the Architectural Barriers Act, Public Law 90-480, and implementing instructions in 41 CFR 101-19.6.

The project location in an area subject to flooding has been evaluated and the findings, determined in accordance with Executive Order 11988, are that the project can be designed to withstand the probable maximum flood that results from the failure of the

13. Design and Construction of Federal Facilities(continued)

Mackay Dam.

The Dry Cell and dry loading stations are unique facilities and similar systems and space are not available at other Federal Scientific Laboratories.