

UNCLASSIFIED

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 1

PROGRAM ELEMENT: 0601152N

PROGRAM ELEMENT TITLE: In-House Laboratory Independent Research

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
Ocean Sciences	586	786	821	1,002	1,038	1,242	1,274	CONT.	CONT.
Advanced Materials	1,760	2,202	2,300	2,504	2,595	2,838	2,911	CONT.	CONT.
Information Sciences	1,173	1,886	2,301	2,672	3,115	3,550	3,640	CONT.	CONT.
Sustaining Programs	11,075	10,670	10,921	10,316	10,112	9,474	9,748	CONT.	CONT.
TOTAL	14,594	15,544	16,343	16,494	16,860	17,104	17,573	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports the missions of the Naval Warfare Centers, Naval Personnel Research and Development Center (NPRDC), and Bureau of Medicine and Surgery (BUMED) with high-risk/high-payoff research, responding as shown below to the Department of the Navy (DON) Integrated Warfare Architecture (IWAR) and enabling the technologies that could significantly improve Joint Chiefs of Staff's Future Joint Warfighting Capabilities. The research addresses fundamental questions regarding existing and anticipated naval systems, and is supported within the Office of Naval Research (ONR) by thrusts in Ocean Sciences, Advanced Materials, Information Sciences, and its Sustaining

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Budget Item Justification
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Programs. This program reflects the integration of efforts both within Warfare Centers, NPRDC, BUMED, and among other research performers. Research efforts are proposed and selected by the Warfare Centers, NPRDC, and BUMED, and reviewed after the fact for the quality of science produced and for relevance to the naval mission.

(U) This program responds to the Littoral Warfare IWAR through ocean sciences research into the variability of the marine environment, such as acoustic shallow water (SW) models that incorporate wave-breaking sources, allowing superior signal processing in SW environments. Research advancing fundamental understanding of Department of the Navy (DON)-essential materials and processes responds to operational capability requirements in the Strategic Mobility IWAR, such as the recent development of an aluminum based, metal-matrix, high-temperature superconducting material that can be extruded into wires for significantly improved naval electrical power systems. The program responds to the Intelligence, Surveillance, Reconnaissance IWAR through thrusts in information sciences that address naval-relevant computing applications including software engineering, high performance computing, artificial intelligence, and the use of computers in manufacturing. For example, the development of an advanced signal processing technique for the analysis of real Anti-Submarine Warfare (ASW) broadband acoustic data provides detection performance, which exceeds the conventional energy detector in high noise ASW applications. Research in other areas supports requirements of the Readiness IWAR, such as discovering redox chemicals for use in "smart" coatings, which alter color when degraded and serve as early warning systems for corrosion of naval systems.

(U) Due to the sheer volume of efforts included in this program element, the programs described in the Accomplishments and Plans sections are representative selections of the work included in this program element.

(U) The DoN Science and Technology (S&T) program includes projects that focus on or have attributes that enhance the affordability of warfighting systems.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under BASIC RESEARCH because it encompasses scientific study and experimentation directed towards increasing knowledge and understanding in broad fields directly related to long-term DoN needs.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

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1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) Ocean Sciences responded to the Littoral Warfare IWAR by investigating physical mechanisms for deposition of high energy acoustic or seismic pulses on elastic objects deployed on or in the bottom of a shallow water ocean environment.
- (U) Advanced Materials responded to the Strike and Littoral Warfare IWARs by studying energetic materials using nanosize fuels and high heat of reaction intermetallic ingredients to enhance warhead performance; by synthesizing high performance, insensitive explosive ingredients (based on principles of molecular charge delocalization and graphitic-like crystal structures) for penetrator applications; by studying the dynamic shock wave properties of warhead materials to support the modeling and design of warheads; and by developing equations of state and reaction rate models for use in hydrodynamic code modeling of warheads.
- (U) Information Sciences statistical analyses reduce the complexities of signals and of the algorithms for signal processing to advance the capability for electronic warfare and electronic countermeasures in Strike and Intelligence, Surveillance, and Reconnaissance IWAR, with enhanced detection probability and diminished tracking time in cluttered environments and in the presence of false targets.
- (U) Sustaining Programs responded to the Strike and Command, Control, Communications, Computers and Information Warfare IWARs by investigating the three-dimensional effects of loss mechanisms in non-ideal, thin-film, integrated waveguide structures for opto-electronic applications, and will respond to the readiness IWAR with research focused on the medical areas of Aviation Medicine, Diving and Submarine Medicine, Toxicology, Human Performance, Infectious Disease, and Combat Casualty Care.

3. (U) FY 2000 PLAN:

- (U) Ocean Sciences will respond to the Littoral IWAR, to the Air and Sea Superiority IWAR and to the Strike IWAR by investigating acoustical propagation with application in mine countermeasures, underwater acoustic communications, and underwater target detection.

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- (U) Advanced Materials will respond to: (1) The Readiness IWAR by investigating material corrosion reduction and coatings; (2) the Strike IWAR and the Sea and Air Superiority IWAR by investigating energetic materials; (3) the Strike IWAR, the Littoral IWAR, and the Strategic Sealift IWAR through research into new types of structural and electronic materials.
- (U) Information Sciences will respond to the Joint Surveillance IWAR, the Strike IWAR, the Littoral IWAR, the Sea and Air Superiority IWAR, and the Electronic Warfare (EW) IWAR through research into network controls and security, displays, and advanced methods in digital signal processing.
- (U) Sustaining Programs will respond to the EW IWAR through research into: (1) the electromagnetic response of materials, and (2) sensors. It will respond to the Strategic Mobility IWAR through research into ways to improve the protection of the assets by improved defensive warheads. It will respond to the readiness IWAR with medical research in the areas of Aviation Medicine, Diving and Submarine Medicine, Toxicology, Human Performance, Infectious Disease, and Combat Casualty Care.
- (U) Modify the current ILIR Project Selection Process to emphasize multi-year team projects in critical mission areas of each of the In-House Laboratories. These projects will allow ILIR claimants to attract and exploit new technical expertise from academia and industry and have a significant impact on Navy and Marine Corps needs.
- (U) Assign responsibility for oversight and management of the overall ILIR program to the ONR Chief Scientist, ensure Laboratory Commanding Officer and Technical Director personal involvement in project definition and selection to enhance project relevance and improve cost-effectiveness of execution.

4. (U) FY 2001 PLAN:

- (U) Ocean Sciences will continue to respond to the Littoral IWAR, to the Air and Sea Superiority IWAR and to the Strike IWAR by investigating acoustical propagation with application in mine countermeasures, underwater acoustic communications, and underwater target detection.
- (U) Advanced Materials will continue to respond to: (1) The Readiness IWAR by investigating material corrosion reduction and coatings; (2) the Strike IWAR and the Sea and Air Superiority IWAR by investigating energetic

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materials; (3) the Strike IWAR, the Littoral IWAR, and the Strategic Sealift IWAR through research into new types of structural and electronic materials.

- (U) Information Sciences will continue to respond to the Joint Surveillance IWAR, the Strike IWAR, the Littoral IWAR, the Sea and Air Superiority IWAR, and the Electronic Warfare (EW) IWAR through research into network controls and security, displays, and advanced methods in digital signal processing.
- (U) Sustaining Programs will continue to respond to the EW IWAR through research into: (1) the electromagnetic response of materials, and (2) sensors. It will respond to the Strategic Mobility IWAR through research into ways to improve the protection of the assets by improved defensive warheads. It will respond to the readiness IWAR with medical research in the areas of Aviation Medicine, Diving and Submarine Medicine, Toxicology, Human Performance, Infectious Disease, and Combat Casualty Care.
- (U) Ensure that ILIR projects continue to enable the Laboratories and Warfare Centers to enhance their ability to improve Joint Warfighting Capabilities and respond to IWARS through promotion of novel ideas, and attraction of leading researchers.
- (U) Complete the development of, and implement, a consistent process across all ILIR claimants which will provide top-down direction, assure relevance to Center mission areas, and provide an appropriate level of oversight of and visibility to senior Naval S&T leadership.
- (U) Relate ILIR projects to ONR Thrusts to ensure total consistency of Navy S&T program with long term needs, and improve collaboration among in-house (Laboratory, Center, and Naval Research Laboratory) and extramural performers.
- (U) Develop project selection criteria and performance metrics for each claimant that emphasize major impact, workforce refreshment, and collaboration.
- (U) Hold first Navy ILIR/Industry/Academia conference to enhance program connectivity and feedback, and stimulate additional collaboration.

B. (U) PROGRAM CHANGE SUMMARY:

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	<u>FY 1999</u>	<u>FY 2000</u>	<u>FY 2001</u>
(U) FY 2000 President's Budget:	14,663	15,630	16,421
(U) Appropriated Value:	0	15,630	0
(U) Adjustments from FY 2000 PRESBUDG:	0	0	0
(U) Execution Adjustments	-2	0	0
(U) Inflation Adjustments	-67	0	0
(U) Various Rate Adjustments	0	0	-78
(U) Congressional Rescissions	0	-86	0
(U) FY 2001 PRESBUDG Submission:	W14,594	15,544	16,343

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: Not applicable.

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0601101A (In-House Laboratory Independent Research)

(U) PE 0601101F (In-House Laboratory Independent Research)

D. (U) SCHEDULE PROFILE: Not applicable.

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