ACTIVITY GROUP CAPITAL INVESTMENT JUSTIFICATION (Dollars in Thousands)		A. Budget Submission **FY 2005 PRESIDENT'S BUDGET**
B. Component/Activity Group/Date Department of the Navy Research and Development February 2004	C. Line No. & Item Description 1001. Focused Ion Beam Workstation	D. Activity Identification Naval Research Laboratory Washington, DC 20375

	FY 2003			FY 2004			FY 2005					
Element of Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost
Non-ADP Equipment (≥$1M)				1	1,350	1,350						

Narrative Justification:
This capital equipment purchase is to be located in the new Nanoscience Institute Building scheduled for completion in FY 2003. The Institute was established to enable NRL to address the scientific opportunities at the nanometer (10^{-9} meter) scale. This is an essential new tool for the Institute since it will provide the ability to carryout nanomachining processes at a resolution of 7nm. The nanomachining process is essential for the following tasks:

1) Fabrication of planar electronic circuit elements. One of the central tasks of the new Institute is to fabricate prototype electronic devices with features <10 nm dimension. Since these are research devices, common mass production lithographic techniques and processing techniques are not suitable. This instrument permits one-of-a-kind prototype fabrication entirely under the control of the research scientist at very low cost.
2) Preparation of cross-sectional samples for high-resolution transmission electron microscopy. In FY 2001, the Institute purchased the highest resolution transmission electron microscope (TEM) currently available, to study nanoscale features in new materials. All samples for the new $1.35M microscope will require this new ion beam workstation for cross-sectioning preparation in order to be sufficiently thin for electron transmission. There is no other equipment that can perform this task successfully in a cost-effective manner.
3) Nanomachining of etchant resistant materials (e.g. diamond) for nanomechanical electromechanical systems (NEMS). Nanomechanical electromechanical systems technology is a major theme of the new Institute. Its goal is to develop electrically driven machines at the atomic level. This machine must be fabricated from extremely strong, extremely hard materials, such as diamond. There is no other technique available to carry out this fabrication on these materials.

This tool cannot be replaced by any other and will be available for use 24 hours per day, 7 days per week to all authorized NRL personnel. The only alternatives are to abandon the mission's objectives, since the workstation will be employed as an integral component of the research and cannot be contracted out to commercial providers. Travel by NRL to another site would be cost prohibitive and would unacceptably impede the Institute's research programs, since its use is expected to be near capacity.

ACTIVITY GROUP CAPITAL INVESTMENT JUSTIFICATION (Dollars in Thousands)		A. Budget Submission **FY 2005 PRESIDENT'S BUDGET**
B. Component/Activity Group/Date Department of the Navy Research and Development February 2004	C. Line No. & Item Description 1001. Near Field Antenna Test Facility	D. Activity Identification Naval Research Laboratory Washington, DC 20375

	FY 2003			FY 2004			FY 2005					
Element of Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost
Non-ADP Equipment (≥$1M)							1	1,900	1,900			

Narrative Justification:
To procure and install a test system consisting of a 23' by 22' vertical planar scanner used for testing medium and high gain antennas (>15 dBi) with apertures less than 22 feet, making it suitable for testing larger arrays or reflector antennas in the frequency range of 2 to 100 GHz. Antenna patterns are measured in the near field of the antenna and converted mathematically to the far field for analysis and use. This system makes side lobe measurements that are 50 dB below the main beam peak with sub-milliradian pointing accuracies possible while increasing throughput, providing improved antenna diagnostics, and lowering cost. This system is inherently more accurate for high-gain antennas and makes indoor testing of a WindSat-type antenna possible. More advanced test systems are required as the performance requirements of modern antenna systems, such as WindSat, increase. Today, it is possible to test WindSat-type antenna systems indoors using an innovative test system called the Near Field Test Range. With the Antenna Test Facility described above, NRL will be able to test the advanced, high performance antenna systems that will be required to meet the system requirements of both near-term and long-term program developments for DOD and other government and commercial applications. Other existing NRL facilities such as anechoic chambers, compact ranges and smaller scanners will not meet these test requirements. The need for sophisticated, high-performance antennas is increasing as spacecraft, aircraft, ship, and ground vehicle mission requirements become more sophisticated. Utilizing the Near Field Range, NRL will have the in-house capability to accommodate numerous multi-use classified and non-classified projects supported by ONR, NRO, NSA, NPOESS IPO, Navy SYSCOMS and the Marine Corps. Future utilization of this facility will be continuous as there are multiple divisions at NRL that develop or utilize antennas as primary elements of their systems. Providing NRL with this capability will have substantial future benefits, both technical and monetary. An in-house capability will provide a controlled environment to accommodate on-going and future programs throughout NRL with appropriate security, availability, and without the risk and huge cost associated with off-site testing. This capability would also eliminate the need to create a special test site at even greater expense.

ACTIVITY GROUP CAPITAL INVESTMENT JUSTIFICATION (Dollars in Thousands)		A. Budget Submission **FY 2005 PRESIDENT'S BUDGET**
B. Component/Activity Group/Date Department of the Navy Research and Development February 2004	C. Line No. & Item Description 2001. Total Non-ADP (≥$500K<$1M)	D. Activity Identification Naval Research Laboratory Washington, DC 20375

	FY 2003			FY 2004			FY 2005					
Element of Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost
Total Non-ADP (≥$500K<$1M)	3		2,292	7		5,321	5		3,485			

Narrative Justification:

FY 2003
Lithographic Fabrication Clean Room Zones $941,454
Vibration Shaker & Amplifier Replacement $820,850
Real Time Ocean Environmental Measurement System $529,800
FY 2004
UAV Payload Test Bed $975,000
Long-Range Current Measurement System $571,000
X-Band Reflector and Dual S/X Band Feed $500,000
Spacecraft Subsystem Design & Test Instrumentation Upgrade $750,000
Enhanced Surface Characterization Nanoscience Facility $800,000
43 Gigabit/Sec Transmission Analyzer $850,000
SiC CVD Reactor $875,000
FY 2005
Directed Energy Effects Test Facility $600,000
X-Band Satellite Receiving System $510,000
Composite Fabrication & Rapid Prototyping $750,000
Littoral Environment Acoustic Data & Echo-Repeater System $775,000
Mobil Atmospheric Aerosol & Radiation Characterization Observatory $850,000

ACTIVITY GROUP CAPITAL INVESTMENT JUSTIFICATION (Dollars in Thousands)		A. Budget Submission **FY 2005 PRESIDENT'S BUDGET**
B. Component/Activity Group/Date Department of the Navy Research and Development February 2004	C. Line No. & Item Description 3001. Total Non-ADP (<$500K)	D. Activity Identification Naval Research Laboratory Washington, DC 20375

	FY 2003			FY 2004			FY 2005					
Element of Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost
Total Non-ADP (<$500K)	44		9,881	24		6,536	30		7,695			

Narrative Justification:

No narrative required.

ACTIVITY GROUP CAPITAL INVESTMENT JUSTIFICATION (Dollars in Thousands)		A. Budget Submission **FY 2005 PRESIDENT'S BUDGET**
B. Component/Activity Group/Date Department of the Navy Research and Development February 2004	C. Line No. & Item Description 6001. Total ADP (<$500K)	D. Activity Identification Naval Research Laboratory Washington, DC 20375

	FY 2003			FY 2004			FY 2005					
Element of Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost
Total ADP (<$500K)	12		2,472	8		2,243	9		2,370			

Narrative Justification:

No narrative required.

ACTIVITY GROUP CAPITAL INVESTMENT JUSTIFICATION (Dollars in Thousands)		A. Budget Submission **FY 2005 PRESIDENT'S BUDGET**
B. Component/Activity Group/Date Department of the Navy Research and Development February 2004	C. Line No. & Item Description 8001. Total Minor Construction (≥$500K<$1M)	D. Activity Identification Naval Research Laboratory Washington, DC 20375

	FY 2003			FY 2004			FY 2005					
Element of Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost
Total Minor Construction (≥$500K<$1M)	2		1,354	2		1,250	3		1,850			

Narrative Justification:

FY 2003
Renovate Light Tunnel, Bldg A59 $644,089
Addition Building 209 $709,700

FY 2004
Communications Distribution Modernization $500,000
Optical Physics Facility Modification $750,000

FY 2005
C41 Facility $550,000
Midway Research Center Perimeter Fence $600,000
Chemistry Facility Modernization $700,000

ACTIVITY GROUP CAPITAL INVESTMENT JUSTIFICATION (Dollars in Thousands)		A. Budget Submission **FY 2005 PRESIDENT'S BUDGET**
B. Component/Activity Group/Date Department of the Navy Research and Development February 2004	C. Line No. & Item Description 9001. Total Minor Construction (<$500K)	D. Activity Identification Naval Research Laboratory Washington, DC 20375

	FY 2003			FY 2004			FY 2005					
Element of Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost	Quan	Unit Cost	Total Cost
Total Minor Construction (<$500K)	2		691	2		600						

Narrative Justification:

No narrative required.