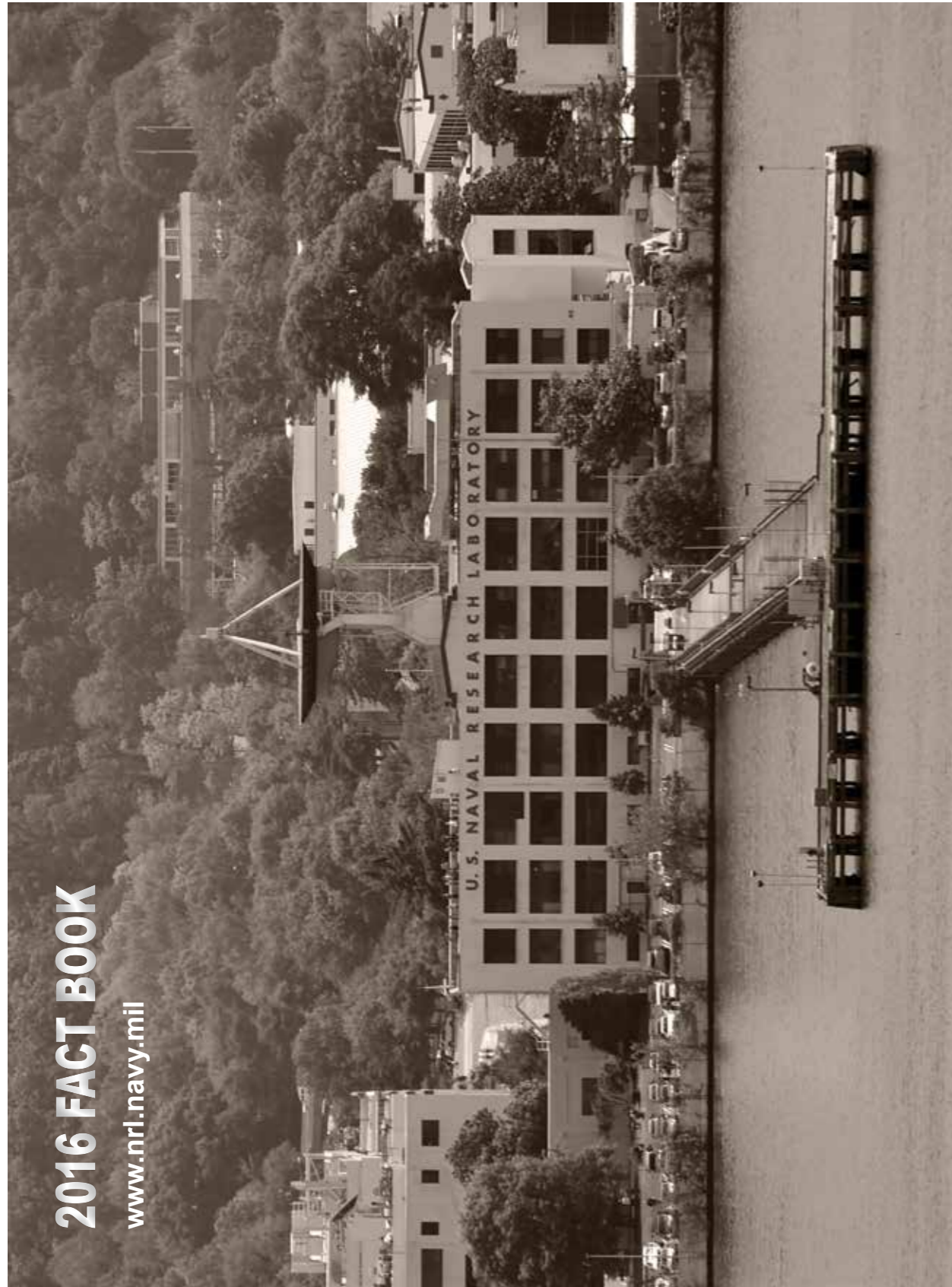


# 2016 FACT BOOK

[www.nrl.navy.mil](http://www.nrl.navy.mil)



2016 NRL FACT BOOK ♦ U.S. NAVAL RESEARCH LABORATORY



U.S. NAVAL RESEARCH LABORATORY  
The Navy's Corporate Laboratory

# Introduction to the U.S. Naval Research Laboratory

The U.S. Naval Research Laboratory (NRL) is the Department of the Navy's corporate laboratory, and it reports to the Chief of Naval Research. As the corporate laboratory of the Navy, NRL is the principal in-house component in the Office of Naval Research's (ONR) effort to meet its science and technology responsibilities.

NRL has had a long and fruitful relationship with industry as a collaborator, contractor, and through Cooperative Research and Development Agreements (CRADAs). NRL values this linkage and continues to develop it.

NRL is an important link in the Navy Research, Development, and Acquisition (RD&A) chain. Through NRL, the Navy has direct ties with sources of fundamental ideas in industry and the academic community throughout the world and provides an effective coupling point to the R&D chain for ONR.



We provide the advanced scientific capabilities required to bolster our country's position of global naval leadership. Here, in an environment where the nation's best scientists and engineers are inspired to pursue their passion, everyone is focused on research that yields immediate and long-range applications in the defense of the United States.



The U.S. Naval Research Laboratory is located in Washington, DC, on the east bank of the Potomac River.



The U.S. Naval Research Laboratory Marine Meteorology Division is located in Monterey, California (NRL-MRY).



The U.S. Naval Research Laboratory Detachment is located at Stennis Space Center, Bay St. Louis, Mississippi (NRL-SSC).

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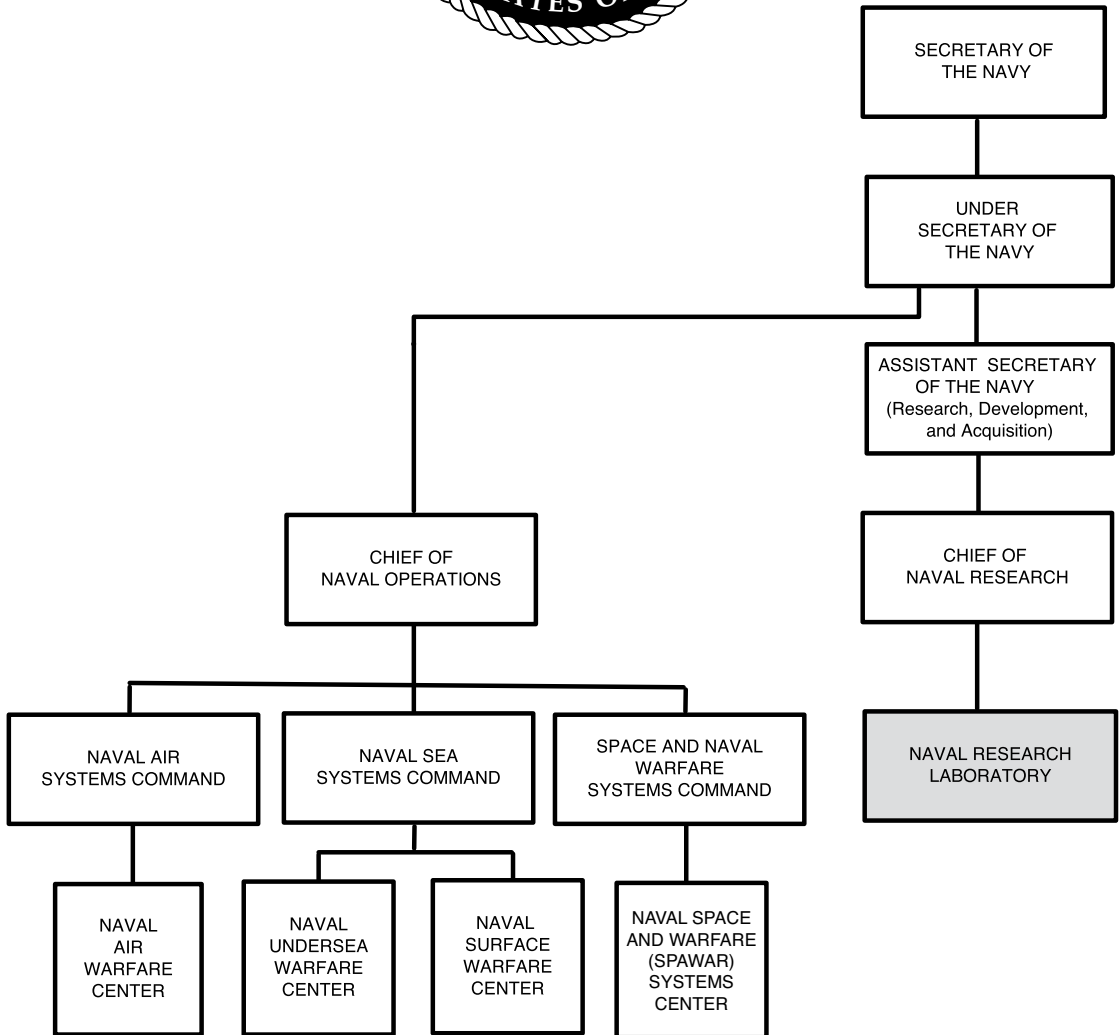
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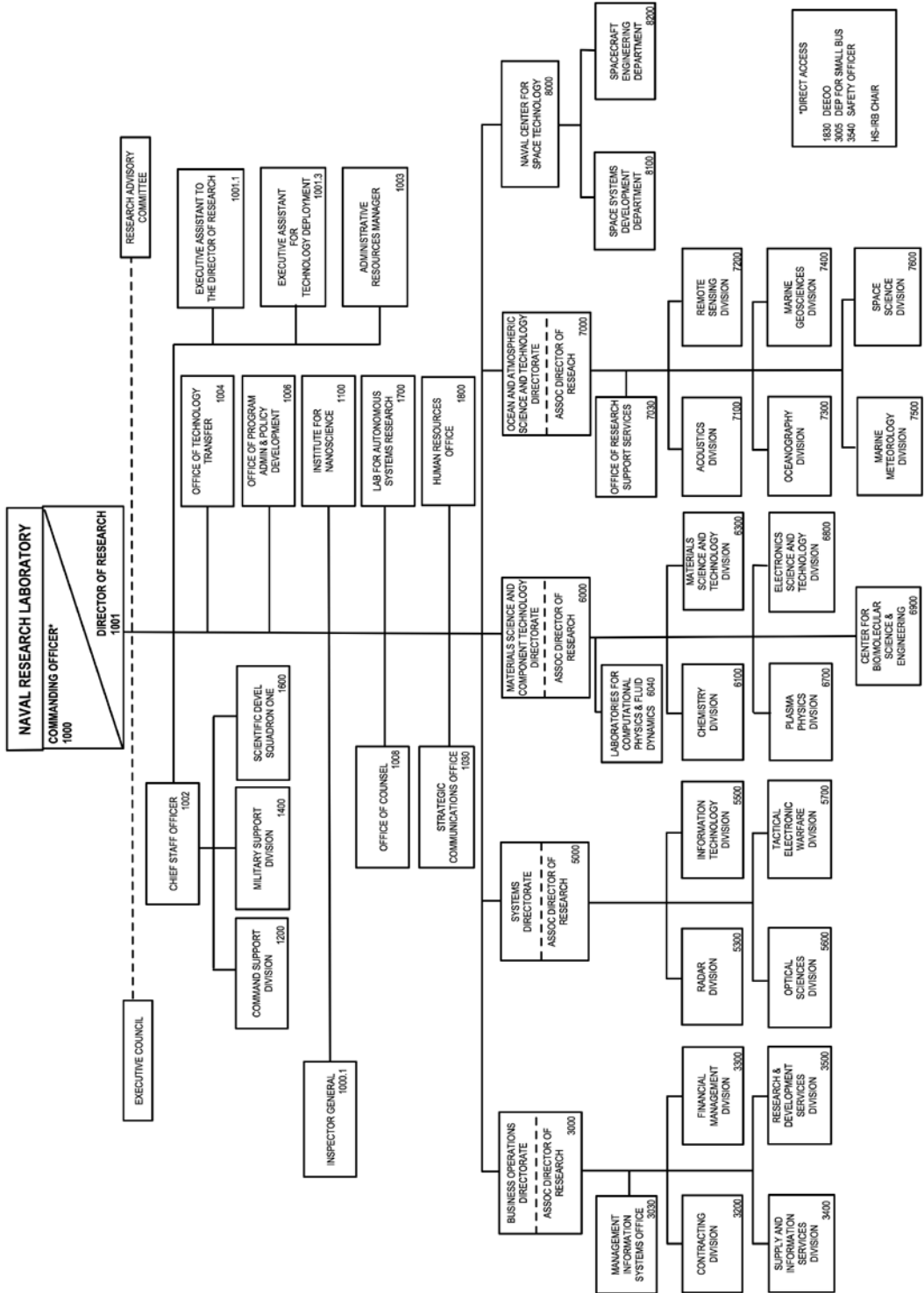
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# NRL Functional Organization



## NRL Sites and Facilities

SITE	ACREAGE		BUILDINGS/ STRUCTURES
	LAND OWNED/LEASED	EASEMENT/ LICENSE- PERMIT	
<b>District of Columbia</b> NRL and Joint Base Anacostia-Bolling*	131/0	0/10.13	90/31
<b>Virginia</b> Midway Research Center Quantico*	162/0	0/0	7/11
<b>Maryland</b> NRL Scientific Development Squadron One (VXS-1), NAS Patuxent River*	Tenant		
Chesapeake Bay Section and Dock Facility Chesapeake Beach*	168/0	.6/.02	51/66
Multiple Research Site Tilghman Island*	3/0	0/0	3/3
Free Space Antenna Range Pomonkey*	141/0	0/0	10/11
Blossom Point Tracking Facility*	42/0	0/265	21/23
<b>Florida</b> Marine Corrosion Facility Key West	Tenant		
<b>California</b> NRL Marine Meteorology Division Monterey*	Tenant		
<b>Mississippi</b> Stennis Space Center Bay St. Louis*	Tenant		
<b>Alabama</b> Ex-USS <i>Shadwell</i> (LSD-15) Mobile Bay	Tenant		
Decommissioned 457-ft vessel used for fire research			

### PROPERTY

<b>Land:</b> 605 acres	<b>Buildings:</b>	<b>Replacement Costs:</b>
	RDT&E	Buildings Plant Replacement
	Administrative	Value (PRV) <sup>1</sup> \$1,291,955,451
	Other	Equipment Costs <sup>2</sup> \$523.7 million

<sup>1</sup> Per DON Facilities Asset Data System standard cost factors.

<sup>2</sup> NRL Accountable Property Acquisition Costs.

\* See maps in the General Information section (page 123).

# Current Research

The following areas represent broad fields of NRL research. Under each, more specific topics that are being investigated for the benefit of the Navy and other sponsoring organizations are listed. Some details of this work are given in the *NRL Review*, published annually. More specific details are published in reports on individual projects provided to sponsors and/or presented as papers for professional societies or their journals.

## Advanced Radio, Optical, and IR Sensors

- Advanced optical sensors
- EM/EO/meteorological/oceanographic sensors
- Satellite meteorology
- Precise space tracking
- Radio/infrared astronomy
- Infrared sensors and phenomenology
- UV sensors and middle atmosphere research
- VLBI/astrometry
- Optical interferometry
- Imaging spectrometry
- Liquid crystal technology

## Autonomous Systems

- Algorithms for control of autonomous systems
- Cognitive robotics
- Human-robot interaction
- Perception hardware and algorithms
- High-level reasoning algorithms
- Machine learning and adaptive algorithms
- Sensors for autonomous systems
- Power and energy for autonomous systems
- Networking and communications for mobile systems
- Swarm behaviors
- Test and evaluation of autonomous systems

## Computer Science and Artificial Intelligence

- Standard computer hardware, development environments, operating systems, and run-time support software
- Methods of specifying, developing, documenting, and maintaining software
- Human-computer interaction
- Intelligent systems for resource allocation, signal identification, operational planning, target classification, and robotics
- Parallel scientific libraries
- Algorithms for massively parallel systems
- Digital progressive HDTV for scientific visualization
- Adaptive systems: software and devices

- Advanced computer networking
- Simulation management software for networked high performance computers
- Interactive 3D visualization tools and applications
- Real-time parallel processing
- Scalable, parallel computing
- Petaflop computing, globally distributed file systems, terabit-per-second networking

## Directed Energy Technology and Railguns

- High-energy lasers
- Laser propagation
- Solid-state and fiber lasers
- High-power microwave sources
- Electromagnetic launchers (railguns)
- Pulse detonation engines
- Charged-particle devices
- Pulsed power
- DE effects
- Underwater laser acoustic sources
- Wireless recharging (power beaming)

## Electronic Electro-optical Device Technology

- Integrated optics
- Radiation-hardened electronics
- Nanotechnology
- Microelectronics
- Microwave and millimeter-wave technology
- Hydrogen masers for GPS
- Aperture syntheses
- Electric field coupling
- Vacuum electronics
- Focal plane arrays
- Radiation effects and satellite survivability
- Molecular engineering

## Electronic Warfare

- EW/C2W/IW systems and technology
- COMINT/SIGINT technology
- EW decision aids and planning/control systems
- Intercept receivers, signal processing, and identification systems
- Passive direction finders



- Decoys and offboard countermeasures (RF and IR)
- Expendable autonomous vehicles/UAVs
- Repeaters/jammers and EO/IR active countermeasures and techniques
- Platform signature measurement and management
- Threat and EW systems computer modeling and simulations
- Visualization
- Hardware-in-the-loop and flyable ASM simulators
- Missile warning infrared countermeasures
- RF environment simulators
- EO/IR multispectral/hyperspectral surveillance

### **Enhanced Maintainability, Reliability, and Survivability Technology**

- Coatings
- Friction/wear reduction
- Water additives and cleaners
- Fire safety
- Laser hardening
- Satellite survivability
- Corrosion control
- Automation for reduced manning
- Radiation effects
- Mobility fuels
- Chemical and biological sensors
- Environmental compliance

### **Environmental Effects on Naval Systems**

- Meteorological effects on communications
- Meteorological effects on weapons, sensors, and platform performance
- Air quality in confined spaces
- Electromagnetic background in space
- Solar and geomagnetic activity
- Magnetospheric and space plasma effects
- Nonlinear science
- Ionospheric behavior
- Oceanographic effects on weapons, sensors, and platforms
- EM, EO, and acoustic system performance/ optimization
- Environmental hazard assessment
- Contaminant transport
- Biosensors

- Microbially induced corrosion
- Laboratory simulation of space plasmas

### **Imaging Research/Systems**

- Remotely sensed signatures analysis
- Real-time signal and image processing algorithms/systems
- Image data compression methodology
- Image fusion
- Automatic target recognition
- Scene/sensor noise characterization
- Image enhancement/noise reduction
- Scene classification techniques
- Radar and laser imaging systems studies
- Coherent/incoherent imaging sensor exploitation
- Remote sensing simulation
- Hyperspectral imaging
- Microwave polarimetry
- Image processing

### **Information Technology**

- High-performance, all-optical networking
- Antijam communication links
- Next-generation, signaled optical network architectures
- Integrated voice and data
- Information security (INFOSEC)
- Voice processing
- High performance computing
- High performance communications
- Requirements specification and analysis
- Real-time computing
- Wireless mobile networking
- Behavior detection
- Machine learning
- Information filtering and fusion
- Integrated internet protocol (IP) and asynchronous transfer mode (ATM) multicasting
- Reliable multicasting
- Wireless networking with directional antennas
- Sensor networking
- Communication network simulation
- Bandwidth management (quality of service)
- High assurance software
- Distributed network-based battle management
- High performance computing supporting uniform and nonuniform memory access with single and multithreaded architectures

Distributed, secure, and mobile information infrastructures  
Simulation-based virtual reality  
High-end, progressive HDTV imagery processing and distribution  
Defensive information warfare  
Virtual reality/mobile augmented reality  
3D multimodal interaction  
Model integration (physical, environmental, biological, psychological) for simulation  
Command decision support  
Data fusion

### **Marine Geosciences**

Marine seismology with both conventional and unique instrumentation, including analysis of acoustic reflections for seafloor physical and acoustic properties, indications of fluid and gas seeps, methane gas and methane hydrate in support of acoustic performance prediction  
Numerical simulation and prediction of seafloor sediment properties  
Generation and analysis of interface (Scholte) waves in support of mine warfare and mine countermeasures  
Laboratory measurements of a wide variety of sediment physical and acoustic properties.  
Acoustic, electro-optic, and electromagnetic sensing for seafloor mapping and characterization  
Modeling, simulations, and prediction of nearshore and riverine processes  
Geospatial science and technology for enabling information dominance  
Geotechnical investigations of seafloor structure and strength

### **Materials**

Superconductivity  
Magnetism  
Biological materials  
Materials processing  
Advanced alloy systems  
Solid free-form fabrication  
Environmental effects  
Energetic materials/explosives  
Aerogels and underdense materials  
Nanoscale materials  
Nondestructive evaluation  
Ceramics and composite materials

Thin film synthesis and processing  
Electronic and piezoelectric ceramics  
Thermoelectric materials  
Active materials and smart structures  
Computational material science  
Paints and coatings  
Flammability  
Chemical/biological materials  
Spintronic materials and half metals  
Biomimetic materials  
Multifunctional materials  
Power and energy  
Synthetic biology  
Microwave and high pressure processing  
Additive manufacturing

### **Meteorology**

Global, theater, tactical-scale, and on-scene numerical weather prediction  
Data assimilation and physical initialization  
Atmospheric predictability and adaptive observations  
Adjoint applications  
Marine boundary layer characterization  
Air/sea interaction; process studies  
Coupled air/ocean/land model development  
Tropical cyclone forecasting aids  
Satellite data interpretation and application  
Aerosol transport modeling  
Meteorological applications of artificial intelligence and expert systems  
On-scene environmental support system development/nowcasting  
Tactical database development and applications  
Meteorological tactical decision aids  
Meteorological simulation and visualization

### **Ocean Acoustics**

Underwater acoustics, including propagation, noise, and reverberation  
Fiber-optic acoustic sensor development  
Deep ocean and shallow water environmental acoustic characterization  
Undersea warfare system performance modeling, unifying the environment, acoustics, and signal processing  
Target reflection, diffraction, and scattering  
Acoustic simulations  
Tactical decision aids  
Sonar transducers

Dynamic ocean acoustic modeling  
Underwater acoustic communications

## **Oceanography**

Oceanography instrumentation  
Open ocean, littoral, polar, and nearshore  
oceanographic forecasting  
Shallow water oceanographic effects on  
operations  
Modeling, sensors, and data fusion  
Ocean data assimilation  
Bio-optical processes  
Oceanographic processes observation: mixing,  
waves, circulation  
Waves, tides, and surf prediction  
Sea ice modeling and prediction  
Coupled ocean-ice-wave-air-land modeling  
Coupled data assimilation  
Global, theater, and tactical scale modeling  
Remote sensing of oceanographic parameters  
Satellite Image Analysis  
In-water sensing of ocean optics and biology  
Turbulence effects on ocean optics

## **Space Systems and Technology**

Two-phase heat transfer systems  
Space systems architectures and requirements  
Advanced payloads and optical communications  
Controllers, processors, signal processing, and  
VLSI  
Precision orbit estimation  
Onboard autonomous navigation  
Satellite ground station engineering and  
implementation  
Tactical communication systems  
Spacecraft antenna systems  
Launch and on-orbit support  
Precise Time and Time Interval (PTTI)  
technology  
Atomic time/frequency standards/  
instrumentation  
Passive and active ranging techniques  
Design, fabrication, and testing of spacecraft and  
hardware  
Structural and thermal analysis  
Attitude determination and control systems  
Reaction control  
Propulsion systems  
Navigation, tracking, and orbit dynamics  
Spaceborne robotics applications

## **Surveillance and Sensor Technology**

Point defense technology  
Imaging radars  
Surveillance radars  
Multifunction RF systems  
High-power millimeter-wave radar  
Target classification/identification  
Airborne geophysical studies  
Fiber-optic sensor technology  
Undersea target detection/classification  
EO/IR multispectral/hyperspectral detection and  
classification  
Sonar transducers  
Electromagnetic sensors, gamma ray to RF  
wavelengths  
SQUID for magnetic field detection  
Low observables technology  
Ultrawideband technology  
Interferometric imagery  
Microsensor system  
Digital framing reconnaissance canvas  
Biologically based sensors  
Digital radars and processors

## **Undersea Technology**

Autonomous vehicles  
Bathymetric technology  
Anechoic coatings  
Acoustic holography  
Unmanned undersea vehicle dynamics  
Weapons launch

# EXECUTIVE DIRECTORATE

# Executive Directorate

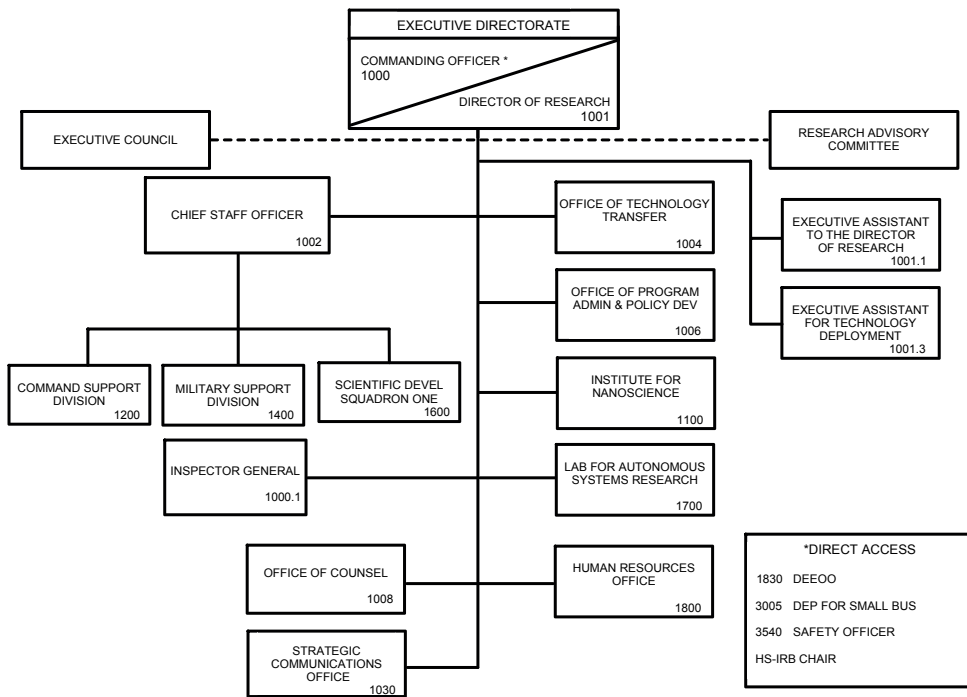
## Code 1000 and Code 1001

The Commanding Officer (Code 1000) and the Director of Research (Code 1001) share executive responsibility for the management of the Naval Research Laboratory. In accordance with Navy requirements, the Commanding Officer is responsible for the overall management of the Laboratory and exercises the usual functions of command, including compliance with legal and regulatory requirements, liaison with other military activities, and the general supervision of the quality, timeliness, and effectiveness of the technical work and of the support services.

The Commanding Officer delegates line authority and assigns responsibility to the Director of Research for the Laboratory's technical program, its planning, conduct, and staffing; evaluation of the technical competence of personnel; liaison with the scientific community; selection of subordinate technical personnel; exchange of technical information; and the effective execution of the NRL mission.

Within the limits of Navy regulations, the Commanding Officer and the Director of Research share authority and responsibility for the internal management of the Laboratory. The Commanding Officer retains all authority and responsibility specifically assigned to him by higher authority.

The mission of the Laboratory is carried out by three science and technology directorates and the Naval Center for Space Technology, supported by the Business Operations Directorate and the Executive Directorate. In addition, the Laboratory's operating staffs provide assistance in their special fields to the Commanding Officer and to the Director of Research. The operating staffs are listed on the following pages of this publication.



## Key Personnel

CAPT M.C. Bruington, USN	Commanding Officer	1000
Dr. J.A. Montgomery	Director of Research	1001
Mr. D.J. DeYoung	Executive Assistant to the Director of Research	1001.1
Ms. M.V. Kisamore	Head, Strategic Workforce Planning	1001.2
Dr. G. Sandhoo	Executive Assistant for Technology Deployment/STILO	1001.3
Vacant	NRL Historian	1001.15
Mr. P.M. Clark, Sr.	Inspector General	1000.1
Ms. B.L. Gibson*	Command Management Review	1000.12
CAPT S. Moran, USN	Executive Officer	1002
Dr. R.C. Manak	Head, Office of Technology Transfer	1004
Ms. M.E. Dixon	Head, Office of Program Admin and Policy Development	1006
Mr. J.N. McCutcheon	Head, Office of Counsel	1008
Mr. V. Chen	Head, Strategic Communications Office	1030
Dr. E.S. Snow <sup>+</sup>	Director, Institute for Nanoscience	1100
Mr. T. Brewer	Head, Command Support Division	1200
CDR D.A. Ursini, USN	Head, Military Support Division	1400
CDR T. Wise, Jr., USN	Commanding Officer, Scientific Development Squadron ONE (VXS-1)	1600
Mr. A.C. Schultz <sup>+</sup>	Director, Laboratory for Autonomous Systems Research	1700
Ms. M.V. Kisamore*	Director, Human Resources Office	1800
Ms. L.L. Hill	Deputy Equal Employment Opportunity Officer	1830
Vacant	Deputy for Small Business	3005
Mr. K.J. Pawlovich	Head, Safety Branch	3540

\*Acting <sup>+</sup>Additional duty

# Commanding Officer



Captain Mark Bruington is the 38th Commanding Officer of the Naval Research Laboratory, assuming command on August 1, 2014. As NRL's Commanding Officer, he directs the activities of approximately 2,500 scientists, engineers, and support personnel in their mission to conduct leading-edge research and provide new technological capabilities to the Navy and Marine Corps. Prior to his assumption of command of NRL, he was the Principal Director, Programs at the Defense Security Cooperation Agency, charged with DoD humanitarian assistance, building partnership capacity and Foreign Military Training and Equipping U.S. partner nations.

Captain Bruington, a native of California, received his commission through the Aviation Officer Candidate School program after graduating from San Francisco State University with a B.S. in Physics. He received his naval aviator wings in 1992 and is a graduate of the United States Naval Test Pilot School (USNTPS), Class 117. He also holds an M.S. in Systems Engineering from Johns Hopkins University, M.S. in National Resource Strategy from the Industrial College of the Armed Forces, and is level III certified in Program Management and Test & Evaluation from the Defense System Management College.

His sea tours include an assignment in the A-6 Intruders with the VA-165, "The Boomers," aboard USS Nimitz (CVN-68) in support of Operation SOUTHERN WATCH. He next transitioned to the F-14 Tomcat and reported to VF-11, "The Red Rippers," aboard the USS John C. Stennis (CVN-74); again in support of Operation SOUTHERN WATCH. Following the events of September 11th, he joined VF-211, "The Fighting Checkmates," again aboard USS John C. Stennis (CVN-74), in the initial phases of Operation ENDURING FREEDOM, where he led numerous strikes in support of coalition troops in Afghanistan. He next transitioned to the Aerospace Engineering Duty Officer community.

His shore tours include instructor duty at USNTPS, Air Test and Evaluation Squadron 23 (VX-23) as the squadron's Safety Officer and F-14 project officer. Next he served as the Vehicle Systems Integrated Product Team (IPT) lead F-35 Lightning II Joint Strike Fighter program office in Arlington, VA. Following this tour, he attended ICAF where he earned distinguished graduate honors then as part of the OPNAV N88 staff. Returning to Patuxent River, he next served as the Deputy Program Manager, PMA-265 for the F/A-18 E/F & EA-18G air vehicle and Royal Australian Air Force (RAAF) F/A-18F programs.

Captain Bruington has flown more than 70 combat missions above Iraq and Afghanistan, flown 41 different types of aircraft while amassing 3,200 flight hours and over 500 carrier-arrested landings. His decorations include the Defense Meritorious Service Medal, Meritorious Service Medal, four Air Medals, and numerous personal, campaign, and unit level awards.

Captain Bruington has flown more than 70 combat missions above Iraq and Afghanistan, flown 41 different types of aircraft while amassing 3,200 flight hours and over 500 carrier-arrested landings. His decorations include the Defense Meritorious Service Medal, Meritorious Service Medal, four Air Medals (Strike/Flight), and numerous personal, campaign, and unit level awards.

## Director of Research



**D**r. John A. Montgomery joined the Naval Research Laboratory in 1968 as a research physicist in the Advanced Techniques Branch of the Electronic Warfare Division, where he conducted research on a wide range of electronic warfare (EW) topics. In 1980, he was selected to head the Off-Board Countermeasures Branch. In May 1985, he was appointed to the Senior Executive Service and was selected as superintendent of the Tactical Electronic Warfare Division. He has been responsible for numerous systems that have been developed/approved for operational use by the Navy and other services. He has had great impact through the application of advanced technologies to solve unusual or severe operational deficiencies noted during world crises, most recently in Afghanistan, Iraq, and for homeland defense and in the Pacific theater. Dr. Montgomery has accumulated 48 years of civilian service at the Naval Research Laboratory.

Dr. Montgomery received the Department of Defense Distinguished Civilian Service Award in 2001. He was recognized by the Department of the Navy Distinguished Civilian Service Award in 1999 and by the Department of the Navy Meritorious Civilian Service Award in 1986. As a member of the Senior Executive Service, he received the Presidential Rank Award of Distinguished Executive in 1991 and again in 2002, and the Presidential Rank Award of Meritorious Executive in 1988, 1999, and again in 2007. He also received the 1997 Dr. Arthur E. Bisson Prize for Naval Technology Achievement, awarded by the Chief of Naval Research in 1998. Further, he received the Association of Old Crows (Electronic Defense Association) Joint Services Award in 1993. He was an NRL Edison Scholar, and is a member of Sigma Xi. He served as the U.S. National Leader of The Technical Cooperation Program's multinational Group on Electronic Warfare from 1987 to 2002, and served as its Executive Chairman. In 2006, Dr. Montgomery received the Laboratory Director of the Year award from the Federal Laboratory Consortium for Technology Transfer, and in 2011, he received the Roger W. Jones Award for Executive Leadership from American University's School of Public Affairs. In 2013, he was elected to membership in the National Academy of Engineering.

Dr. Montgomery received his B.S. in physics from North Texas State University in 1967 and his M.S., also in physics, in 1969. He received his Ph.D. in physics from the Catholic University of America in 1982. As Director of Research at the Naval Research Laboratory, Dr. Montgomery oversees research and development programs with expenditures of approximately \$1.2B per year.



# Executive Council



The Executive Council consists of executive, management, and administrative personnel. Executive Council members include the following:

- Commanding Officer, Chairperson
- Director of Research
- Executive Assistant to the Director of Research
- Associate Directors of Research
- Executive Officer
- Director, Naval Center for Space Technology
- Associate Director, Naval Center for Space Technology
- Heads of Divisions
- Director, Laboratories for Computational Physics and Fluid Dynamics
- Director, Center for Bio/Molecular Science and Engineering
- Director, Human Resources Office
- Public Affairs Officer
- Deputy Equal Employment Opportunity Officer
- Head, Office of Program Administration and Policy Development
- Safety Officer
- Head, Office of Counsel
- Head, Office of Technology Transfer
- Head, Management Information Systems Staff
- Head, Office of Research Support Services
- Representative, Administrative Advisory Council
- Director, Institute for Nanoscience
- Director, Laboratory for Autonomous Systems Research

# Research Advisory Committee



The Research Advisory Committee advises the Commanding Officer and the Director of Research on scientific programs and the administration of the Laboratory. The committee assists in planning the long-range scientific program, coordinating the scientific work, reviewing the budget, accepting or modifying problems, considering personnel actions, and initiating such studies as may be necessary or desirable. The membership consists of the following:

Director of Research, Chairperson  
Commanding Officer  
Associate Directors of Research  
Executive Officer (Observer)



Mr. P.M. Clark, Sr.

### **Inspector General — Code 1000.1**

When directed, the Laboratory's Inspector General investigates, inspects, and/or inquires into matters that affect the operation and efficiency of NRL. These matters include but are not limited to: effectiveness, efficiency, and economy; management practices; and fraud, waste, and abuse. He serves as principal advisor to the Commanding Officer on all inspection matters and audits and is the principal point of contact and liaison with all agencies outside NRL.



CAPT S. Moran, USN

### **Executive Officer — Code 1002**

The Chief Staff Officer serves as the Deputy to the Commanding Officer and acts for the Commanding Officer in his absence. The Command Support Division (Code 1200), the Military Support Division (Code 1400), and the Scientific Development Squadron One (VXS-1) (NAS Patuxent River, MD, Code 1600) report directly to the Chief Staff Officer.



Mr. V. Chen

### **Strategic Communications Officer — Code 1031**

The Public Affairs Officer (PAO) advises the Commanding Officer and Director of Research on public affairs matters, including external and internal relations and community outreach, and serves as the Commanding Officer's principal assistant in the area of public affairs. To do this, the PAO plans and directs a program of public information dissemination on official NRL activities. The PAO coordinates responses to requests from the news media and the public for unclassified information or materials dealing with the Laboratory, coordinates participation in community relations activities, and directs the internal information programs. The PAO is also responsible for coordinating all actions within the Laboratory that respond to requirements of the Freedom of Information Act (FOIA).



Ms. L.L. Hill

### **Deputy Equal Employment Opportunity Officer — Code 1830**

The Deputy Equal Employment Opportunity Officer (DEEEO) is the EEO program manager and the advisor to the Commanding Officer on all EEO matters. The DEEEO manages the discrimination complaint and reasonable accommodation processes and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Hispanic Employment, African American Employment, Asian-Pacific Islanders, American Indian Employment, Individuals with Disabilities, including Disabled Veterans). The DEEEO recruits quality candidates for those areas when underrepresentation exists. Duties also include reviewing, coordinating, and monitoring implementation of EEO policies and developing local guidance, directives, and implementation procedures for the EEO programs.

# Office of Technology Transfer

Code 1004



**Head:** Dr. R.C. Manak

**Point of Contact:** Ms. D.E. Heddings  
Code 1004  
(202) 767-7229

## Key Personnel

Dr. R.C. Manak	Head, Technology Transfer Office	1004
Mr. S.P. Marquis	Sr. Licensing Associate	1004
Ms. A.M. Horansky-McKinney	Sr. Licensing Associate	1004
Mr. G. Letscher	Licensing Associate	1004
Dr. H. Ricks-Laskoski	Licensing Associate	1004
Ms. D.E. Heddings	Sr. Management Analyst	1004
Ms. E.R. Crutchfield	Management Analyst	1004
Vacant	Administrative Assistant (SCEP)	1004

**Personnel:** 7 full-time civilian; 1 SCEP student

## Basic Responsibilities

The Technology Transfer Office (TTO) is responsible for NRL's implementation of the Federal Technology Transfer Act of 1986 (Public Law 99-502). The law requires the transfer of Government innovative technologies to industry for commercialization as products and services for public benefit. TTO negotiates Cooperative Research and Development Agreements (CRADAs) under which NRL investigators collaborate with investigators from industry, academia, state or local governments, or other Federal agencies to develop NRL technologies for government and/or commercial use. It markets NRL's patented inventions, negotiates patent license agreements under which the Navy grants a licensee the right to make, use, and sell NRL inventions (in exchange for receiving licensing fees and a percentage of sales), and enforces licenses to assure diligence in commercialization efforts.

# Office of Program Administration and Policy Development

Code 1006



**Head:** Ms. M.E. Dixon

**Point of Contact:** Ms. D.L. Gibson  
Code 1006.2  
(202) 767-3370

## Key Personnel

Ms. M.E. Dixon	Head, Office of Program Admin and Policy Development	1006
Ms. L.S. Herrin	Head, Program Administration Staff	1006.1
Ms. D.L. Gibson	VIP Coordinator/Protocol Officer/Admin Officer	1006.2
Ms. M.M. Webb	Head, Executive Management & Policy Develop Staff	1006.3
Ms. M.E. Barton	Directives	1006.31
Ms. M.E. Dixon*	Head, NRL Facilities Staff	1006.4
Vacant	Special Assistant	1006.6
Mr. K. Szczublewski	Administrative Resources Manager	1006.7

**Personnel:** 16 full-time civilian

\*Acting

## Basic Responsibilities

The Office of Program Administration and Policy Development provides managerial, technical, and administrative support to the Director of Research (DOR) in such areas as program and policy development, intra-Navy and inter-Service Science and Technology (S&T) program coordination; liaison with other Navy, DoD, and government activities on matters of mutual concern; and support to the Executive Directorate in planning and directing NRL's S&T (6.1, 6.2) program. Specific functions include: monitoring and providing background information on technical and policy matters that come under the purview of the DOR; representing NRL, ONR, and/or the Navy on tri-Service or DoD-wide coordination matters; performing special studies or chairing ad hoc study groups regarding program decisions or policy positions; performing special studies involving major NRL programs and resource issues; providing administrative support in the areas of personnel, budget, facilities, equipment, and security; providing executive management information and analyses for various aspects of the S&T program effort; coordinating VIP visits to NRL; managing the NRL directives system; administering the NRL response to Congressional requests; maintaining the NRL R&D achievements file; developing the S&T guidance for monitoring and reporting the NRL S&T program; administering NRL's various postdoctoral fellowship programs; and managing the Facility Modernization Program.

# Office of Counsel

Code 1008



**Head:** Mr. J.N. McCutcheon

**Point of Contact:** Legal Assistant  
Code 1008.1  
(202) 767-2244

## Key Personnel

Mr. J.N. McCutcheon	Head, Office of Counsel	1008
Mr. C.G. Steenbuck	Deputy Counsel	1008.1
Mr. K.L. Broome	Associate Counsel/Intellectual Property	1008.2
Mr. D.J. Gearin	Assistant Counsel/SSC Legal Matters	1008.3
Mr. S.G. Bell	Assistant Counsel/SSC IP Matters	1008.3

**Personnel:** 30 full-time civilian

## Basic Responsibilities

The Office of Counsel is responsible for providing legal services to NRL's management in all areas of general, administrative, intellectual property, and technology transfer law. The Office reviews all procurement-related actions; reviews NRL scientific papers prior to publication; prepares patent applications and prosecutes the applications through the Patent and Trademark Office; defends against contract protests, other contract litigation, and personnel cases; and advises on other legal matters relating to technology transfer, personnel, fiscal, and environmental law.

NRL Counsel also serves as legal advisor to the Commanding Officer and Director of Research.

# Institute for Nanoscience

Code 1100



**Director:** Dr. E.S. Snow<sup>o</sup>

**Point of Contact:** Ms. C.A. Habron  
Code 1100  
(202) 767-1804

<sup>o</sup>Additional Duty

## Key Personnel

Dr. E.S. Snow <sup>o</sup>	Director, Institute for Nanoscience	1100
Ms. C.A. Habron	Position Assistant	1100
Mr. D.R. St. Amand	Facilities Manager	1100
Mr. D.W. Zapotok	Facilities Manager	1100
Mr. W.A. Spratt	Facilities Manager	1100

**Personnel:** 4.5 full-time civilian

## Staff Activity Areas

Interdisciplinary nanoscience that enables:

- Low-power, high-speed electronics
- Lightweight, high-strength materials
- Highly sensitive molecular sensors
- Efficient energy generation and storage
- Quantum information technologies
- Hybrid bio/inorganic systems

## Basic Responsibilities

The Institute for Nanoscience has two primary responsibilities: to administer an interdisciplinary research program in nanoscience and to provide NRL scientists with high-quality laboratory space and state-of-the-art nanofabrication facilities.

The mission of the research program is to conduct highly innovative, interdisciplinary research at the intersections of the fields of materials, electronics, and biology in the nanometer size domain. The Institute exploits the broad multidisciplinary character of NRL to bring together scientists and engineers with disparate training and backgrounds to attack common goals at the intersection of their respective fields at this length scale. The Institute's S&T programs provide the Navy and DoD with scientific leadership in this complex, emerging area and help to identify opportunities for advances in future defense technology.

The Institute also operates a nanoscience research building containing nanofabrication facilities and environmentally controlled measurement laboratories. The central core of the building, a 5000 ft<sup>2</sup> Class 100 clean room, has been outfitted with the newest tools to permit nanofabrication, measurement, and testing of devices. In addition to the clean room facility, the building also contains 5000 ft<sup>2</sup> of controlled-environment laboratory space, which is available to NRL researchers whose experiments are sufficiently demanding to require this space. There are 12 of these laboratories within the building. They provide shielding from electromagnetic interference, and very low floor vibration and acoustic levels. Eight of the laboratories control the temperature to within  $\pm 0.5$  °C and four to within  $\pm 0.1$  °C.

## Major Research Capabilities and Facilities

Clean room (5000 ft<sup>2</sup>), quiet (4000 ft<sup>2</sup>), and ultra-quiet (1000 ft<sup>2</sup>) laboratories  
35 dB and 25 dB acoustically isolated zones  
20°C  $\pm$  0.5°C and 0.1°C controlled temperature zones  
Vibration isolation  
Vertical (mm, pp) <0.1 @ 70–500 Hz  
Horizontal (mm, pp) <0.1 @ 70–500 Hz  
Clean electrical power, free from SCR spikes and other interferences, and <  $\pm$ 10% voltage change  
<0.5 mG at 60 Hz EMI  
45  $\pm$  5% relative humidity  
Class 100 clean room  
Source of water meeting ASTM D5127 spec.  
Type E1.2  
Clean Room Major Equipment  
Monitoring system (toxic gas, hazmat, temperature)  
Laminar flow wet benches for localized Class 1/10 ambient in clean room  
Air purification unit to remove local organic contamination  
DI water system  
Wire bonder  
Two electron-beam writers

Two scanning electron microscopes  
Atomic force microscope  
Metallurgical optical microscopes  
3D optical profiler  
Mask aligners (2, 1, and 0.2  $\mu$ m)  
Electron beam evaporation systems  
Low pressure chemical vapor deposition (LPCVD) system  
Magnetron sputter deposition system  
Reactive ion etching systems  
Dual-beam focused ion beam workstation  
Optical pattern generating system  
Laser micromachining system  
Plasma-enhanced chemical vapor deposition (PECVD) system  
Plasma-enhanced atomic layer deposition system  
Chlorine reactive ion etching system  
3D optical lithography system  
Other Major Equipment  
Transmission electron microscope  
UHV multi-tip scanning tunneling microscope/nanomanipulator  
Aberration-corrected scanning transmission electron microscope



# Command Support Division

Code 1200



**Director:** Mr. T.B. Brewer

**Point of Contact:** Ms. N.M. White  
Code 1202  
(202) 767-6987

## Key Personnel

Mr. T.B. Brewer	Head, Command Support Division	1200
Ms. N.M. White	Administrative Officer	1202
Mr. K.A. Wheelock	Head, Stennis Space Center Security Staff	1203
Mr. C.D. Dodson	Head, Force Protection and Physical Security Branch	1210
Mr. J.D. Millard	Head, Information Assurance and Communications Security Branch	1220
Ms. V.L. Cicala	Head, Information Security and Special Programs Branch	1230
Ms. R.A. Proctor	Head, Personnel Security and Visitor Control Branch	1240

**Personnel:** 66 full-time civilian

## Basic Responsibilities

The Command Support Division is responsible for NRL security policy, management, and enforcement. The Division Head is the NRL Security Manager. The primary areas of security are: information assurance, information security, personnel security, industrial security, classification management, public release, foreign disclosure, physical security, force protection, antiterrorism, operations security, special security programs, and communications security. Provides security education across all security disciplines. Conducts local inspections for compliance with current internal and external policies. Provides advice and guidance to senior NRL management concerning the security posture of the Command.

# Military Support Division

Code 1400



**Head:** CDR D.A. Ursini, USN

**Point of Contact:** LT T.J. Reichhart  
Code 1410  
(202) 767-2103

## Key Personnel

CDR D.A. Ursini, USN	Head, Military Support Division	1400
Ms. M.S. Braschler	Administrative Officer	1402
LT T.J. Reichhart, USN	Administrative Officer	1410
YN1 N. Brown, USN	Administrative Yeoman	1410A
LT K.W. Smith, USN	Project Officer	1430
LT B. Bullen, USN	Project Officer	1430A
LT J. Chatfield, USN	Project Officer	1430B

**Personnel:** 1 full-time civilian; 6 military

## Basic Responsibilities

The Military Support Division provides military operational and administrative services to NRL.

The Operations Branch assists NRL research directorates in planning and executing project flight missions, develops deployment schedules and military operational and training objectives, and coordinates the Research Reserve Program within NRL.

The Military Administration Branch is responsible for the coordination and efficient functioning of all military administrative operations for NRL (including site detachments). These duties specifically include: personnel actions, maintenance of personnel records, performance evaluations, awards and training; advising the Chief Staff Officer on manpower matters and organization issues; and preparing and administering the military operational budget.

# Scientific Development Squadron ONE (VXS-1)

Code 1600



**Commanding Officer:** CDR T. Wise, USN

**Point of Contact:** LT S. Bender, USN  
Code 1640  
(301) 995-4122

## Key Personnel

CDR T. Wise, USN	Commanding Officer, VXS-1	1600
CDR D. Neall, USN	Executive Officer	1601
AWFCS M. Marler, USN	Senior Enlisted Leader	1600.2
YN1 E. Moore, USN	Executive Secretary	1600.4
LT S. Bender, USN	Administrative Officer	1610
LCDR J. Thompson, USN	Projects Director/Operations Officer	1630/1630.1
LCDR M. McLean, USN	Maintenance Officer	1640
LT J. Warren, USN	Safety/NATOPS/Training Officer	1670
Mr. S. Rorke	Head, Configuration Branch	1690

**Personnel:** 4 full-time civilian; 65 military

## Staff Activity Areas

- Projects
  - Operations
  - Safety/NATOPS/Training
- Administration
- Maintenance
  - Quality Assurance
- Configurations
  - Project Liaison Officer

## Basic Responsibilities

The Scientific Development Squadron ONE (VXS-1) located at NAS Patuxent River, Maryland, operates and maintains three uniquely configured P-3 Orion aircraft and one C-12 aircraft. The men and women of the squadron provide the Naval Research Laboratory with airborne research platforms, conducting flights worldwide in support of a broad spectrum of projects and experiments. These include magnetic variation mapping, electro-optic infrared research, hydroacoustic research, bathymetry, electronic countermeasures, gravity mapping, data link, and radar research. The squadron annually logs approximately 1000 flight hours, and in its 51 years, Scientific Development Squadron ONE (VXS-1) has amassed 72,000 hours of mishap-free flying.



Scientific Development Squadron One hangar



Aircraft maintenance

# Laboratory for Autonomous Systems Research

Code 1700



**Director:** Mr. A.C. Schultz<sup>°</sup>

**Point of Contact:** Mr. A.C. Schultz  
Code 1700  
(202) 767-0792

<sup>°</sup>Additional Duty

## Key Personnel

Mr. A.C. Schultz <sup>°</sup>	Director, Laboratory for Autonomous Systems Research	1700
Mr. D.R. King	Facilities Manager	1700
Mr. A. O'Hara	Facilities Support	1700
Ms. D. Thorp	Secretary	1700

**Personnel:** 3.5 full-time civilian

## Staff Activity Areas

Multidisciplinary research, development, and integration in autonomous systems, including:

- Software for intelligent autonomy
- Novel human-systems interaction technology
- Mobility and platforms
- Sensor systems
- Power and energy systems
- Networking and communications
- Trust and assurance

## Basic Responsibilities

The Laboratory for Autonomous Systems Research provides specialized facilities to support highly innovative, interdisciplinary research in autonomous systems, including software for intelligent autonomy, sensor systems, power and energy systems, human–systems interaction, networking and communications, and platforms and mobility. The Laboratory capitalizes on the broad multidisciplinary character of NRL, bringing together scientists and engineers with disparate training and backgrounds to advance the state of the art in autonomous systems at the intersection of their respective fields. The Laboratory provides unique facilities and simulated environments (littoral, desert, tropical) and instrumented reconfigurable high bay spaces to support integration of science and technology components into research prototype systems. The objective of the laboratory is to enable Naval and DoD scientific leadership in this complex, emerging area and to identify opportunities for advances in future defense technology.

The facility includes a Reconfigurable Prototyping High Bay that allows real-time, accurate tracking of many entities (vehicles and humans) for experimental ground truth. Small UAVs and ground vehicles can simultaneously operate within the large high bay, which is viewable from four adjacent Human–System Interaction labs. The Tropical High Bay emulates a rainforest with appropriate terrain and plants, and includes flowing water features. An outdoor Highland Forest provides an additional forest environment, and also includes interesting water and terrain features. The Desert High Bay provides a simulated desert environment featuring a sand pit, natural rock walls, and appropriate lighting and wind. The Littoral High Bay provides a simulated coastal environment featuring sediment tanks, large pool with a sloping floor, and small flow tanks. In addition to the environmental high bays, the facility also has a Power and Energy Laboratory, a Sensor Laboratory, and a mechanical and electrical shop.

The facility is open to use by all NRL scientists contributing to the science and technology of autonomous systems and will host many NRL scientists as needed.

## Major Research Capabilities and Facilities

Prototyping High Bay: (150 ft by 75 ft by 30 ft), contains real-time motion capture system, directional environmental sounds, GPS repeater and simulator

Four human-systems interaction labs contain eye trackers and multiuser, multitouch monitors

Littoral High Bay with 45 ft by 25 ft by 5.5 ft deep pool with 16-channel wave generator and slope that allows simulation of littoral environments; multiple sediment tanks (from 5 ft to 16 ft); GPS repeater and simulator; portable tank 4 ft by 36 ft

Desert High Bay with a 40 ft by 14 ft area of sand 2.5 ft deep, and 18 ft high rock walls; high speed fans and variable lighting

Tropical High Bay, a 60 ft by 40 ft greenhouse, contains a re-creation of a southeast Asian rain forest with native plants; nominal 80 degrees temperature and 80% humidity; can generate rain events up to 6 in. per hour; Rainforest contains waterfall, stream, and pond

Outdoor test range is a 1/3 acre highland forest with a waterfall, stream and pond, and terrain of differing difficulty including large bolder structures and earthen berms

Sensor lab contains environmental chambers (small and walk-in) with maximum temperature range of –50°F to 375°F, relative humidity from 10% to 95% and for smaller chamber, barometric pressure of –9000 feet to 100,000 feet; lab also contains various fume hoods, biosafety cabinet, anechoic chamber, vapor generators, and other specialized equipment

Power and energy lab contains specialized equipment including a battery dry room, glove box, isolation room, and fume hoods

# Human Resources Office

Code 1800



**Director:** Ms. M.V. Kisamore\*

**Point of Contact:** Ms. R.A. Ward  
Code 1802  
(202) 404-2797

\*Acting

## Key Personnel

Ms. M.V. Kisamore*	Director, Human Resources Office	1800
Ms. R.A. Ward	Administrative Officer	1802
Ms. M.V. Kisamore*	Head, Information Technology and Reports Office	1804
Ms. A.M. Slattery	Head, Personnel Operations Branch	1810
Ms. L.L. Hill	Head, EEO, Diversity, and Employee Recognition Branch	1830
Ms. S.M. Cummings	Head, Employee Development and Management Branch	1840
Ms. L.J. Owens	Head, Employee Relations Branch	1850

**Personnel:** 30 full-time civilian

## Staff Activity Areas

Personnel Operations (Staffing and Classification)  
Employee Relations  
Employee Development  
Equal Employment Opportunity  
Compensation, Reports, and Demonstration Project  
Information Technology and Reports  
Manpower

## Basic Responsibilities

The Human Resources Office (HRO) provides civilian personnel, manpower, and Equal Employment Opportunity (EEO) services to the Naval Research Laboratory. The Human Resources Program provides the full range of operating civilian personnel management in the staffing and placement, position classification, employee relations, labor relations, employee development, EEO functional areas, manpower management, and morale, welfare, and recreation programs.

The HRO at NRL's main site in Washington, DC, services approximately 2,500 employees and provides a centralized capability to perform managerial, service, and advisory functions in support of field office operations. These include issuing policy and procedural directives; developing, designing, and maintaining automated systems; and monitoring and evaluating product effectiveness to develop and maintain efficient, cost-effective, service-oriented methods.



Personnel Operations Branch



Diversity and Employee Recognition Branch



Employee Development and Management Branch



Employee Relations Branch



# Ruth H. Hooker Research Library

Code 5596



**Chief Librarian:** Ms. S.M. Ryder

**Point of Contact:** Ms. S.M. Ryder  
Code 5596  
(202) 767-2357

## Key Personnel

Ms. S.M. Ryder	Chief Librarian	5596
Mr. J.C. Haesloop	Library IT Director	5596.5
Ms. J.E. Griffin	Head, Research Reports and Bibliography Section	5596.5

**Personnel:** 21 full-time civilian

## Basic Responsibilities

NRL's Ruth H. Hooker Research Library supports NRL and ONR scientists in conducting their research by making a comprehensive collection of the most relevant scholarly information available and useable; by providing direct reference and research support; by capturing and organizing the NRL research portfolio; and by creating, customizing, and deploying a state-of-the-art digital library. Traditional library resources include extensive technical report, book, and journal collections dating back to the 1800s housed within a centrally located research facility that is staffed by subject specialists and information professionals. The collections include 44,000 books; 80,000 digital books; 80,000 bound historical journal volumes; more than 3,500 current journal subscriptions; and approximately 2 million technical reports in paper, microfiche, or digital format (classified and unclassified). Research Library staff members provide advanced information consulting; literature searches against all major online databases including classified databases; circulation of materials from the collection including classified literature up to the Secret level; and retrieval of articles, reports, proceedings, or documents through our interlibrary loan and document delivery network. The digital library provides desktop access to thousands of journals, books, proceedings, reports, databases, and reference sources.

# **BUSINESS OPERATIONS DIRECTORATE**



# Business Operations Directorate

## Code 3000

The Business Operations Directorate provides executive management, policy development, and program administration for business programs needed to support the activities of the scientific directorates. This support is in the areas of financial management, supply management, technical information services, contracting, research and development services, and management information systems support.

## Associate Director of Research for Business Operations



**M**r. D.K. Therning was born in Modesto, California. He graduated from Washington State University with a bachelor's degree in finance in 1983 and earned a master's degree in business administration from George Mason University in 1993.

Mr. Therning has accumulated extensive experience in the financial business management of research, development, test, and evaluation (RDT&E) activities within the Department of the Navy (DON) beginning at the Naval Weapons Center, China Lake, California, where he served as a budget analyst in the Public Works Department and then in the Weapons Department. In 1984, he became the Financial Management Advisor to the Ordnance Systems Department. In 1985, under the auspices of the Naval Scientist Training and Exchange Program, he was selected for a one-year assignment in the Office of the Director of Naval Laboratories (DNL), Washington, DC. He remained on the DNL staff as a budget analyst until 1987, when

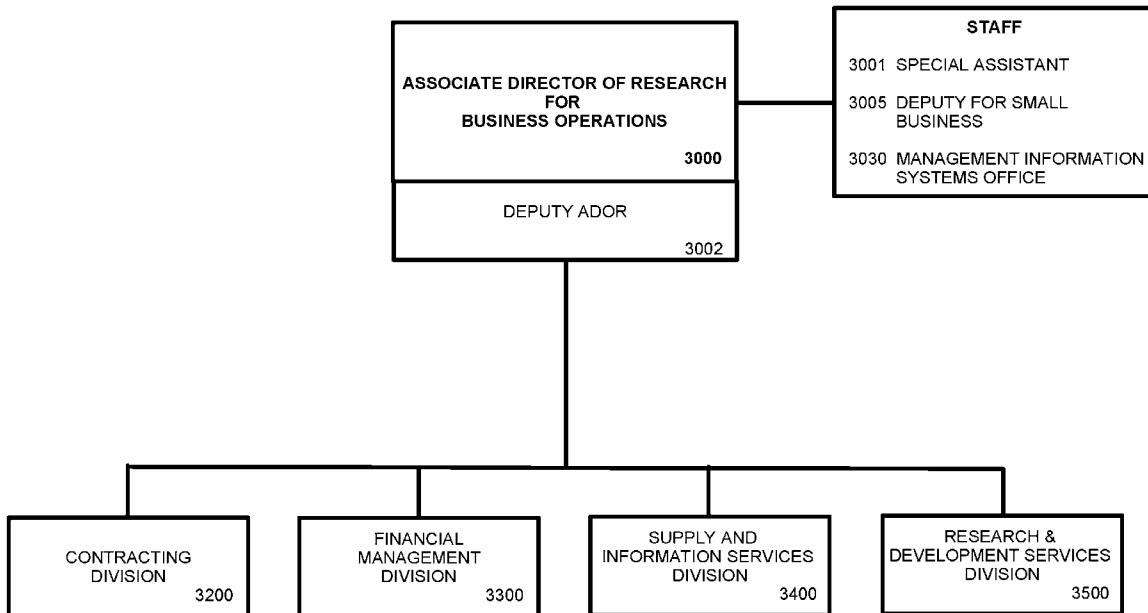
he was appointed Budget Officer of the DNL's seven Navy Industrial Fund R&D laboratories.

As the DON reorganized the R&D laboratories and T&E activities, Mr. Therning oversaw the financial reorganization of the DNL labs with other activities into the Naval warfare centers. Upon the disestablishment of DNL, Mr. Therning remained in the Space and Naval Warfare Systems Command as the Director of the Defense Business Operations Fund (DBOF) Resources Management Division, with collateral duty as the Financial Manager of the Naval Command, Control, and Ocean Surveillance Center (NCCOSC). During this time, he managed the conversion of nine appropriated fund engineering activities to DBOF and the financial consolidation of these activities with NCCOSC.

In 1995, Mr. Therning served as Head of the Revolving Funds Branch of the Office of the Assistant Secretary of the Navy (Financial Management and Controller), where he was responsible for the budget formulation and execution processes of all DON DBOF activities, which includes the RDT&E activities, shipyards, aviation depots, ordnance centers, and supply centers.

Mr. Therning was appointed Head, Financial Management Division/Comptroller of NRL in July 1996. In October 1996, in addition to leading the Financial Management Division, he assumed responsibilities for the Management Information Systems office. In January 1999, as an additional duty to his role as Comptroller, Mr. Therning was appointed to the newly established position of Deputy Associate Director of Research for Business Operations to assist in the management and administration of the Business Operations Directorate.

Mr. Therning was Acting Associate Director of Research for Business Operations from April 1999 until March 2000, when he was appointed the Associate Director of Research for Business Operations.



### Key Personnel

Mr. D.K. Therning	Associate Director of Research for Business Operations	3000
Ms. M.Q. Loften	Special Assistant	3001
Mr. A.P. Nave	Deputy Associate Director of Research for Business Operations	3002
Ms. S. Kelly	Deputy for Small Business	3005
Ms. P.W. Lowery	Head, Management Information Systems Office	3030
Ms. V.I. Hall	Head, Contracting Division	3200
Mr. J.O. Zamorano	Head, Financial Management Division/Comptroller	3300
Mr. B.W. Belcastro	Head, Supply and Information Services Division	3400
Mr. T.K. Hull, Jr.	Director, Research and Development Services Division	3500

**Point of Contact:** Ms. M. Loften, Code 3001, (202) 404-7462

# Contracting Division

Code 3200



**Head:** Ms. V.I. Hall

**Point of Contact:** Ms. K.P. Best  
Code 3202  
(202) 767-3749

## Key Personnel

Ms. V.I. Hall	Head, Contracting Division	3200
Ms. M.L. Muck	Deputy Head	3201
Ms. K.P. Best	Administrative Officer	3202
Mr. W.A. McGriff	Contracts Support Branch	3210
Ms. L.T. Kellstrom	Head, Contracts Branch 1	3220
Ms. C.A. Parnell	Head, Contracts Branch 2	3230
Ms. B.J. Green	Head, Contracts Branch 3	3240
Mr. R.D. Sewell	Team Lead, Contracts Section, SSC	3235

**Personnel:** 46 full-time civilian

## Staff Activity Areas

Advance Acquisition Planning  
Acquisition Strategies  
Acquisition Training  
Contract Negotiations  
Contractual Execution  
Contract Administration  
Acquisition Policy Interpretation and Implementation

## Basic Responsibilities

The Contracting Division is responsible for the acquisition of major research and development materials, services, and facilities where the value is in excess of \$150,000. It also maintains liaison with the ONR Procurement Directorate on procurement matters involving NRL. Specific functions include: providing consultant and advisory services to NRL division personnel on acquisition strategy, contractual adequacy of specifications, and potential sources; reviewing procurement requests for accuracy and completeness; initiating and processing solicitations for procurement; awarding contracts; performing contract administration and post-award monitoring of contract terms and conditions, delivery, contract changes, patents, etc., and taking corrective actions as required; providing acquisition-related training to division personnel; and interpreting and implementing acquisition-related Federal, Department of Defense, and Navy regulations.



Customers are greeted at the receptionist station.



Procurement Technician reviews contract file.



Specialist and Division Head discuss small business programs.



# Financial Management Division

Code 3300



**Head:** Mr. J.O. Zamorano

**Point of Contact:** Ms. S.L. Willett  
Code 3302  
(202) 767-2950

## Key Personnel

Mr. J.O. Zamorano	Head, Financial Management Division/Comptroller	3300
Ms. S.L. Willett	Administrative Officer	3302
Ms. E. Mitchell	Head, Financial Improvement and Audit Readiness Office	3305
Mr. E.L. Williams	Head, Budget and Funds Management Branch	3310
Mr. B.J. Ambroso	Head, Funding Section	3311
Ms. E.L. Williams	Head, Internal Budget Section	3312
Mr. W. Wong	Head, Corporate Budget Section	3313
Ms. S.L. Weber	Head, Financial Systems, Reports, and Accounting Branch	3350
Ms. L.L. Goodwin	Head, Cost Accounting Section	3351
Ms. L.L. Goodwin	Cost and Analysis Unit	3351.1
Ms. V.A. Reid	Head, Vendor Pay Unit	3351.2
Ms. L.D. Bowie	Head, Financial Services Section	3352
Ms. L.D. Bowie	Head, Payroll Services Unit	3352.1
Mr. M.A. Buchanan	Head, Travel Services Unit	3352.2
Ms. S.V. Greenwell	Head, Accounting Systems and Reports Section	3353
Ms. K.T. Lewis	Head, Asset Management and Accounting Section	3354

**Personnel:** 70 full-time civilian

## Staff Activity Areas

Budget  
Reports and Statistics  
Accounting  
Travel Services  
Payroll Liaison  
Audit Readiness  
Asset Management

## Basic Responsibilities

The Financial Management Division (FMD) is managed by the Head, Financial Management Division, who is designated the Naval Research Laboratory (NRL) Comptroller. The NRL Comptroller/Head of the FMD reports administratively to the SES Associate Director of Research for Business Operations, but maintains direct access to the Commanding Officer and Director of Research. The FMD develops, coordinates, and maintains an integrated system of financial management that provides the Commanding Officer, Director of Research, Associate Director of Research for Business Operations, and other NRL officials with the information and support needed to fulfill the financial and resource management aspects of their responsibilities. FMD translates NRL program requirements into the financial plan, formulates the NRL budget, monitors and evaluates performance with the budget plan, and provides recommendations and advice to NRL management for corrective actions or strategic program adjustments. FMD maintains the accounting records of NRL's financial and related resources transactions; and prepares reports, financial statements, and other documents in support of NRL management needs and/or to comply with external reporting requirements. FMD provides financial management guidance, policies, advice, and documented procedures to ensure that NRL operates in compliance with Navy and DoD regulations and with economy and efficiency. FMD coordinates efforts with the Defense Finance and Accounting Service (DFAS) to complete payment transactions related to NRL business (e.g., the payment of NRL personnel for payroll and travel expenses, and the payment to NRL's contractors and vendors for goods and services purchased by NRL). Additionally, FMD provides administrative support to the Management Information Systems (MIS) Office.



The Budget Branch prepares various financial analyses, reports, and studies in response to external data calls and/or management requests.



The Financial Systems, Reports, and Accounting Branch ensures that NRL's financial system satisfies user requirements and is in compliance with applicable rules and regulations, maintains official accounting records, and coordinates efforts with DFAS to complete payment transactions related to NRL business.

# Supply and Information Services Division

Code 3400



**Supply Officer:** Mr. B.W. Belcastro

**Point of Contact:** Ms. A.M. Olson  
Code 3402  
(202) 404-1701

## Key Personnel

Mr. B.W. Belcastro	Supply Officer	3400
Vacant	Deputy Supply Officer	3401
Ms. A.M. Olson	Administrative Officer	3402
Ms. D.M. Grimes	Head, Customer Support Staff	3403
Ms. T.M. Thomas	Head, Purchasing Branch	3410
Ms. K.K. Parrish	Head, Technical Information Services Branch	3430
Mr. R.C. Taylor	Head, Material Control Branch	3450
Ms. S.E. Bethea	Head, Administrative Services Branch	3460

**Personnel:** 107 full-time civilian

## Staff Activity Areas

Purchasing  
Technical Information Services  
Customer Support and Program Management  
Material Control  
Administrative Services  
Automated Inventory Management System  
Disposal and Storage

## Basic Responsibilities

The Supply and Information Services Division provides the Laboratory and its field activities with contracting, supply management, logistics, administrative, and technical information services. Specific functions include: procuring required equipment, material, and services; receiving, inspecting, storing, and delivering material and equipment; packing, shipping, and traffic management; surveying and disposing of excess and unusable property; operating various supply issue stores and performing stock inventories; providing technical and counseling services for the research directorates in the development of specifications for a complete procurement package; and obtaining and providing guidance in the performance stages of contractual services. Services also include publications, visual information, exhibits, photography, editing, and mailroom services and correspondence management.



Employees of the Administrative Services Branch discuss NRL electronic forms.



Customers and employee at the Supply store.



Woodworkers prepare boxes for shipping.



Disposal and storage in Building 49.



Photographer and videographer capture footage for a technical presentation.

# Research and Development Services Division

Code 3500



**Director:** Mr. T.K. Hull, Jr.

**Point of Contact:** Ms. D.M. Quinn  
Code 3502  
(202) 404-4312

## Key Personnel

Mr. T.K. Hull, Jr.	Director, Research and Development Services Division	3500
Ms. D.M. Quinn	Administrative Officer	3502
Mr. R.A. Dambrosio, Jr.	Head, Customer Liaison Staff	3505
Mr. S.Y. Chan	Head, Support Services Branch	3520
Mr. S.B. Daulat	Head, Engineering Section	3521
Mr. H.W. Rolf	Head, Chesapeake Bay Section	3522
Mr. E.T. Smith	Head, Shop Services Section	3523
Mr. U.E. Irby	Head, Production Control Section	3524
Mr. T. Miller	Head, Facilities, Planning and Operations Section	3525
Vacant	Head, Technical Services Branch	3530
Mr. K.J. Pawlovich	Head, Safety Branch	3540
Dr. P.M. Murray	Head, Occupational Safety and Health/Industrial Hygiene Section	3541
Mr. P.B. Knight	Head, Explosives Safety Section	3542
Ms. D.L. Cummings	Head, Health Physics Section	3544
Mr. D.R. Smith	Head, Environmental Section	3546
Ms. L. Jeffrieshunter	Head, Environmental Response Unit	3546.1

**Personnel:** 155 full-time civilian

## Basic Responsibilities

The Research and Development Services Division is responsible for the physical plant of the Naval Research Laboratory and subordinate field sites. The responsibilities include military construction, engineering, and coordination of construction; facility support services, planning, maintenance/repair/operation of all infrastructure systems; transportation; and occupational safety, health and industrial hygiene, and environmental safety.

The Division provides engineering and technical assistance to research divisions in the installation and operation of critical equipment in support of the research mission.

## Staff Activity Areas

- Engineering
- Production Control and Transportation
- Shop Services
- Chesapeake Bay Facilities Management
- Customer Liaison
- Safety and Occupational Health/Industrial Hygiene
- Explosives Safety
- Health Physics
- Environmental
- Utilities
- Telephones
- Facilities Planning and Operations

## Major Research Capabilities and Facilities

Military construction

Research support engineering

Planning

Full range of facility contracting, including construction, architect/engineering services, facilities support, and reserved parking

Transportation

Telephone services

Maintenance and repair of buildings, grounds, and communication and alarm systems

Shops for machining, sheet metal, carpentry, and welding

Safety and Occupational Health/Industrial Hygiene

Explosives safety

Health physics

Environmental Program



# SYSTEMS DIRECTORATE





# Systems Directorate

## Code 5000

The Systems Directorate applies the tools of basic research, concept exploration, and engineering development to expand operational capabilities and to provide materiel support to Fleet and Marine Corps missions. Emphasis is on technology, devices, systems, and know-how to acquire and move warfighting information and to deny these capabilities to the enemy. Current activities include:

- New and improved radar systems to detect and identify ever smaller targets in the cluttered littoral environment;
- Optical sensors and related materials to extract elusive objects in complex scenes when both processing time and communications bandwidth are limited;
- Unique optics-based sensors for detection of biochemical warfare agents and pollutants, for monitoring structures, and for alternative sensors;
- Advanced electronic support measures techniques for signal detection and identification;
- Electronic warfare systems, techniques, and devices including quick-reaction capabilities;
- Innovative concepts and designs for reduced observables;
- Techniques and devices to disable and/or confuse enemy sensors and information systems;
- Small “intelligent” autonomous land, sea, or air vehicles to carry sensors, communications relays, or jammers; and
- High performance/high assurance computers with right-the-first-time software and known security characteristics despite commercial off-the-shelf components and connections to public communications media.

Many of these efforts extend from investigations at the frontiers of science to the support of deployed systems in the field, which themselves provide direct feedback and inspiration for applied research and product improvement and/or for quests for new knowledge to expand the available alternatives.

In addition to its wide-ranging multidisciplinary research program, the Directorate provides support to the corporate laboratory in shared resources for high performance computing and networking, technical information collection and distribution, and in coordination of Laboratory-wide efforts in signature technology, counter-signature technology, Theater Missile Defense, and the Naval Science Assistance Program.

## Associate Director of Research for Systems

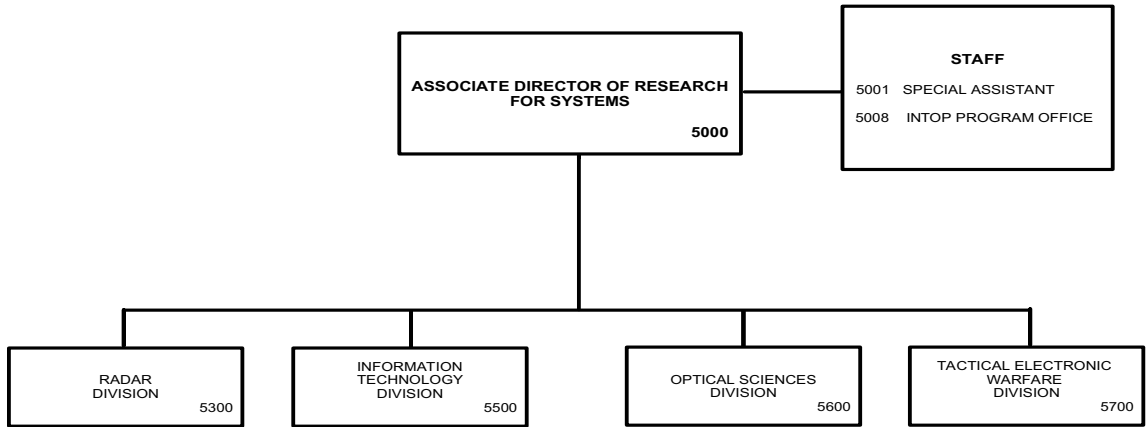


**D**r. Gerald M. Borsuk is the Associate Director of Research for the Systems Directorate at NRL in Washington, DC. He provides executive direction and leadership to four major NRL research divisions that conduct a broad multi-disciplinary program of scientific research and advanced technological development in the areas of optics, electromagnetic warfare, information technology, and radar with combined funding in fiscal year 2014 of \$490 million. He is responsible for the conduct and effectiveness of research programs performed within these divisions and for the overall administration of activities throughout the Systems Directorate. He is also the Focus Area Coordinator for all NRL Base programs in electronics science and technology.

Prior to his appointment as Associate Director of Research for Systems, Dr. Borsuk served for 23 years as the Superintendent of the Electronics Science and Technology Division at NRL, where he was responsible for the in-house execution of a multi-disci-

plinary program of basic and applied research in electronic materials and structures, solid state devices, nanometer scale electronics, vacuum electronics, and circuits. Prior to joining NRL, Dr. Borsuk served in the industrial sector for 17 years, first as a bench scientist and later as a manager of science and technology research. His last position in industry before joining NRL was as a science and technology manager at the Westinghouse Electric Corporation's (now Northrop-Grumman) Advanced Technology Laboratory in Baltimore, MD.

Dr. Borsuk received a doctorate in physics from Georgetown University in Washington, DC, in 1973. He is a Fellow of the IEEE. He has published in the literature and has been awarded several patents. He is the recipient of four Presidential Rank Senior Executive Awards, the most recent of which was the Distinguished Rank Award granted in 2010. Among his other recognitions for achievement, he is the recipient of the IEEE Frederik Philips Medal, the IEEE Harry Diamond Memorial Award, the IEEE Millennium Medal, and an IR-100 Award. Dr. Borsuk also served on the Editorial Board of the IEEE Proceedings for 18 years.



### Key Personnel

Dr. G.M. Borsuk	Associate Director of Research for Systems	5000
Ms. L.L. Williams	Special Assistant	5001
Dr. M. White	Special Consultant	5007
Mr. G.C. Tavik	Head, InTop Program Office	5008
Dr. B.G. Danly	Superintendent, Radar Division	5300
Dr. J.D. McLean	Superintendent, Information Technology Division	5500
Dr. C.A. Hoffman	Superintendent, Optical Sciences Division	5600
Dr. F.J. Klemm	Superintendent, Tactical Electronic Warfare Division	5700

**Point of Contact:** Ms. S. Hile, Code 5000A, (202) 767-3324

# Radar Division

Code 5300



**Superintendent:** Dr. B. Danly

**Point of Contact:** Dr. B. Danly  
Code 5300  
(202) 404-2700

## Key Personnel

Dr. B.G. Danly	Superintendent, Radar Division	5300
Mr. M.F. Walder	Associate Superintendent	5301
Ms. V. Short-Williams	Administrative Officer	5302
Mr. V. Gregers-Hansen	Head, AEGIS Coordinator Staff	5306
Dr. B.G. Danly	Head, Advanced Concepts Group	5307
Mr. T. Pizzillo	Head, Radar Analysis Branch	5310
Mr. G. Tavik	Head, Advanced Radar Systems Branch	5320
Dr. A. Shackelford	Head, Surveillance Technology Branch	5340

**Personnel:** 80 full-time civilian

## Staff Activity Areas

- Shipboard radar systems
- Small target detection
- Maritime Domain Awareness
- Networked Radar Concepts (FlexDAR)
- High-power millimeter-wave radar
- Radar analysis
- Advanced radar systems
- Surveillance Technology

## Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analyses and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors that are applicable to enhancing the Navy's ability to fulfill its mission.

## Major Research Capabilities and Facilities

Shipboard radar research and development test beds:

- FlexDAR demonstration system (every element digital beamforming)
- AN/SPS-49-A(V)1
- S-Band radar waveform development testbed

Airborne research radar facility, AN/APS-137D(V)5

High Power 94 GHz radar system

Ultra-high resolution radar (Microwave Microscope)

Radar signature calculation facility

Electromagnetic numerical computational facility

Compact range and nearfield antenna measurement laboratory

Electronic Protection (EP) and adaptive pulse compression (APC) testbed

Electronics and mechanical computer aided design facility

High Frequency (HF) Multiple-Input Multiple-Output (MIMO) testbed

HF Surface Wave Radar Testbed

Microwave and RF instrumentation laboratories

# Information Technology Division

Code 5500



**Superintendent:** Dr. J.D. McLean

**Point of Contact:** Dr. B.J. Cadwell  
Code 5501  
(202) 767-2954

## Key Personnel

Dr. J.D. McLean	Superintendent/Command Information Officer <sup>°</sup>	5500
Dr. B.J. Cadwell	Associate Superintendent	5501
Ms. A. Colpitts	Administrative Officer	5502
Dr. G.C. Gilbreath	Head, Freespace Photonic Communications Office	5505
Dr. R.P. Willis	Head, Adversarial Modeling and Exploitation Office	5508
Mr. A.C. Schultz	Director, Navy Center for Applied Research in Artificial Intelligence	5510
Dr. P. Klein	Head, Networks and Communication Systems Branch	5520
Mr. S. Chincheck	Director, Center for High Assurance Computer Systems	5540
Mr. M.A. Rupar	Head, Transmission Technology Branch	5550
Mr. R. Mittu	Head, Information Management and Decision Architectures Branch	5580
Mr. K. Rohwer	Director, Center for Computational Science/NRL Deputy Chief Information Officer <sup>°</sup>	5590
Ms. S.M. Ryder	Chief Librarian, Ruth H. Hooker Research Library	5596

**Personnel:** 212 full-time civilian

<sup>°</sup>Additional duty

## Basic Responsibilities

The Information Technology Division conducts basic research, exploratory development, and advanced technology demonstrations in the collection, transmission, processing, presentation, and distribution of information to provide information superiority and distributed networked force capabilities that improve Naval operations across all mission areas. The Division provides immediate solutions to current operational needs as required while developing those technologies necessary to implement the Navy after next.

## Research Activity Areas

Freespace Photonics Communications Office  
Adversarial Modeling and Exploitation Office  
Navy Center for Applied Research in Artificial Intelligence  
Transmission Technology  
Center for High Assurance Computer Systems  
Networks and Communication Systems  
Information Management and Decision Architectures  
Center for Computational Science  
Ruth H. Hooker Research Library

## Major Research Capabilities and Facilities

Extended Spectrum Experimentation Laboratory  
Robotics and Autonomous Systems Laboratory  
Immersive Simulation Laboratory  
Warfighter Human-Systems Integration Laboratory  
Audio Laboratory  
Mobile and Dynamic Network Laboratory  
Integrated Communications Technology Test Lab  
General Electronics Environmental Test Facility  
Key Management Laboratory  
Crypto Technology Laboratory  
Navy Cyber Defense Research Laboratory  
Communications Security (COMSEC) Laboratory  
Navy Shipboard Communications Testbed  
Behavior Detection Laboratory  
Virtual Reality Laboratory  
Service Oriented Architecture Laboratory  
Distributed Simulation Laboratory  
Motion Imagery Laboratory  
Laboratory for Large Data Research  
Affiliated Resource Center for High Performance Computing  
Ruth H. Hooker Research Library



# Optical Sciences Division

Code 5600



**Superintendent:** Dr. C.A. Hoffman

**Point of Contact:** Ms. C. Woods  
Code 5602  
(202) 767-9306

## Key Personnel

Dr. C.A. Hoffman	Superintendent, Optical Sciences Division	5600
Dr. J. Nichols	Associate Superintendent	5601
Ms. C. Woods	Administrative Officer	5602
Dr. J. Meyer	Head, Senior Scientific Staff	5604
Dr. B.L. Justus	Head, Optical Physics Branch	5610
Dr. J. Sanghera	Head, Optical Materials and Devices Branch	5620
Dr. K.J. Williams	Head, Photonics Technology Branch	5650
Mr. D.C. Linne von Berg	Head, Applied Optics Branch	5660
Dr. A. Dandridge	Head, Optical Techniques Branch	5670

**Personnel:** 131 full-time civilian

## Staff Activity Areas

- Program analysis and development
- Special systems analysis
- Technical study groups
- Technical contract monitoring
- Theoretical studies

## Research Activity Areas

- Optical Materials
- Lasers and other Optical Sources
- Organic and Inorganic Opto-Electronics
- Visible and Infrared Imaging and Image Processing
- RF and Integrated Photonics
- Fiber Optic Sensing
- Optical System Development

## Basic Responsibilities

The Optical Sciences Division carries out a variety of research, development, and application-oriented activities in the generation, propagation, detection, and use of radiation in the wavelength region between near-ultraviolet and far-infrared wavelengths. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices, materials, and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operational techniques. The applications activities include systems analysis, prototype system development, and exploitation of R&D results for the solution of optically related military problems. In addition to its internal program activities, the Division serves the Laboratory specifically and the Navy generally as a consulting body of experts in optical sciences. The work in the Division includes studies in quantum optics, laser physics, optical waveguide technologies, laser-matter interactions, atmospheric propagation, holography, optical data processing, fiber-optic sensor systems, optical systems, optical materials, radiation damage studies, IR surveillance and missile seeker technologies, IR signature measurements, and optical diagnostic techniques. A portion of the effort is devoted to developing, analyzing, and using special optical materials.

## Major Research Capabilities and Facilities

- Optical probes laboratory to study viscoelastic, structural, and transport properties of molecular systems
- Short-pulse excitation apparatus for kinetic mechanisms investigations
- IR laser facility for optical characterization of semiconductors
- Facilities for synthesis and characterization of optical glass compositions and for the fabrication of optical fibers
- Silica and IR fluoride/chalcogenide fiber fabrication facilities
- Environmental testing of fiber sensors (acoustic, magnetic, electric field, etc.)
- Mid-IR, low-phonon crystal growth facility
- Infrared countermeasure techniques laboratory
- Mobile, high-precision optical tracker
- EO/IR technology/systems modeling and simulation capabilities
- Field-qualified EO/IR measurement devices
- Focal plane array evaluation facility
- Facilities for fabricating and testing integrated optical devices
- Panchromatic and multi- and hyperspectral digital imaging processing facilities
- NRL P-3 aircraft sensor pallet
- Airborne EO/IR and radar sensors
  - VNIR through SWIR hyperspectral systems
  - VNIR, MWIR, and LWIR high-resolution systems
- Wideband SAR systems
- RF and laser data links
- High-speed, high-power photodetector characterization
- Communication link characterization to >100 Gbps
- RF phase noise, noise figure, and network analysis
- Ultrahigh-speed A/O converters

# Tactical Electronic Warfare Division

Code 5700



**Superintendent:** Dr. F.J. Klemm

**Point of Contact:** Mr. A.A. DiMattesa  
Code 5701  
(202) 767-5974

## Key Personnel

Dr. F.J. Klemm	Superintendent, Tactical Electronic Warfare Division	5700
Dr. J. Heyer	Senior Scientist for Electronic Warfare Technologies	5700.1
Mr. A.A. DiMattesa	Associate Superintendent	5701
Ms. J.C. Johnson	Administrative Officer	5702
Vacant	Senior Scientist for Expendable Vehicles	5704
Mr. G.K. Weissbach	Head, Electronic Warfare Lead Laboratory Staff	5705
Mr. J.E. Peak	Head, Signature Technology Office	5708
Mr. J.G. Durbin	Head, Offboard Countermeasures Branch	5710
Dr. T.A. Roberts	Head, Electronic Warfare Support Measures Branch	5720
Mr. M. Spath	Head, Aerospace Electronic Warfare Systems Branch	5730
Mr. M.J. Monsma	Head, Surface Electronic Warfare Systems Branch	5740
Mr. D.S. Fraedrich	Head, Advanced Techniques Branch	5750
Mr. T.R. Willats	Head, Integrated Electronic Warfare Simulation Branch	5760
Mr. J.Q. Binford	Head, Electronic Warfare Modeling and Simulation Branch	5770

**Personnel:** 269 full-time civilian

## Staff Activity Areas

EW Strategic Planning  
Signature Technology Office  
Effectiveness of Naval EW Systems (ENEWS)

## Basic Responsibilities

The Tactical Electronic Warfare Division (TEWD) is responsible for research and development in support of the Navy's tactical electronic warfare requirements and missions. These include electronic warfare support measures, electronic countermeasures, and supporting counter-countermeasures, as well as studies, analyses, and simulations for determining and improving the effectiveness of these systems.

## Research Activity Areas

- Offboard Countermeasures
- Airborne Electronic Warfare Systems
- Ships Electronic Warfare Systems
- Electronic Warfare Support Measures
- Advanced Techniques
- Integrated EW Simulation
- EW Modeling and Simulation

## Major Research Capabilities and Facilities

Visualization display room	Classified material lay-up facility
Transportable step frequency radar	Classified computing facilities
Vehicle development laboratory	RF measurement laboratory
Offboard test platform	Wet chemistry laboratory
Compact antenna range facility	Ultra-near-field test facility
Millimeter-Wave Antenna Range Facility	RF and millimeter-wave laboratory
TEWD Mechanical Fabrication Shop	Optical laboratory
RFCM techniques development chamber facility	Paint room
Low-power anechoic chamber	Secure laboratories for classified projects
High-power microwave research facility	
Electro-optics mobile laboratory	
Infrared-electro-optical calibration and characterization laboratory	
Infrared missile simulator and simulator development laboratory	
Secure supercomputing facility	
CBD/Tilghman Island IR field evaluation facility	
Ultrashort pulse laser effects research and analysis laboratory	
Central Target Simulator facility	
Flying Electronic Warfare laboratory	
High-power RF explosive laboratory	



**MATERIALS SCIENCE AND COMPONENT  
TECHNOLOGY DIRECTORATE**



# Materials Science and Component Technology Directorate

## Code 6000

The Materials Science and Component Technology Directorate carries out a multidisciplinary research program whose objectives are the discovery, invention, and exploitation of new improved materials, the generation of new concepts associated with materials behavior, and the development of advanced components based on these new and improved materials and concepts. Theoretical and experimental research is carried out to determine the scientific origins of materials behavior and to develop procedures for modifying these materials to meet important naval needs for advanced platforms, electronics, sensors, and photonics.

The program includes investigations of a broad spectrum of materials including insulators, semiconductors, superconductors, metals and alloys, optical materials, polymers, plastics, artificially structured bio/molecular materials and composites, and energetic materials, which are used in important naval devices, components, and systems. New techniques are developed for producing, processing, and fabricating these materials for crucial naval applications.

The synthesis, processing, properties, and limits of performance of these new and improved materials in natural or radiation environments, and under deleterious conditions such as those associated with the marine environment, neutron or directed energy beam irradiation, or extreme temperatures and pressures, are established. For new materials design, emphasis is placed on protection of the environment.

Additionally, major thrusts are directed in advanced sensing, detection, reactive flow physics, computational physics, and plasma sciences. Areas of particular emphasis include nanoscience and technology, fluid mechanics and hydrodynamics, nuclear weapon effects simulations, high energy density materials including fuels, propellants, explosives, and storage devices, interactions of various types of radiation with matter, survivability of materials and components, and directed energy devices.



## Associate Director of Research for Materials Science and Component Technology



**D**r. B.B. Rath was born in Banki, India. He received a B.S. degree in physics and mathematics from Utkal University, an M.S. in metallurgical engineering from Michigan Technological University, and a Ph.D. from the Illinois Institute of Technology.

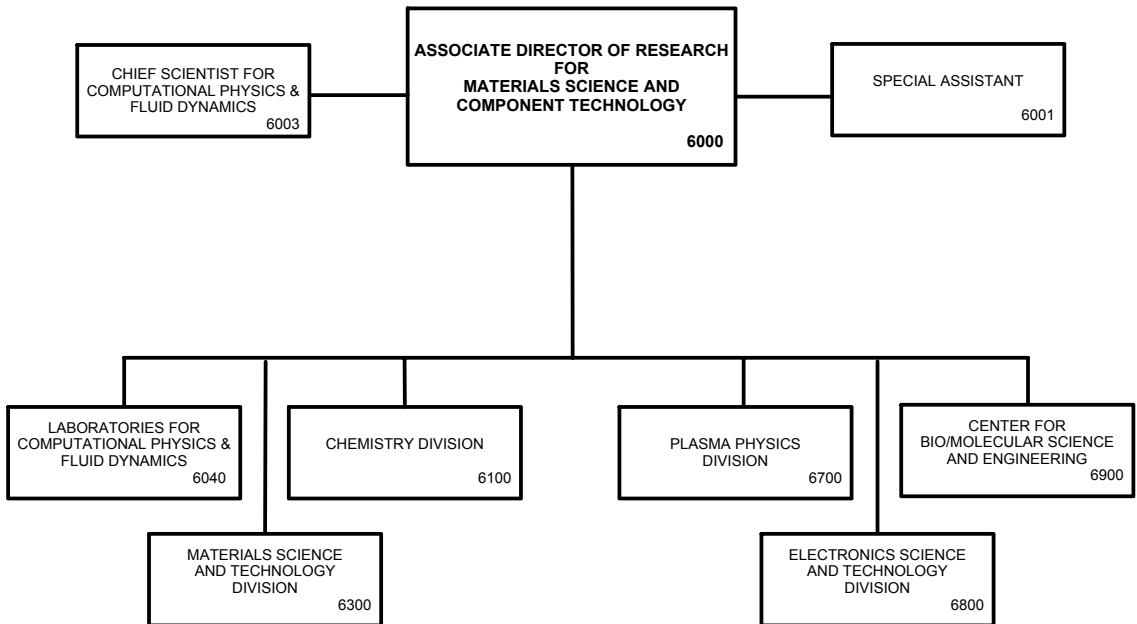
Dr. Rath was Assistant Professor of Metallurgy and Materials Science at Washington State University from 1961 to 1965. From 1965 to 1972, he was with the staff of the Edgar C. Bain Laboratory for fundamental research of the U.S. Steel Corporation. From 1972 to 1976, he headed the Metal Physics Research Group of the McDonnell Douglas Research Laboratories in St. Louis, Missouri, until he came to NRL as head of the Physical Metallurgy Branch. During this period, he was adjunct professor at Carnegie-Mellon University, the University of Maryland, and the Colorado School of Mines. Dr. Rath served as Superintendent of the Materials Science and Technology Division from 1982 to 1986, when he was appointed to his present position.

Dr. Rath is recognized in the fields of solid-state transformations, grain boundary migrations, and structure-property relationships in metallic systems. He has published over 140 papers in these fields and edited several books and conference proceedings.

Dr. Rath serves on several planning, review, and advisory boards for both the Navy and the Department of Defense, as well as for the National Materials Advisory Board of the National Academy of Sciences, National Science Foundation, University of Virginia, Colorado School of Mines, and the University of Florida. He is currently the Navy representative to the DOE Deputy Assistant Secretary's advisory and planning committee on methane hydrates, and the Navy representative to the Indo-U.S. Joint Commission on Science and Technology. He previously served as the Navy representative to the panel of The Technical Cooperation Program (TTCP) countries.

Dr. Rath is a member of the National Academy of Engineering. He is a fellow of the Minerals, Metals and Materials Society (TMS), American Society for Materials-International (ASM), Washington Academy of Sciences, Materials Research Society of India, the Institute of Materials of the United Kingdom, and the American Association for the Advancement of Science (AAAS). In 2007, Dr. Rath received an honorary doctorate in engineering from the Michigan Technological University and was elected to deliver the commencement address to the 2007 graduating class. In 2008, he received the Illinois Institute of Technology Mechanical Materials & Aerospace Engineering Department 2008 Alumni Recognition Award. In 2010, he received an honorary doctorate from Ravenshaw University and the Indian Institute of Technology.

Dr. Rath has received a number of honors and awards, most recently the Michigan Technological University Distinguished Alumni Award, the Padma Bhushan Award of Honors and Excellence bestowed by the President of India, and the Acta Materialia J. Herbert Hollomon Award. His other awards include the DoD Distinguished Civilian Service Award which is presented by the Secretary of Defense for distinguished accomplishments and sustained superior service, the 2005 Fred Saalfeld Award for Outstanding Lifetime Achievement in Science, the Presidential Rank Award for Distinguished Executive (2005), the NRL Lifetime Achievement Award (2004), National Materials Advancement Award from the Federation of Materials Societies (2001), the Presidential Rank of Meritorious Executive Award (1999 and 2004), the S. Chandrasekhar Award and Medal, and the Award of Merit for Group Achievement from the Chief of Naval Research. He received the 1991 George Kimball Burgess Memorial Award, the Charles S. Barrett Medal, and the prestigious TMS Leadership Award for his contributions to materials research. The American Society for Materials-International and The Metals, Minerals, and Materials Society have jointly recognized him with the TMS/ASM Joint Distinguished Lectureship in Materials & Society Award and the 2001 ASM Distinguished Life Membership Award. He has served as the 2004–2005 President of the American Society for Materials. He also has served as a member of the Boards of Directors/Trustees of TMS, ASM-International, and the Federation of Materials Societies (FMS), as a member of the editorial boards of several international materials research journals, and as chairman of many committees of TMS, ASM, FMS, and American Association of Engineering Societies.



### Key Personnel

Dr. B.B. Rath	Associate Director of Research for Materials Science and Component Technology	6000
Mr. S.J. Gill	Special Assistant	6001
Dr. J.P. Boris	Chief Scientist for Computational Physics and Fluid Dynamics	6003
Dr. K. Kailasanath	Director, Laboratories for Computational Physics and Fluid Dynamics	6040
Dr. B.J. Spargo	Superintendent, Chemistry Division	6100
Dr. P. Matic	Superintendent, Materials Science and Technology Division	6300
Dr. T.A. Mehlhorn	Superintendent, Plasma Physics Division	6700
Dr. B. Levush	Superintendent, Electronics Science and Technology Division	6800
Dr. B.R. Ratna	Director, Center for Bio/Molecular Science and Engineering	6900

**Point of Contact:** Ms. D.L. Gray, Code 6000, (202) 767-2538

# Laboratories for Computational Physics and Fluid Dynamics

Code 6040



**Director:** Dr. K. Kailasanath

**Point of Contact:** Ms. C. Collier  
Code 6040  
(202) 404-1064

## Key Personnel

Dr. K. Kailasanath	Director, Laboratories for Computational Physics and Fluid Dynamics	6040
Ms. C. Collier	Administrative Officer	6040.2
Dr. J.P. Boris	Chief Scientist for Computational Physics and Fluid Dynamics	6003
Dr. R. Ramamurti	Head, Laboratory for Propulsion, Energetic, and Dynamic Systems	6041
Dr. G. Patnaik	Head, Laboratory for Advanced Computational Physics	6042
Dr. D. Mott	Head, Laboratory for Multiscale Reactive Flow Physics	6043

**Personnel:** 22 full-time civilian

## Research Activity Areas

Reactive Flows  
Computational Physics Developments  
Military Aircraft Noise Reduction  
Naval Air Propulsion

## Basic Responsibilities

The Laboratories for Computational Physics and Fluid Dynamics (LCP&FD) are responsible for the research leading to and the application of advanced analytical and numerical capabilities that are relevant to NRL, Navy, DoD, and other Government agencies. This research is pursued in the fields of compressible and incompressible fluid dynamics, reactive flows, fluid/structure interactions including submarine and aerospace applications, atmospheric and solar geophysics, magnetoplasma dynamics, application of parallel processing to large-scale problems such as unsteady flows of contaminants in and around cities, advanced propulsion concepts, flame dynamics for shipboard fire safety, jet noise reduction, and other disciplines of continuum computational physics as required to further the overall mission of NRL. The specific objectives of the LCP&FD are to develop and maintain state-of-the-art analytical and computational capabilities in fluid dynamics and related fields of physics; to establish in-house expertise in parallel processing for large-scale scientific computing; to perform analyses and computational experiments on specific relevant problems using these capabilities; and to transfer this technology to new and ongoing projects through cooperative programs with the research Divisions at NRL and elsewhere.

## Major Research Capabilities and Facilities

1120 Core Intel Cluster

1152 core AMD cluster

420 core Intel Core i7 Cluster with 88 Nvidia GPUs

256 Core Intel Core i7 Cluster with 16 NVIDIA GPUs, 70 Xeon Phi

136 Core Many-Core Platform with 136 Xeon Phi

More than 50 Apple and Intel workstations

200 TB RAID storage system

All computers have network connections to NICENET, allowing access to the NRL CCS facilities (including DoD HPC resources) and many other computer resources internal and external to NRL.

# Chemistry Division

Code 6100



**Superintendent:** Dr. B.J. Spargo

**Point of Contact:** Ms. M. Walters  
Code 6102  
(202) 767-2460

## Key Personnel

Dr. B.J. Spargo	Superintendent, Chemistry Division	6100
Dr. W.W. Schultz	Associate Superintendent	6101
Ms. M. Walters	Administrative Officer	6102
Mr. K.E. Lucas	Senior Scientific Staff	6104
Dr. C.M. Roland	Senior Scientist for Soft Matter Physics	6105
CDR S. Newell, USN	Biotechnology Program Manager	6106
Dr. G.E. Collins*	Head, Chemical Dynamics and Diagnostics Branch	6110
Dr. A.P. Saab	Head, Materials Chemistry Branch	6120
Mr. E.J. Lemieux	Head, Center for Corrosion Science and Engineering	6130
Dr. J.N. Russell, Jr.	Head, Surface Chemistry Branch	6170
Dr. S.L. Rose-Pehrsson	Head, Navy Tech Center for Safety and Survivability	6180

**Personnel:** 113 full-time civilian; 3 military; 5 intermittent; 3 part-time

\*Acting

## Research Activity Areas

Chemical Diagnostics  
Materials Chemistry  
Center for Corrosion Science and Engineering  
Surface/Interface Chemistry  
Safety and Survivability

## Basic Responsibilities

The Chemistry Division conducts basic research, applied research, and development studies in the broad fields of chemical/structural diagnostics, reaction rate control, materials chemistry, surface and interface chemistry, corrosion passivation, environmental chemistry, and ship safety/survivability. Specialized programs within these fields include coatings, functional polymers/elastomers, clusters, controlled release of energy, physical and chemical characterization of surfaces, electrochemistry, assembly and properties of nanometer structures, tribology, chemical vapor deposition/etching, atmosphere analysis and control, environmental protection/reclamation, prevention/control of fires, mobility fuels, modeling/simulation, and miniaturized sensors for chemical, biological, trace analysis and data fusion, and explosives.

To enhance protection of Navy personnel and platforms from damage and injury in peace and wartime, the Navy Technology Center for Safety and Survivability performs RDT&E on fire and personnel protection, fuels, chemical defense, submarine atmospheres, and damage control aspects of ship and aircraft survivability; supports Navy and Marine Corps requirements in these areas; and acts as a focus for technology transfer in safety and survivability.

To address problems in corrosion and marine fouling, a Marine Corrosion Facility is located in Key West, Florida. This laboratory resides in an unparalleled site for natural seawater exposure testing and marine related materials evaluation. The tropical climate is ideal for marine exposure testing. Along with the high quality seawater, the location provides small climatic variation and a stable biomass throughout the year.

## Major Research Capabilities and Facilities

### Synthesis/processing facilities

- Paint formulation and coating
- Functional polymers/elastomers/composites
- Nanotubes/Nanofibers
- Surface modification
- Thin film deposition/etching with in situ control
- Marine Corrosion Facility (at Key West, FL)
- Fire/Damage Control Test Facility (at Mobile, AL)
- Wave pool (at Mobile, AL)
- Large and small boat test platforms (at Mobile, AL)

### Characterization facilities

- General-purpose chemical analysis/trace analysis
- Surface diagnostics
- Nanometer scale composition/structure properties
- Magnetic resonance NDI
- Tribology
- Polymer structure/function/dynamics

### Special-purpose capability

- Environmental monitoring/remediation
- Combustion and fire research
- Alternate and petroleum-derived fuels

### Trace explosive detection test beds

- Trace vapor generation and detection test beds
- Simulation/modeling
- Synchrotron radiation beam lines (at NSLS, Brookhaven, NY)
- Pressurized test chambers (small, medium, large)

# Materials Science and Technology Division

Code 6300



**Superintendent:** Dr. P. Matic

**Point of Contact:** Mr. M.R. Shepherd  
Code 6302  
(202) 767-2458

## Key Personnel

Dr. P. Matic	Superintendent, Materials Science and Technology Division	6300
Dr. B. Jonker	Senior Scientist	6300.1
Dr. K. Bussmann	Associate Superintendent	6301
Mr. M.R. Shepherd	Administrative Officer	6302
Vacant	Head, Special Projects Group	6303
Dr. V.G. DeGiorgi	Head, Multifunctional Materials Branch	6350
Dr. A. Piqué*	Head, Materials and Systems Branch	6360
Dr. M.J. Mehl	Head, Center for Materials Physics and Technology	6390

**Personnel:** 93 full-time civilian

\*Acting

## Research Activity Areas

### Fundamental Materials and Physics

Density functional theory, molecular dynamics and multiphysics simulations, quantum dots, spintronics, and surface and interface physics

### Materials-based Concepts and Devices

Chemical and explosive detection, magneto-optic sensors, laser direct write, nonlinear dynamics, and advanced alloys

### Extreme Environment Multiphysics

Corrosion, electromagnetic launch, warfighter protection, additive manufacturing, and joining technology

### Materials for Energy

Fuel from seawater, battery and fuel cell materials, multiferroic energy harvesting, thermo-electric ceramics, and superconductor technologies

### Materials Informatics

3D materials science, multiscale simulation, atom probe tomography, TEM, SEM, tomography, and IR characterization

### Biology and Materials

Neuronal networks, single-cell process measurements, cell healing mechanisms, protein modeling in solution, and biomechanical modeling

## Basic Responsibilities

The Materials Science and Technology Division conducts basic and applied research in functional and structural materials and engages in exploratory and advanced development to generate new Navy technologies and defense capabilities. The Division efforts encompass metals, ceramics, polymers, composites, and biological materials for electrical, magnetic, optical, plasmonic, chemical, mechanical, and energy technologies. Major Division focus areas include fundamental material physics, innovative device design, performance in extreme environments, power and energy, materials informatics, and the interface between materials and biology. These efforts are performed by multidisciplinary teams of materials scientists, physicists, chemists, and engineers working at the atomic, nano, microstructural, mesostructural, and macroscopic scales. The integrated use of new experimental and computational techniques accelerates new scientific understanding and innovative engineering solutions. Advanced materials synthesis, processing, characterization, diagnostic capabilities, performance prediction methods, and life-cycle management methods are developed to further new device design, prototyping, and testing methods.

## Major Research Capabilities and Facilities

### Synthesis and Processing

- Hot and cold isostatic presses
- Isothermal heat treating facility
- Vacuum arc melting facility
- Rapid Solidification System
- Composites processing autoclave
- Thermal/sputter/MBE/PLD/CVD/Aerosol film deposition, atmosphere-UHV
- Parylene coater
- Laser direct write system
- Dip pen lithography-bioforce enabler
- 3D-printing of polymers
- Polymer extruder, synthesis and characterization
- Channel reactors for fuels synthesis
- Laser cutting facility
- Biomechanical surrogate fabrication
- Chemical-mechanical polishing

### Physical & Structural Property Characterization

- Conductive AFM/MFM
- Vibrating sample & SQUID magnetometry
- Magneto-transport characterization 1.5K-400K, 9T
- Analytical transmission electron microscopy
- Atomic-resolution scanning TEM
- Scanning electron microscopy with EDS, EBSD and automated robotic serial sectioning system
- Variable-pressure SEM
- Dual-beam focused ion beam system
- Atom probe tomography (LEAP)
- SIMS-SSAMS mass spectrometry for sub-ppb elemental characterization

- Quantitative metallography
- Thermal analysis characterization suite (TGA/DSC DMA/DEA/rheometer)
- Dielectric characterization facility
- Microwave device test facility
- Bomen infrared spectrometer facility
- Diffuse light scattering facility
- Femtosecond laser facility
- Magneto-electric materials characterization
- Gas chromatography
- X-ray computed microtomography with DCT
- X-ray diffractometers, powder and 4-circle
- Contact angle and surface tension analyzer
- LEED/RHEED/XPS/Auger characterization

### Mechanical Property Characterization

- Robotic multiaxial loading system
- Stress corrosion cracking measurement systems
- Computer-aided experimental stress analysis
- 2D and 3D strain imaging and measurement
- Material drop tower test facility
- Helmet drop tower test facility
- Shock tube
- Gas gun

### Imaging, Modeling, and Simulation

- High speed video and infrared cameras
- Quantum cascade lasers
- Live biological cell confocal imaging and manipulation system
- Live biological cell mechanical loading system
- High performance computer clusters



# Plasma Physics Division

Code 6700



**Superintendent:** Dr. T.A. Mehlhorn

**Point of Contact:** Dr. T.A. Mehlhorn  
Code 6700  
(202) 767-2723

## Key Personnel

Dr. T.A. Mehlhorn	Superintendent, Plasma Physics Division	6700
Dr. R.F. Hubbard	Associate Superintendent	6701
Ms. T.G. Santos	Administrative Officer	6702
Vacant	Senior Scientist, Radiation Physics and High Energy Density Materials	6705
Dr. G. Ganguli	Senior Scientist, Intense Particle Beams and Plasma Processes	6709
Dr. J. Giuliani	Head, Radiation Hydrodynamics Branch	6720
Dr. S.P. Obenschain	Head, Laser Plasma Branch	6730
Dr. W. Amatucci	Head, Charged Particle Physics Branch	6750
Dr. J. Schumer	Head, Pulsed Power Physics Branch	6770
Dr. J. Penano	Head, Beam Physics Branch	6790

**Personnel:** 90 full-time civilian

## Research Activity Areas

Radiation Hydrodynamics  
Laser Plasma  
Charged Particle Physics  
Pulsed Power Physics  
Beam Physics

## Basic Responsibilities

The Plasma Physics Division conducts a broad theoretical and experimental program of basic and applied research in plasma physics, laboratory discharge, and space plasmas, intense electron and ion beams and photon sources, atomic physics, pulsed power sources, laser physics, advanced spectral diagnostics, and nonlinear systems. The effort of the Division is concentrated on a few closely coordinated theoretical and experimental programs. Considerable emphasis is placed on large-scale numerical simulations related to plasma dynamics; ionospheric, magnetospheric, and atmospheric dynamics; nuclear weapons effects; inertial confinement fusion; atomic physics; plasma processing; nonlinear dynamics and chaos; free electron lasers and other advanced radiation sources; advanced accelerator concepts; and atmospheric laser propagation. Areas of experimental interest include laser–plasma, laser–electron beam, and laser–matter interactions, high-energy laser weapons, laser shock hydrodynamics, thermonuclear fusion, electromagnetic wave generation, the generation of intense electron and ion beams, large-area plasma processing sources, electromagnetic launchers, high-frequency microwave processing of ceramic and metallic materials, advanced accelerator development, inductive energy storage, laboratory simulation of space plasma phenomena, high-altitude chemical releases, and in situ and remote sensing space plasma measurements.

## Major Research Capabilities and Facilities

Mercury, 6 MV, 360 kA, magnetically insulated inductive voltage adder  
Gamble II, 1 MV, 1 MA pulsed power generator  
HAWK, 1 MA inductive storage facility  
Underwater laser acoustics system  
Table-Top Ti: Sapphire Femtosecond Laser (TFL) systems (10 Hz and 1 kHz)  
NIKE krypton fluoride laser facility  
Space Physics Simulation Chamber  
Plasma Applications Laboratory (low temperature plasmas at atmospheric and reduced pressures)  
Microwave facility for processing of advanced materials  
ELECTRA, repetitive-pulsed electron beam processing facility  
Railgun Materials Testing Facility  
Directed Energy Physics Facility (fiber lasers for weapons and power beaming applications)  
SWOrRD laser facility

# Electronics Science and Technology Division

Code 6800



**Superintendent:** Dr. B. Levush

**Point of Contact:** Ms. C. McConnell  
Code 6802  
(202) 767-3416

## Key Personnel

Dr. B. Levush	Superintendent, Electronics Science and Technology Division	6800
Dr. J.M. Pond	Associate Superintendent	6801
Ms. C. McConnell	Administrative Officer	6802
Vacant	Theoretical Consultant	6807
Dr. T.L. Reinecke	Senior Scientist for Nanoelectronics	6877
Dr. R.J. Walters	Head, Optoelectronics and Radiation Effects Branch	6810
Dr. D.K. Abe	Head, Electromagnetics Technology Branch	6850
Dr. E.S. Snow	Head, Physics of Electronic Materials Branch	6870
Dr. F.J. Kub	Head, High Power Electronics Branch	6880

**Personnel:** 107 full-time civilian

## Research Activity Areas

- Nanoelectronics
- Surface and Interface Sciences
- Microwave, Millimeter, and Submillimeter Technology
- Electronic Materials Growth, Characterization, and Processing
- Theoretical and Computational Electronics and Electromagnetics
- Power Electronics
- Optoelectronics
- Photovoltaics
- Radiation Effects
- Quantum Information and Sensing

## Basic Responsibilities

The Electronics Science and Technology Division conducts programs of basic science and applied research and development in nanoscience and nanotechnology, surface and interface sciences, electronic materials, computational modeling and simulation, power electronics, microwave, millimeter, and sub-millimeter technology, optoelectronics, photovoltaics, and radiation effects. The activities of the Division integrate device research with basic materials investigations and with systems research and development needs.

## Major Research Capabilities and Facilities

Solar Cell Characterization Laboratory  
Optoelectronic Scanning Electron Characterization Facility  
Infrared Sensor Characterization Laboratory  
Millimeter-Wave Vacuum Electronics Fabrication Facility  
Ultraviolet Photolithography Laboratory for Millimeter-wave and THz Devices  
Compound Semiconductor Processing Facility  
Atomic Layer Deposition System  
3D  $\mu$ -Printing by Direct Laser Writing  
Ultrafast Laser Facility  
Epicenter  
Laboratory for Advanced Materials Synthesis  
Advanced Silicon Carbide Epitaxial Research Laboratory  
High Pressure Laboratory

# Center for Bio/Molecular Science and Engineering

Code 6900



**Director:** Dr. B.R. Ratna

**Point of Contact:** Ms. E.C. Newman  
Code 6902  
(202) 404-6012

## Key Personnel

Dr. B.R. Ratna	Director, Center for Bio/Molecular Science and Engineering	6900
Ms. A.W. Kusterbeck	Assistant Director	6901
Ms. E C. Newman	Administrative Officer	6902
Dr. D.A. Stenger	Senior Scientist for Biosurveillance	6905
Dr. I.L. Medintz	Senior Scientist for Biosensors and Biomaterials	6907
Dr. J.R. Deschamps	Head, Laboratory for Biosensor and Biomaterials	6910
Ms. A.W. Kusterbeck*	Head, Laboratory for Biomolecular Dynamics	6920
Dr. L.M. Tender	Head, Laboratory for the Study of Molecular Interfacial Interactions	6930

**Personnel:** 57 full-time civilian

\*Acting

## Research Activity Areas

Biologically Derived Microstructures  
Biosensors  
Novel Materials  
Molecular Biology  
Energy Harvesting

## Basic Responsibilities

The Center for Bio/Molecular Science and Engineering is using the tools of modern biology, physics, chemistry, and engineering to develop advanced materials and sensors. The long-term research goal is first to gain a fundamental understanding of the relationship between molecular architecture and the function of materials, then apply this knowledge to solve problems for the Navy and DoD community. The key theme is the study of complex bio/molecular systems with the aim of understanding how “nature” has approached the solution of difficult structural and sensing problems. Technological areas currently being studied include molecular and microstructure design, molecular biology, imaging of cells using nanoparticles, sensor design and prototype development for biosurveillance or underwater chemical detection, and energy harvesting. Much of the research deals with the engineering of peptides, proteins, and nanoparticles into complex microstructures for use in advanced material applications, and the harnessing of the recognition functions of proteins and cells for the development of advanced sensors. A highly multidisciplinary staff is required to pursue these research and development programs. The Center provides a stimulating environment for cross-disciplinary programs in the areas of immunology, biochemistry, systems biology, electrochemistry, synthetic chemistry, microbiology, microlithography, photochemistry, biophysics, spectroscopy, advanced diagnostics, organic synthesis, and electro-optical engineering.

## Major Research Capabilities and Facilities

### Optical equipment

- Confocal microscope
- Raman microscope
- UV-visible absorption spectrophotometers
- Transmission electron microscope
- Scanning electron microscope
- Microscope/atomic force microscope
- Nanosight (nanoparticle tracking analysis)

### Analytical instruments

- Gas chromatography mass spectrometer
- HPLC
- LC/MS/MS system
- FluroMax-3 spectrofluorometer
- Titration workstation

### General facilities

- X-ray scattering
- Cold room for storage and preparation
- High-speed and microanalytical ultracentrifuges
- Inert atmosphere dry box
- NMR
- FTIR
- Ellipsometer
- Dynamic mechanical analyzer
- Differential scanning calorimeter
- Circular dichroism
- Minimill injection mold machine

### Multi RF centrifuge

- Perkin Elmer BioChip Arrayer I
- Freeze-dry system
- Affymetrix Gene Chip system
- Surface plasmon resonance (SPR)
- Isothermal calorimeter
- High-resolution 3D Printer



**OCEAN AND ATMOSPHERIC SCIENCE AND  
TECHNOLOGY DIRECTORATE**





# Ocean and Atmospheric Science and Technology Directorate

## Code 7000

The Ocean and Atmospheric Science and Technology Directorate performs research and development in the fields of acoustics, remote sensing, oceanography, marine geosciences, marine meteorology, and space science. Areas of emphasis in acoustics include advanced acoustic concepts and computation, acoustic signal processing, physical acoustics, acoustic systems, ocean acoustics, and acoustic simulation and tactics. Areas of emphasis in remote sensing include radio, infrared, and optical sensors, remote sensing physics and hydrodynamics, remote sensing simulation, and imaging systems. Areas of emphasis in oceanography include coastal and open ocean dynamics, ocean modeling and prediction, coastal and open ocean processes, remote sensing applications to oceanography, and marine biocorrosion processes. Areas of emphasis in marine geosciences

include marine physics, seafloor sciences, geospatial information science and technology, and mapping, charting, and geodesy. Areas of emphasis in marine meteorology include atmospheric dynamics for theater-wide, tactical-scale prediction systems and forecast support, and meteorological applications development. Areas of emphasis in space science include middle and upper atmosphere physics, solar terrestrial relationships, solar physics, and higher energy astronomy. Senior naval officers are assigned as military advisors to help maintain the directorate focus on operational Navy and other DoD requirements in these areas of emphasis. The directorate is responsible for administrative and technical support to major activities in Washington, DC; Stennis Space Center, Mississippi; and Monterey, California.

# Associate Director of Research for Ocean and Atmospheric Science and Technology



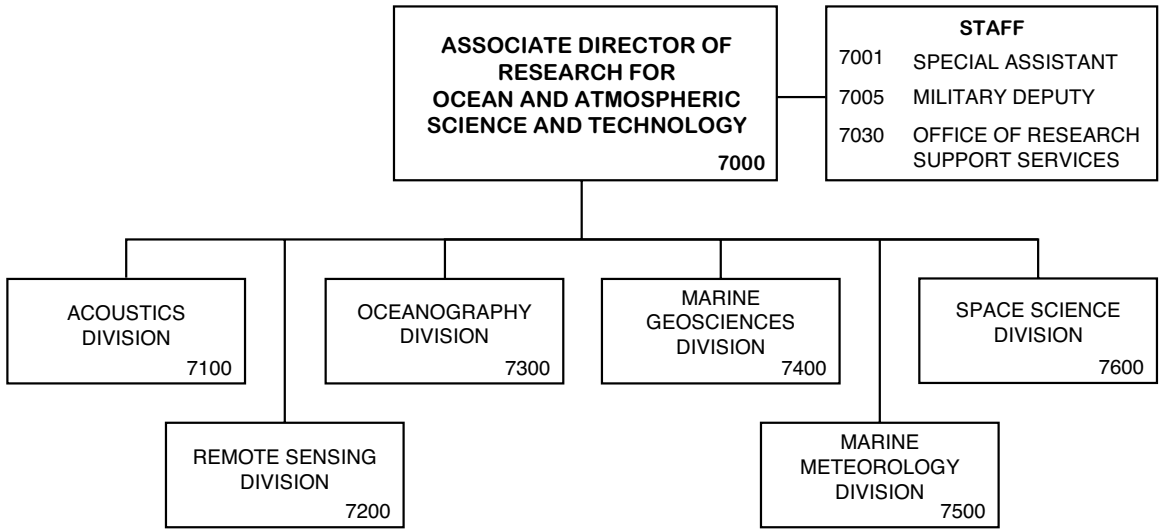
**D**r. E.R. Franchi was born in Huntington, New York. He graduated from Clarkson University in 1968 with a bachelor of science degree in mathematics. He received his master of science (1970) and Ph.D. (1973) degrees, both in applied mathematics, from Rensselaer Polytechnic Institute. After completing his graduate studies, Dr. Franchi accepted a research position with Bolt, Beranek, and Newman where he performed validation studies of underwater acoustic propagation and noise models.

Dr. Franchi joined the Naval Research Laboratory in 1975 as a research mathematician in the Acoustics Division. In this position, he conducted and directed research in low frequency acoustic reverberation and scattering, including design and conduct of field experiments, development of signal processing techniques, data analysis and interpretation, computer prediction models, and active sonar performance studies. In 1986, he was named head of the Acoustic Systems Branch where he was responsible for programs that emphasized theoretical, experimental, and computational research to understand the physical mechanisms of acoustic propagation, scattering, and

ambient noise that control the design and performance of large-aperture passive sonar systems, low frequency active sonar systems, and shallow water sonar systems.

In July 1988, Dr. Franchi was appointed to the Senior Executive Service and selected as the Associate Technical Director of the Naval Ocean Research and Development Activity (NORDA) and its Director of Ocean Acoustics and Technology. The Directorate conducted basic, exploratory, and advanced research and development and program management in the areas of acoustic model development and simulation, ocean acoustics measurements, and ocean engineering in support of all undersea warfare missions. In October 1992, the Directorate became the Center for Environmental Acoustics in the Acoustics Division of the Naval Research Laboratory, with Dr. Franchi as director. Dr. Franchi was selected to the position of Superintendent of the Acoustics Division in October 1993. The Acoustics Division conducts basic, exploratory, and applied research and development in areas of acoustic modeling and simulation, ocean acoustics measurements, acoustic systems development, acoustic signal processing, and physical acoustics. He was responsible for the technical/scientific management, direction, and administration of programs with a total budget in excess of \$25M, and for efficient management of division resources including the activities of approximately 110 civilian personnel. He served as Acting Associate Director of Research for the Ocean and Atmospheric Science and Technology Directorate from October 2001 to May 2002 and from June 2007 to April 2008. In April 2008, he was selected as the Associate Director of Research.

Dr. Franchi received the Presidential Rank Award of Meritorious Executive in 2003. He has over 35 years experience in underwater acoustics research and is the author/co-author of over 35 publications. He is recognized as an authority on underwater acoustic scattering and reverberation and has played major roles in Navy low frequency active sonar programs as both performer and advisor/consultant. He served as the U.S. National Leader of The Technical Cooperation Program's multinational Panel on ASW Systems and Technology from 1996 to 2002, and served as its Panel Chairman from 2002 to 2009. In 2011, Dr. Franchi received the TTCP Personal Achievement Award in recognition of his significant contributions and strategic vision in leading the ASW Panel. He represents the United States to the NATO Maritime Science and Technology Experts Committee and served as its Committee Chairman from 2010 to 2014. In 2011, he was appointed to the NATO Science and Technology Reform Implementation Team. He was elected to Pi Mu Epsilon, the Honorary National Mathematics Society, while an undergraduate at Clarkson University. Dr. Franchi is a member of the Acoustical Society of America and past member of the Mathematical Association of America. From 2004 to 2013, he volunteered his time to serve on the Board of Directors of the NRL Federal Credit Union.



### Key Personnel

Dr. E.R. Franchi	Associate Director of Research for Ocean and Atmospheric Science and Technology	7000
Ms. P.A. Dixon	Special Assistant	7001
CDR S. Mancini, USN	Military Deputy	7005
Dr. H.C. Eppert, Jr.	Head, Office of Research Support Services	7030
Dr. D.G. Todoroff	Superintendent, Acoustics Division	7100
Dr. R.M. Bevilacqua	Superintendent, Remote Sensing Division	7200
Dr. R.H. Preller	Superintendent, Oceanography Division	7300
Dr. H.C. Eppert, Jr.	Superintendent, Marine Geosciences Division	7400
Dr. M.S. Peng/Dr. J.A. Hansen*	Superintendent, Marine Meteorology Division	7500
Dr. J.P. Dahlburg	Superintendent, Space Science Division	7600

**Point of Contact:** Ms. C.A. Joyce, Code 7000A, (202) 404-8174

\*Acting

# Office of Research Support Services (NRL-SSC)

Code 7030



**Head:** Dr. H.C. Eppert, Jr.

**Point of Contact:** Dr. H.C. Eppert, Jr.  
Code 7030  
(228) 688-4010; DSN 828-4010

## Key Personnel

Dr. H.C. Eppert, Jr.	Head, Office of Research Support Services	7030
Ms. V. May*	Administrative Officer	7030.2
Mr. P.T. Haverstic	Head, Facilities Office	7030.3
Ms. S.M. Mensi	NRL-SSC Strategic Communications Office	7030.4
Mr. W.L. Calehuff	Safety/Environmental Officer	7030.5
Ms. H. Turfitt	HPC Management Office	7030.6
Mr. K.O. Davis	NRL-SSC Network Management Office	7030.8

**Personnel:** 8 full-time civilian

\*Acting

## Staff Activity Areas

Office of Research Support  
Facilities Office  
HPC Management Office  
Safety/Environmental Office  
Public Affairs Office  
NRL-SSC Network Management Office

## Basic Responsibilities

The Office of Research Support Services is responsible for the operational and management support necessary for the day-to-day operations at NRL Stennis Space Center, Mississippi (NRL-SSC). The head of NRL-SSC acts for the Commanding Officer in dealing with local Navy, Federal, and civil activities and personnel on matters relating to NRL-SSC support activities and facilities, community and multicommand issues, and safety and disaster control measures.

Support functions include public affairs, network support, safety, high performance computer management, and support services to include management, administration, and facilities.

# Acoustics Division

Code 7100



**Superintendent:** Dr. D.G. Todoroff

**Point of Contact:** Dr. D.G. Todoroff  
Code 7100  
(202) 767-3482

## Key Personnel

Dr. D.G. Todoroff	Superintendent, Acoustics Division	7100
Vacant	Associate Superintendent	7101
Mr. J. Tomlinson	Administrative Officer	7102
LT J. Tortella, USN	Military Deputy	7105
Dr. E. Williams	Senior Scientist for Structural Acoustics	7106
Dr. B. Houston	Head, Physical Acoustics Branch	7130
Dr. G. Orris	Head, Acoustic Signal Processing and Systems Branch	7160
Dr. J. Fabre	Head, Acoustic Simulation, Measurements, and Tactics Branch	7180

**Personnel:** 61 full-time civilian

## Research Activity Areas

Physical Acoustics  
Acoustic Signal Processing and Systems  
Acoustic Simulation, Measurements, and Tactics

## Basic Responsibilities

The Acoustics Division conducts basic and applied research addressing the physics of acoustic signal generation, propagation, scatter, and detection with the objective of improving the strategic and tactical capabilities of the Navy and Marine Corps in the ocean and land operational environment. The Division's scientists and engineers perform collaborative research with scientists affiliated with national and international academic, private, and governmental research organizations. The Division's research spans classical and quantum physics, signal processing, the impact of fluid dynamics on the oceans sound speed field, the propagation and scatter of acoustic signals in the ocean and land environments, structural and physical acoustics including the development of MEMS and nanotechnology based sensors, and the application of networked unmanned underwater vehicles and associated sensors to the Navy's ASW, MCM, and ISR missions.

## Major Research Capabilities and Facilities

### Laboratory Measurements

One-million-gallon, vibration-isolated under water acoustic holographic/3D laser vibrometer facility for studying structural acoustic phenomena

Large, sandy-bottom, acoustic holographic pool facility for investigating echo characteristics of underwater buried/near-bottom targets and sediment acoustics

In-air structural acoustics facility with high spatial density near-field acoustic holography and 3D laser vibrometry for diagnosing large structures, including aircraft interiors and rocket payload fairings

Salt water acoustic tank (20 ft by 20 ft by 10 ft deep) with environmental control and substantial optical access for studying the acoustics of bubbly media, acoustic metamaterials, and laser induced sound

Micro-Nanostructure Dynamics Laboratory to study the structural dynamics and performance of high Q oscillators and other micromechanical systems using laser Doppler vibrometers, super resolution nearfield scanning optical microscope, and low temperature calorimeter

Model Fabrication Laboratory to fabricate rough topographical surfaces in various materials for acoustic scattering and propagation studies and measurements.

Sonomagnetic Laboratory with doubly insulated Faraday cage for conducting experiments to measure weak electromagnetic fields generated by mechanical/acoustic vibrations of a conducting medium in an arbitrary magnetic field

### Seagoing Assets

Acoustic arrays (towed/moored/suspended) 64-channel broadband source-receiver array with time-reversal mirror functionality over a frequency band of 500 to 3500 Hz

High-powered sound sources and source arrays

Autonomous acoustic sources

Acoustic communications array and data acquisition buoy

Portable, ocean-deployable synthetic aperture acoustic measurement system (100-meter rail with precise positioning)

Containerized, seagoing multichannel data acquisition system

High-speed, maneuverable towed body with MK-50 and synthetic aperture sonars to measure high frequency scattering and coherence



# Remote Sensing Division

Code 7200



**Superintendent:** Dr. R.M. Bevilacqua

**Point of Contact:** Dr. R.M. Bevilacqua  
Code 7200  
(202) 767-3391

## Key Personnel

Dr. R.M. Bevilacqua	Superintendent, Remote Sensing Division	7200
Vacant	Associate Superintendent	7201
Ms. C.M. Milstead	Administrative Officer	7202
CDR A. Lomax, USN	Military Deputy	7205
Vacant	Special Projects Office	7207
Dr. S.R. Restaino	Head, Radio/Infrared/Optical Sensors Branch	7210
Dr. P.W. Gaiser	Head, Remote Sensing Physics Branch	7220
Dr. M. Kappus	Head, Coastal and Ocean Remote Sensing Branch	7230
Dr. R.L. Fiedler	Head, Image Science and Applications Branch	7260

**Personnel:** 82 full-time civilian

## Research Activity Areas

Passive Microwave research and exploitation  
Middle Atmosphere  
Hydrodynamics  
Hyper/multi-spectral Coastal Imaging  
Synthetic Aperture Radar Exploitation  
Interferometric Imaging  
Ionospheric Remote Sensing  
Astrophysics

## Basic Responsibilities

The Remote Sensing Division is the Navy's center of excellence for remote sensing research and development, conducting a program of basic research, science, and applications aimed at the development of new concepts for sensors and imaging systems for objects and targets on the Earth, in the near-Earth environment, and in deep space. The research, both theoretical and experimental, deals with discovering and understanding the basic physical principles and mechanisms that give rise to target and background emission and to absorption and emission by the intervening medium. The accomplishment of this research requires the development of sensor systems technology. This development effort includes active and passive sensor systems to be used for the study and analysis of the physical characteristics of phenomena that give rise to naturally occurring background radiation, such as that caused by the Earth's atmosphere and oceans, as well as man-made or induced phenomena, such as ship/submarine hydrodynamic effects. The research also includes theory, laboratory, and field experiments leading to ground-based, airborne, and space-based systems for use in such areas as environmental remote sensing (including improved meteorological support systems for the operational Navy), astrometry, astrophysics, surveillance, and nonacoustic ASW. Special emphasis is given to developing space-based platforms and exploiting existing space systems.

## Major Research Capabilities and Facilities

WindSAT satellite instrument (joint with Code 8000)	In-water lidar facility
WindSat processing facility	Aerosol field measurement facility
Ground-based water vapor millimeter-wave spectrometer (WVMS)	Airborne polarimetric microwave imaging radiometer (APMIR)
SAR processing facility	Interferometric Synthetic Aperture Radar (InSAR)
SCI processing facility	Multi-phase Center Synthetic Aperture Radar (MSAR)
SEALAB	Electro-optical (EO) airborne sensor suite
SAP facility	Visible/near infrared (VNIR) hyperspectral imaging systems
Hyperspectral imaging, sensors, and processing facility	VNIR polarimetric multispectral imager
Optical remote sensing calibration lab/facility	Short-wave IR (SWIR) hyperspectral imaging systems
Navy Precision Optical Interferometer (NPOI)	Midwave infrared (MWIR) indium antimonide (InSb) imaging system
Very Large Array (VLA) Low-band Ionospheric and Transient Experiment (VLITE)	Long-wave infrared (LWIR) quantum well IR photodetector (QWIP) imaging system
Free surface hydrodynamics laboratory (including a 10 m wave tank with wave generation capability)	

# Oceanography Division

Code 7300



**Superintendent:** Dr. R.H. Preller

**Point of Contact:** Mr. R.C. Rhodes  
Code 7301  
(228) 688-4704; DSN 828-4704

## Key Personnel

Dr. R.H. Preller	Superintendent, Oceanography Division	7300
Mr. R.C. Rhodes	Associate Superintendent	7301
Ms. E.H. Rawls	Administrative Officer	7302
Dr. B.J. Little	Office of the Senior Scientist for Marine Molecular Processes	7303
LCDR M. Salazar, USN	Military Deputy	7305
Dr. G.A. Jacobs	Head, Ocean Dynamics and Prediction Branch	7320
Dr. R.L. Crout	Head, Ocean Sciences Branch	7330

**Personnel:** 78 full-time civilian; 1 military

## Research Activity Areas

Ocean Dynamics and Prediction  
Ocean Data Assimilation  
Coupled Environmental Models  
Physical Oceanographic Processes  
Bio-optical Modeling  
Remote Sensing of Ocean Optics

## Basic Responsibilities

The Oceanography Division conducts basic and applied research in description and modeling of biological, physical, and dynamical processes in open ocean, regional, and littoral areas; in exploitation of satellite, airborne, and in situ sensors for environmental characterization; and in investigation and application of microbial processes to Navy problems. The oceanographic research is both theoretical and experimental in nature and is focused on understanding and modeling ocean, coastal, and littoral area hydro/thermodynamics, circulation, waves, ice dynamics, air–sea exchange, optics, and small and microscale processes. Analytical methods and algorithms are developed to provide quantitative retrieval of geophysical parameters of Navy interest from state-of-the-art sensor systems. The Division work includes analysis of biological processes that mediate and control optical properties of the oceans, coastal, and littoral regions, and microbially induced corrosion/metal–microbe interaction. The Division programs are designed to be responsive to and to anticipate Naval needs. Transition of Division products to the DoD, Navy systems developers, operational Navy, and civilian (dual use) programs is a primary goal. The Division’s programs are coordinated and interactive with other NRL programs and activities, ONR’s research programs, and other government agencies involved in oceanographic activities. The Division also collaborates and cooperates with scientists from the academic community and other U.S. and foreign laboratories.

## Major Research Capabilities and Facilities

Towed sensor and advanced microstructure profiler systems for studying upper ocean fine and micro-structure  
Integrated absorption cavity and optical profiler systems for studying ocean optical characteristics  
Self-contained bottom-mounted upward-looking acoustic profilers for measuring ocean variability  
Acoustic Doppler profiler for determining ocean currents while under way  
Remotely operated underwater vehicle (ROV)  
Bottom-mounted acoustic Doppler profilers  
Towed hyperspectral optical array  
SCI processing facility  
Satellite receiving stations for AVHRR, MODIS, DMSP, and JPASS ocean color processing facility  
Environmental scanning electron microscope, confocal laser scanning microscope, and Inspect S low vacuum scanning electron microscope for detailed studies of biocorrosion in naval materials  
Real-time Ocean Observations and Forecast Facility for monitoring and tracking of ocean physical and bio-optical conditions  
Slocum Electric Gliders for performing wide-area ocean surveys of temperature, salinity, and optical characteristics

SCANFISH MKII, a towed undulating vehicle system, designed for collecting 3D TS profile data of the water column  
Bottom-mounted Shallow water Environmental Profiler in Trawl-safe Real-time configuration (SEPTR) for measuring temperature, salinity, and optical parameters in addition to current profiles and pressure  
Bio-optical Physical Pop-up Environmental Reconnaissance System to measure bio-optical and physical properties of the water column  
Cytosense Scanning Flow Cytometer to identify individual phytoplankton and zooplankton for ecological model development and validation  
Shipboard Lidar Optical Profiler to measure optical properties of the water  
Raleigh Bernard Convective Tank and a Hybrid Underwater Camera for providing object detection and identification in extremely turbid underwater environments  
Collaborative system for propagating environment error distributions through disparate dynamical systems

# Marine Geosciences Division

Code 7400



**Superintendent:** Dr. H.C. Eppert, Jr.

**Point of Contact:** Ms. V. May  
Code 7402  
(228) 688-4660; DSN 828-4660

## Key Personnel

Dr. H.C. Eppert, Jr.	Superintendent, Marine Geosciences Division	7400
Mr. W.E. Avera	Associate Superintendent	7401
Ms. V.J. May	Administrative Officer	7402
Mr. K.B. Shaw	Head, Office of Geospatial Science and Technology Innovation	7403
CAPT W. Nisley	Military Deputy	7405
Dr. J.M. Brozena, Jr.	Head, Marine Physics Branch	7420
Dr. K.T. Holland	Head, Seafloor Sciences Branch	7430
Dr. J. Sample	Head, Geospatial Sciences and Technology Branch	7440

**Personnel:** 85 full-time civilian; 2 military

## Research Activity Areas

- Marine Geology
- Marine Geophysics
- Marine Geotechnique
- Geospatial Sciences and Technology
- In Situ and Laboratory Sensors

## Basic Responsibilities

The Marine Geosciences Division conducts a broadly based, multidisciplinary program of scientific research, advanced technology development, and applied research in marine geosciences, geodesy, geospatial information, and related technologies. This includes investigations of basic processes within ocean basins, littoral regions and adjacent land areas, and arctic regions; development of models, sensors, and techniques; and the exploitation of this knowledge and technology to enhance Navy and Marine Corps systems, plans, and operations, and to meet national needs.

As the Navy's subject matter expert in the areas of geospatial information and services (GI&S), the Division provides vital technical support to the Oceanographer/Navigator of the Navy; Commander, Naval Meteorology and Oceanography (CNMOC); CNO (N2/N6E); the National Geospatial-Intelligence Agency (NGA); and the Tri-Service Community. NRL also contributes to the development of leading-edge geospatial technology by reviewing emerging GI&S standards and products.

Close coordination and interactions with the Commander, Naval Meteorology and Oceanography Command, Naval Oceanographic Office, CNO, Office of Naval Research (ONR), Systems Commands, Warfare Centers, NGA, and the other DoD and national organizations are essential to the success of Division programs, with transition of Division technology to systems developers and to the operational Navy a primary goal. The Division program is coordinated and interactive with other NRL programs and activities, ONR's research programs, NOAA, USGS, NSF, and other government agencies involved in seafloor activities. The Division collaborates and cooperates with scientists from the academic community, other U.S. and foreign laboratories, and industry.

## Major Research Capabilities and Facilities

<p>Airborne gravimetry, magnetics, and topographic measurements suite coupled with differential GPS yielding position accuracies of &lt;1.0 meter</p> <p>100 and 500 kHz sidescan sonar with 2–12 kHz chirp profiler and Cs magnetometer for seafloor characterization/imaging and shallow subbottom profiling</p> <p>Deep-towed acoustic geophysical system operating at 220–1000 Hz characterizes subseafloor structure</p> <p>Acoustic seafloor classification system operating at 8–50 kHz provides underway, real-time prediction of sediment type and physical properties</p> <p>Seafloor probes for measuring sediment pore water pressures, permeability, electrical resistivity, acoustic compressional and shear wave velocities and attenuations, and dynamic penetration resistance</p> <p>Map data formatting facility compresses map information onto CD-ROM media for masters for use in aircraft digital moving map systems</p> <p>Comprehensive geotechnical and geoacoustics laboratory capability</p> <p>3D, multispectral, subbottom swath imaging system</p> <p>Ocean bottom seismographs (OBS)</p> <p>In situ sediment acoustic measurement system (ISSAMS)</p> <p>Instrumented mine shapes to measure hydrodynamics of free-fall in the water column, dynamics of deceleration in seafloor sediments, and rates and depths of scour burial</p> <p>Bottom Mounted Sector Scanning and Pencil Beam Sonar System</p>	<p>Integrated digital databases analysis and display system for bathymetric, meteorological, oceanographic, geoacoustic, and acoustic data</p> <p>Stereometric video image processing system for use in foreshore morphology measurement</p> <p>Sediment gas-content sampler</p> <p>Acoustic tomographic probes for surf zone sands and gassy muds</p> <p>Computed tomography (CT) system and real-time radiography unit with a 0–225 keV @ 0–1 mA micro-focus X-ray tube and a 225 mm image intensifier</p> <p>Human Machine Interaction Laboratory</p> <p>GPS-based survey vehicles and equipment to measure foreshore and nearshore bathymetry (camera towers, jet ski, and push cart)</p> <p>Geospatial lab for rapid 2D and 3D visualization, analysis, and prototyping</p> <p>Small oscillatory flow tunnel to observe sediment dynamics under forcing from waves and currents</p> <p>Tomographic particle image velocimetry system for three-dimensional volumetric velocity measurements of fluid flow</p> <p>SEABAT Bathymetric Survey System, 200–400 kHz</p> <p>3D Riverine Mapping System</p> <p>Multi-band Synthetic Aperture Radar; 2.5–9.5 MHz, 1000–1500 MHz</p> <p>UXS Environmental Sensing Laboratory</p> <p>Marine Biogeochemistry Laboratory</p>
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# Marine Meteorology Division

Code 7500



**Superintendent:** Dr. J.A. Hansen

**Point of Contact:** Ms. L. Hazard  
Code 7502  
(831) 656-4314; DSN 828-4314

## Key Personnel

Dr. J.A. Hansen	Superintendent, Marine Meteorology Division	7500
Dr. D. Westphal*	Associate Superintendent	7501
Ms. L. Hazard	Administrative Officer	7502
Dr. C. Reynolds	Lead Scientist, Probabilistic Prediction Research Office	7504
CDR J.S. Martin, USN	Military Deputy	7505
Dr. M.S. Peng	Head, Atmospheric Dynamics and Prediction Branch	7530
Dr. J.A. Hansen	Head, Meteorological Applications Development Branch	7540

**Personnel:** 74 full-time civilian; 1 military

\*Acting

## Research Activity Areas

Atmospheric Dynamics and Prediction  
Data Assimilation  
Tactical Environmental Support  
Atmospheric Physics  
Satellite Data/Imagery  
Decision Aids

## Basic Responsibilities

The Marine Meteorology Division conducts a basic and applied research and development program designed to improve scientific understanding of atmospheric processes that impact Fleet operations and to develop automated systems that analyze, simulate, predict, and interpret the structure and behavior of these processes and their effect on naval weapons systems. Basic and applied research includes work in air-sea interaction, aerosol and cloud physics, atmospheric turbulence, orographically forced flow, atmospheric predictability, scale interactions observation impact, advanced data assimilation, ensemble prediction, tropical dynamics, and numerical methods. Research and development ranges from development of atmospheric analysis/forecast systems and satellite data products to the development of tactical decision aids for operations support. Interdisciplinary research supports the development of coupled analysis/forecast systems, including components for ocean, wave, land surface, aerosol, chemistry, and middle atmosphere prediction. NRL-Monterey (NRL-MRY) is co-located with the Fleet Numerical Meteorology and Oceanography Center (FNMOC) and has developed and transitioned to FNMOC and other operational centers the data assimilation, global, and mesoscale weather forecast models, aerosol prediction systems, and satellite applications products that form the backbone of the Navy's worldwide environmental forecasting capability. Specialties of the Division include numerical weather prediction, data assimilation, tropical cyclones, marine boundary layer processes, aerosols, rapid environmental assessment, environmental decision aids, and satellite data analysis, interpretation, and application.

## Major Research Capabilities and Facilities

The U.S. GODAE Data Server (Global Ocean Data Assimilation Experiment) for collection and broad distribution of near-real-time METOC data and higher-level products from Navy, DoD, and other providers to the global ocean and atmospheric research community

A Cray XE6m Supercomputer for numerical weather prediction systems development provided by the DoD High Speed Computing Modernization Program (HPCMP) through a Dedicated HPC Project Investment (DHPI) grant

Bergen Data Center with an extensive disk file storage capacity and research data tape backup/archival capability

Classified and unclassified radar and satellite data processing facility

Two Mobile Atmospheric Aerosol and Radiation Characterization Observatories (MAARCO) used to collect atmospheric data around the world

Marine Meteorology Center building for the Meteorological Applications Development Branch, Secure IT Facility, Division Administrative support, and Front Office Management Team



# Space Science Division

Code 7600



**Superintendent:** Dr. J.P. Dahlburg

**Point of Contact:** Ms. S.L. Swann  
Code 7602  
(202) 767-3248

## Key Personnel

Dr. J.P. Dahlburg	Superintendent, Space Science Division	7600
Vacant	Associate Superintendent	7601
Ms. S.L. Swann	Administrative Officer	7602
LCDR D. Cheney, USN	Military Deputy, Space Test Program (STP) Office, Kirtland AFB, NM	7603
Dr. J.L. Lean	Senior Scientist for Sun-Earth Systems Research	7605
Dr. C.R. Englert	Head, Geospace Science and Technology Branch	7630
Dr. J.E. Grove	Head, High-Energy Space Environment Branch	7650
Dr. D.G. Socker	Head, Solar and Heliospheric Physics Branch	7680

**Personnel:** 77 full-time civilian; 1 military

## Research Activity Areas

Geospace Science and Technology  
High Energy Space Environment  
Solar and Heliospheric Physics

## Basic Responsibilities

The Space Science Division conducts a broad-spectrum RDT&E program in solar-terrestrial physics, astrophysics, upper/middle atmospheric science, and astronomy. Instruments to be flown on satellites, sounding rockets and balloons, and ground-based facilities and mathematical models are conceived and developed. Researchers apply these and other capabilities to the study of the atmospheres of the Sun and Earth, including solar activity and its effects on the Earth's ionosphere, upper atmosphere, and middle atmosphere; laboratory astrophysics; and the unique physics and properties of celestial sources. The science is important to orbital tracking, radio communications, and navigation that affect the operation of ships and aircraft, utilization of the near-space and space environment of the Earth, and the fundamental understanding of natural radiation and geophysical phenomena.

## Major Research Capabilities and Facilities

Development and test facilities for satellite, sounding rocket, and balloon instruments, to perform solar terrestrial, astrophysical, astronomical, solar, upper/middle atmospheric, and space environment sensing

Solar Coronagraph Optical Test Chamber (SCOTCH)

Vacuum Ultraviolet Calibration Facility (VUCF)

Gamma Ray Imaging Laboratory (GRIL)

Rocket Assembly and Checkout Facility

Neutron Characterization Laboratory

Semiautomatic Probe Station

Solar Irradiance Calibration Facility

Suborbital Instrument Assembly and Test Facility

SuperMISTI reconfigurable and adaptable stand-off gamma ray and neutron radiation detection systems for detection of special nuclear material and other radiological/nuclear Weapons of Mass Destruction

Very high angular Resolution Imaging Spectrometer (VERIS) sounding rocket instrument

Helium Resonance Scattering in the Corona and Heliospheric (HERSCHEL) sounding rocket instrument

High Intensity Transient Event Acquisition System (HITEAS)

Michelson Interferometer for Global High-resolution Thermospheric Imaging (MIGHTI) satellite instrument

Extreme Ultraviolet Imaging Spectrometer (EIS) satellite instrument

Large Angle Spectrometric Coronagraph (LASCO) satellite instrument

Sun Earth Connection Coronal and Heliospheric Investigation (SECCHI) satellite instrument suite

Solar Orbiter Heliospheric Imager (SoloHI) satellite instrument

Wide-field Imager (WISPR) satellite instrument

Compact Coronagraph (CCOR) satellite instrument

Special Sensor Ultraviolet Limb Imager (SSULI) satellite instrument

Winds Ions Neutrals Composition Suite (WINCS) small satellite instrument suite

Extensive computer-assisted data manipulation, interpretive, and theoretical capabilities for space science instrumentation operations, data imaging, and modeling

SECCHI Payload Operations Center (POC)

Fermi Gamma-ray Space Telescope (formerly GLAST) Science Analysis Center (SAC)

SoftWare for Optimization of Radiation Detectors (SWORD)

Mountain Wave Forecast Model (MWFM)

Mass Spectrometer and Incoherent Scatter Radar empirical atmospheric model (NRLMSISE)

Horizontal Wind Model (HWM)

Ground to Space empirical atmospheric model (G2S)

Navy Gloval Environmental Model (NAVGEM)

Highly Integrated Thermosphere Ionosphere DEMonstration System (HI-TIDES)



**NAVAL CENTER FOR SPACE TECHNOLOGY**



# Naval Center for Space Technology

## Code 8000

In its role to preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems that support naval missions, the Naval Center for Space Technology performs basic and applied research through advanced development in all areas of interest to the Navy space program. The Center develops spacecraft, systems using these spacecraft, and ground command and control stations. Principal functions of the Center include understanding and clarifying requirements, recognizing and prosecuting promising research and development, analyzing and testing systems to quantify their capabilities, developing operational concepts that

exploit new technical capabilities, performing system engineering to allocate design requirements to subsystems, and performing engineering development and initial operation to test and evaluate selected spacecraft subsystems and systems. The Center is a focal point and integrator for those divisions at NRL whose technologies are used in space systems. The Center also provides systems engineering and technical direction assistance to system acquisition managers of major space systems. In this role, technology transfer is a major goal and motivates a continuous search for new technologies and capabilities and the development of prototypes that demonstrate the integration of such technologies.

## Director, Naval Center for Space Technology



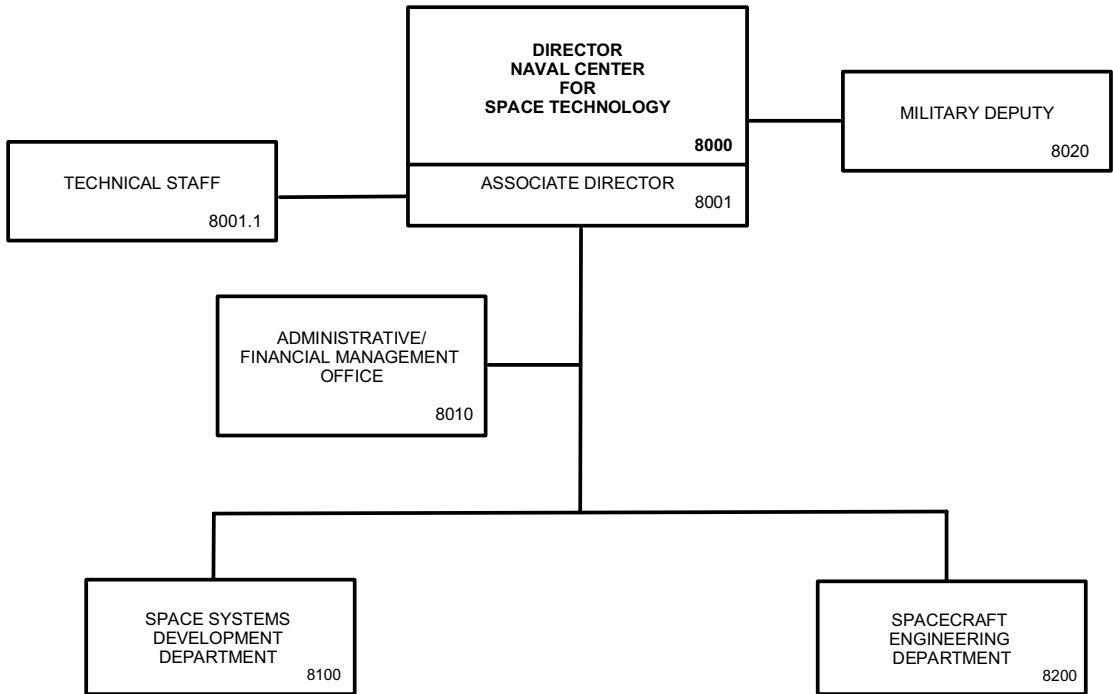
**M**r. John P. Schaub is the Director of the Naval Center of Space Technology (NCST) at the U.S. Naval Research Laboratory (NRL). As DNCST, Mr. Schaub leads a highly skilled workforce of engineers, scientists, and technicians who conduct cutting-edge spacecraft research and development programs to meet and anticipate the needs of the Department of the Navy (DoN), Department of Defense (DoD) and the Intelligence Community (IC). The Center's mission is to preserve and enhance a strong space technology base and provide expert assistance in the development and acquisition of space systems which support naval missions. NCST also provides systems engineering and technical direction assistance to major space systems acquisition programs.

Mr. Schaub came to NRL in 1985 and dedicated his career towards becoming a recognized expert in the design and development of spacecraft systems, program management, and systems engineering. He materially contributed to the development of “first

of a kind” spacecraft or space instruments providing important capabilities in C4ISR, terrestrial and space weather, strategic defense, operationally responsive space, space robotic servicing, and advances in space science and technology.

Prior to his appointment as Director for NCST, Mr. Schaub served within the SES as Superintendent of the Spacecraft Engineering Department for ten years. He served as Associate Superintendent and then Acting Superintendent for NRL's Spacecraft Engineering department from November 1998 to December 2006. From May 1994 to November 1998, Mr. Schaub was detailed to the National Reconnaissance Office (NRO) where he served as Director, Space Technology Experiment (STEX) Satellite Program Office.

Mr. Schaub successfully completed the requirements of a dual degree program and was awarded bachelor's degrees in mechanical engineering from the Georgia Institute of Technology and physics with honors from the State University of New York (SUNY) at Oneonta in 1984. He is the recipient of numerous Special Act, Notable Achievement, and Outstanding Performance Awards, including the NRO Advanced Science & Technology Directorate Team of the Year Award in 1998. Mr. Schaub is senior member of the American Institute of Aeronautics and Astronautics and has served as a voting member of the DoN Space Experiments Review Board (SERB) since 2008. In 2014, Mr. Schaub was named an Alumni of Distinction by SUNY Oneonta.



### Key Personnel

Mr. J.P. Schaub	Director, Naval Center for Space Technology	8000
Vacant	Associate Director	8001
Vacant	Technical Staff	8001.1
Vacant	Head, Administrative/Financial Management Office	8010
CDR C. Larges, USN	Military Deputy	8020
Mr. C. Dwyer	Superintendent, Space Systems Development Department	8100
Mr. G.A. Golba*	Superintendent, Spacecraft Engineering Department	8200

**Point of Contact:** Mr. M.S. Deniston, Code 8010, (202) 767-6550

\*Acting



# Space Systems Development Department

Code 8100



**Superintendent:** Mr. C. Dwyer

**Point of Contact:** Ms. M.E. Russo  
Code 8102  
(202) 767-0432

## Key Personnel

Mr. C. Dwyer	Superintendent, Space Systems Development Department	8100
Mr. D.A. DeRieux	Associate Superintendent	8101
Ms. M.E. Russo	Administrative Officer	8102
Mr. R.L. Nichols	Head, Mission Management Office	8103
Vacant	Head, National Programs Support Office	8104
Mr. A.S. Hope	Head, Mission Development Branch	8110
Dr. K.A. Clark	Head, Advanced Systems Technology Branch	8120
Ms. W.S. Borodin	Head, Command, Control, Communications, Computers, and Intelligence Branch	8140
Dr. K.L. Senior	Head, Advanced Space Precision Navigation and Timing Branch	8150

**Personnel:** 126 full-time civilian; 1 part-time civilian; 23 student civilian; 1 intermittent civilian

## Research Activity Areas

Advanced Space/Airborne/Ground Systems Technologies  
Astrodynamics  
Command, Control, Communications, Computers, Intelligence,  
Surveillance, and Reconnaissance  
Space and Airborne Payload Development  
Laser Communications Research  
Space and Airborne Mission Development  
Precision Navigation and Time

## Basic Responsibilities

The Space Systems Development Department (SSDD) is the space and ground support systems research and development organization of the Naval Center for Space Technology. The primary objective of the SSDD is to develop command, control, communications, computers, and intelligence, surveillance, and reconnaissance (C4ISR) hardware and software solutions to space, airborne, and ground applications to respond to Navy, DoD, and national mission requirements with improved performance, capacity, reliability, efficiency, and/or life cycle cost. The Department must derive system requirements from the mission, develop architectures in response to these requirements, and design and develop systems, subsystems, equipment, and implementation technologies to achieve the optimized, integrated operational space, airborne, and ground system. These development responsibilities extend across the entire space/airborne/ground spectrum of hardware, software, and advanced technologies, including digital processing and control, analog systems, power, communications, payload command and telemetry, radio frequency, optical, payload, and electromechanical systems, as well as systems engineering.

## Major Research Capabilities and Facilities

- Payload test facility and processor development laboratory
- Laser communications and electro-optics laboratories
- Tactical Technology Development Laboratory (TTDL)
- Precision oscillator (clock) test facility
- RF payload development laboratory with anechoic chamber
- Precision high-frequency RF compact range anechoic chamber facility
- Transportable ground station development, assembly, and test facility
- Multiplatform FPGA/ASIC/VLSI development laboratory
- Satellite telemetry, tracking, and satellite control at Blossom Point, MD
  - L/C/S/X-band fixed antenna resources
  - Connectivity to the Air Force Satellite Control Network (AFSCN)
- Pomomkey field site: large antenna, space communications, and research facility
- Midway Research Center space communications and research facility
- Optical telescope facility

# Spacecraft Engineering Department

Code 8200



**Superintendent:** Mr. G.A. Golba\*

**Point of Contact:** Ms. C.A. Gross  
Code 8202  
(202) 767-6412

\*Acting

## Key Personnel

Mr. G.A. Golba*	Superintendent, Spacecraft Engineering Department	8200
Mr. G.A. Golba	Associate Superintendent	8201
Ms. C.A. Gross	Administrative Officer	8202
Mr. J.P. Schaub*	Head, Programs Support Office	8204
Mr. T. Duffey	Head, Design, Test, and Processing Branch	8210
Vacant	Head, Space Mechanical Systems Development Branch	8220
Mr. M.E. Mook	Head, Control Systems Branch	8230
Mr. M.S. Johnson	Head, Space Electronics Systems Development Branch	8240

**Personnel:** 148 full-time civilian; 1 part-time civilian; 19 student civilian

\*Acting

## Research Activity Areas

- Design, Test, and Processing
- Space Mechanical Systems Development
- Control Systems
- Space Electronic Systems Development
- Spacecraft and Robotics Control Systems
  - Attitude Control Systems
  - Propulsion Systems
  - Astrodynamics, Orbit Determination, and Control
  - Robotic Control, Agility, and Motor Learning

## Basic Responsibilities

The Spacecraft Engineering Department (SED) is the focal point for the Navy's capability to design and build spacecraft. Activities range from concept and feasibility planning to on-orbit IOC for NRL's space systems.

The SED provides spacecraft bus expertise for the Navy and maintains an active in-house capability to develop satellites; manages Navy space programs through engineering support and technical direction; in concert with the Space Systems Development Department, designs, assembles, and tests spacecraft and space experiments, including all aspects of space, launch, and ground support; analyzes and designs structures, mechanisms, and a variety of control systems, including attitude, propulsion, reaction, and thermal; integrates satellite designs, launch vehicles, and satellite-to-boost stages; functions as a prototype laboratory to ensure that designs can be transferred to industry and incorporated into subsequent satellite hardware builds; and consults with the Navy Program Office on technical issues involving spacecraft architecture, acquisition, and operation.

## Major Research Capabilities and Facilities

### Chambers:

- Thermal-vacuum
- Acoustic reverberation
- Large, tapered horn, RF anechoic chamber
- EMI/EMC testing chamber

### Facilities:

- Spacecraft high-reliability electronic and electrical rework facility
- Spacecraft electronic systems integration and test facility
- Radio frequency (RF) system development facility
- RF microcircuit fabrication clean room facility
- Large tapered horn RF anechoic chamber facility
- Frequency sources laboratory
- Shock and vibration test
- Clean rooms (multiple classes and sizes)
- Spacecraft fabrication and assembly
- Fuels testing
- Autoclave
- Space robotics laboratory
- Proximity operations testbed
- CAD/CAM
- Propulsion system welding
- Static loads test
- Star tracker characterization
- Spacecraft spin balance
- Modal analysis
- Computational astrodynamics simulation and visualization
- Advanced Two-Phase Heat Transfer



# **TECHNICAL OUTPUT, FISCAL, AND PERSONNEL INFORMATION**



# Technical Output

The Navy continues to be a pioneer in science and engineering developments and a leader in applying these advancements to military requirements. The primary means of informing the scientific and engineering community of the advances made at NRL is through the Laboratory's technical output—reports, articles in scientific journals, contributions to books, papers presented to scientific societies and topical conferences, patents, and inventions.

The figures for calendar years 2013 and 2014 presented below represent the output of NRL facilities in Washington, DC; Bay St. Louis, Mississippi; and Monterey, California.

In 1986, Congress enacted the Federal Technology Transfer Act in an effort to encourage the commercial use of technology developed in Federal laboratories. The Act allows Government inventors and the laboratories where they work to share the royalties generated by commercial licensing of their inventions. Also, the Act encourages the establishment of Cooperative Research and Development Agreements (CRADAs) between laboratories such as NRL and non-Federal entities such as state and local governments, universities, and business corporations. Such cooperative R&D agreements can include the allocation in advance of patent rights on any inventions made under the joint research effort.

The 1986 Act has given additional impetus to the Laboratory's efforts to patent important inventions arising out of its various research programs.

## Calendar Year 2014

Type of Contribution	Unclassified	Classified	Total
Articles in periodicals, chapters in books, and papers in published proceedings	1429*	0	1429*
Oral Presentations	1280	0	1280
NRL Formal Reports	7	2	9
NRL Memorandum Reports	55	2	57
Books	4	0	4
U.S. patents granted	123	1	124
Foreign patents granted	7	0	7
U.S. Trademark Registrations	3	0	3

## Calendar Year 2015

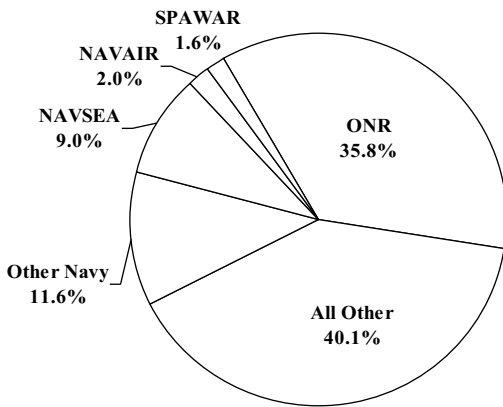
Type of Contribution	Unclassified	Classified	Total
Articles in periodicals, chapters in books, and papers in published proceedings	1250*	0	1250*
Oral Presentations	1044	0	1044
NRL Formal Reports	9	1	10
NRL Memorandum Reports	53	1	54
Books	0	0	0
U.S. patents granted	132	0	132
Foreign patents granted	6	0	6
U.S. Trademark Registrations	8	0	8

\*This is a provisional total based on information available to the Ruth H. Hooker Research Library on July 7, 2016. Total includes refereed and non-refereed publications.

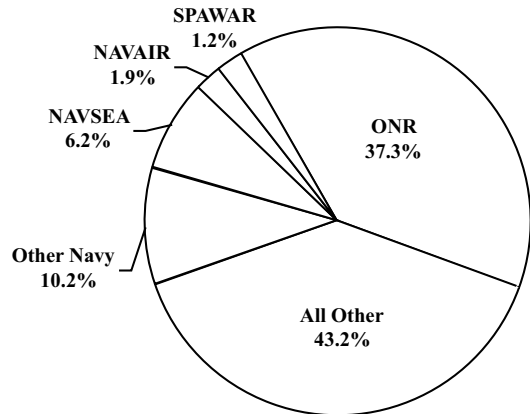


# FY 2014/2015 Sources of New Funds (Actual)

**FY 2014**



**FY 2015**



**FY 2014**  
**Source of Funds**

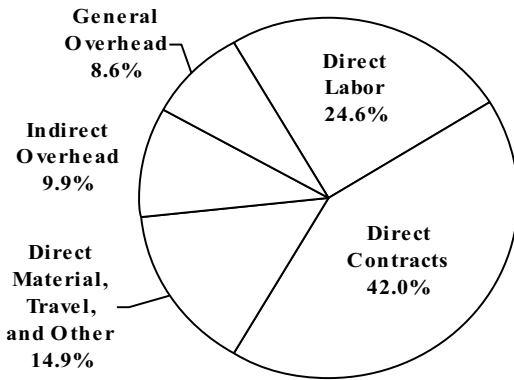
FY 2014	\$M		Total
	Reimbursable	Direct Cite	
Office of Naval Research (ONR)	340.5	32.3	372.8
Naval Sea Systems Command (NAVSEA)	53.1	40.3	93.4
Space and Naval Warfare Systems Command (SPAWAR)	15.1	1.8	16.9
Naval Air Systems Command (NAVAIR)	12.8	7.9	20.7
Other Navy	90.2	30.6	120.8
All Other	<u>345.3</u>	<u>72.1</u>	<u>417.4</u>
Total Funds	857.0	185.0	1,042.0

**FY 2015**  
**Source of Funds**

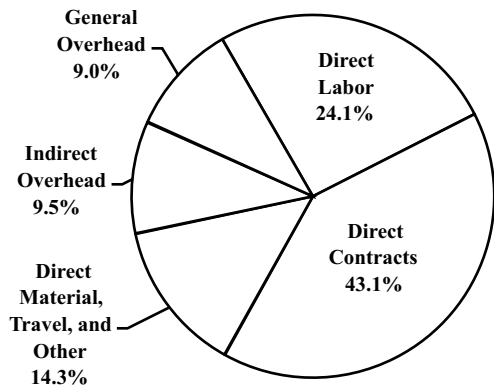
FY 2015	\$M		Total
	Reimbursable	Direct Cite	
Office of Naval Research (ONR)	357.4	31.8	389.2
Naval Sea Systems Command (NAVSEA)	45.6	19.2	64.8
Space and Naval Warfare Systems Command (SPAWAR)	11.2	1.7	12.9
Naval Air Systems Command (NAVAIR)	8.5	11.7	20.2
Other Navy	84.2	22.3	106.5
All Other	<u>336.1</u>	<u>114.4</u>	<u>450.5</u>
Total Funds	843.0	201.1	1,044.1

# FY 2014/2015 Uses of Funds

**FY 2014**



**FY 2015**



## FY 2014 Distribution of Funds

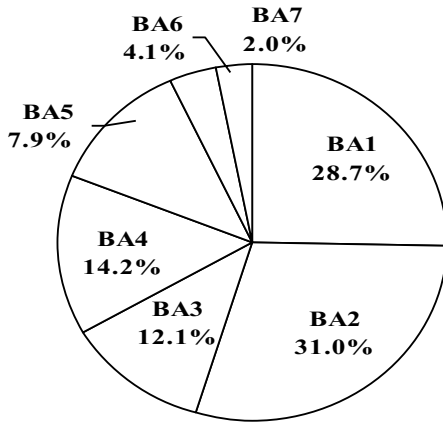
	\$M
Direct Labor	242.2
General Overhead	84.4
Indirect Overhead	97.4
Direct Material, Travel, and Other	147.3
Direct Contracts	<u>414.3</u>
Total Costs*	985.6

## FY 2015 Distribution of Funds

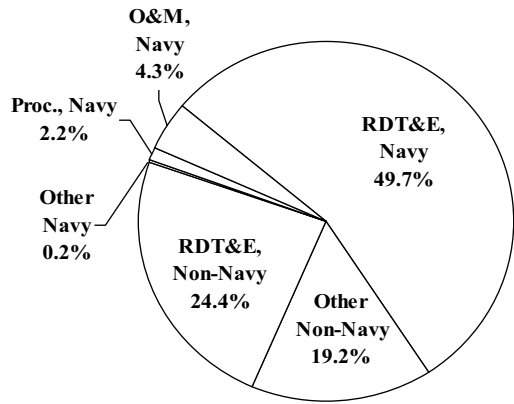
	\$M
Direct Labor	252.3
General Overhead	93.9
Indirect Overhead	99.3
Direct Material, Travel, and Other	150.1
Direct Contracts	<u>451.5</u>
Total Costs*	1,047.1

\*Costs based on CFO statements; direct contracts include costs for reimbursable-funded contracts and obligations for direct cite-funded contracts.

# FY 2015 Total New Funds by Category



**Distribution of RDT&E, Navy (%)**  
(\$519.3)

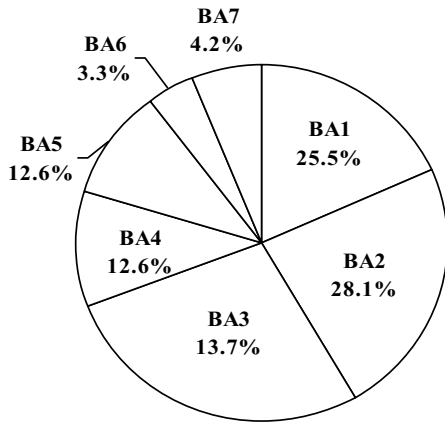


**Distribution of Total (%)**  
(\$1,044.1)

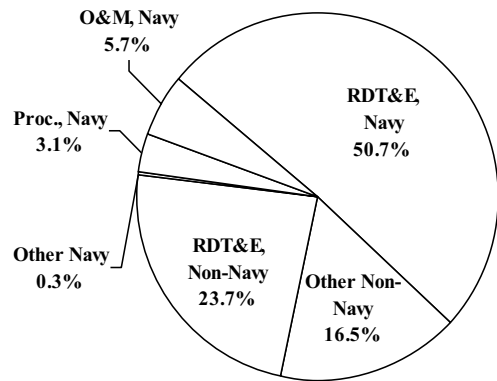
## FY 2015

		\$M		
Category		Navy	Non-Navy	Total
BA1	Basic Research	148.9	8.0	156.9
BA2	Applied Research	161.0	35.2	196.2
BA3	Advanced Technology Development	63.1	139.3	202.4
BA4	Advanced Component Development Prototypes	73.7	8.7	82.4
BA5	System Development and Demonstration	41.2	12.0	53.2
BA6	RDT&E Management Support	21.2	18.0	39.2
BA7	Operational System Development	<u>10.2</u>	<u>33.3</u>	<u>43.5</u>
	Subtotal RDT&E	519.3	254.5	773.8
	Operations and Maintenance	45.1	35.4	80.5
	Procurement	22.7	88.7	111.4
	Other	<u>1.7</u>	<u>76.7</u>	<u>78.4</u>
	Total New Funds	588.8	455.3	1,044.1

# FY 2014 Total New Funds by Category



**Distribution of RDT&E, Navy (%)**  
(\$528.4)



**Distribution of Total (%)**  
(\$1,042.0)

## FY 2014

		\$M		
Category		Navy	Non-Navy	Total
BA1	Basic Research	134.5	6.6	141.1
BA2	Applied Research	148.6	33.8	182.5
BA3	Advanced Technology Development	72.6	140.7	213.2
BA4	Advanced Component Development Prototypes	66.5	15.7	82.2
BA5	System Development and Demonstration	66.8	10.6	77.4
BA6	RDT&E Management Support	17.5	14.2	31.7
BA7	Operational System Development	<u>21.9</u>	<u>25.5</u>	<u>47.4</u>
	Subtotal RDT&E	528.4	247.1	775.5
	Operations and Maintenance	58.9	37.3	96.2
	Procurement	32.4	47.2	79.6
	Other	<u>2.8</u>	<u>87.9</u>	<u>90.7</u>
	Total New Funds	622.5	419.5	1,042.0

# Personnel Information

## Civilian On-Board

Full-Time, Permanent (FTP)	
Graded	2,540
Ungraded	<u>93</u>
Total	2,467
Temporary, Part-Time, Intermittent (TPTI)	
TPTI	<u>73</u>
Total Civilian	2,540

### FTP Breakdown

Scientific/Engineering Professional	1,615
Scientific/Engineering Technical	103
Administrative Specialist/Professional	383
Administrative Support	238
Senior Executive Service	21
Scientific or Professional	14
General Schedule	<u>0</u>
Total	2,374

## Military On-Board

Officers	35
Enlisted	<u>58</u>
Total Military On-Board	93
(Military Allowance)	106

## Annual Civilian Turnover Rate (%) (permanent employees only)

	2009	2010	2011	2012	2013	2014	2015
Research divisions	4.7	5	5.3	6.0	4.2	6.7	7.5
Nonresearch areas	7.4	11	13.5	11.1	8.3	10.6	15.7
Entire Laboratory	5.3	6.2	6.9	7.0	5	7.5	9.1

## Highest Academic Degrees Held by Civilian Full-Time Permanent Employees

Bachelors	576
Masters	417
Doctorates	870

\*All data is as of December 31, 2015.

# PROFESSIONAL DEVELOPMENT

# Professional Development

## Programs for NRL Employees

The Human Resources Office supports and provides traditional and alternative methods of training for employees. NRL employees are encouraged to develop their skills and enhance their job performance so they can meet the future needs of NRL and achieve their own goals for growth.

One common study procedure is for employees to work full time at the Laboratory while taking job-related courses at universities and schools local to their job site. The training ranges from a single course to undergraduate, graduate, and postgraduate course work. Tuition for training is paid by NRL. The formal programs offered by NRL are described here.

### GRADUATE PROGRAMS

The **Advanced Graduate Research Program** (formerly the Sabbatical Study Program, which began in 1964) enables selected professional employees to devote full time to research or pursue work in their own or a related field for up to one year at an institution or research facility of their choice without the loss of regular salary, leave, or fringe benefits. NRL pays all travel and moving expenses for the employee. Criteria for eligibility include professional stature consistent with the applicant's opportunities and experience, a satisfactory program of study, and acceptance by the facility selected by the applicant. The program is open to employees who have completed six years of Federal service, four of which have been at NRL.

The **Edison Memorial Graduate Training Program** enables employees to pursue graduate studies in their fields at local universities. Participants in this program work 24 hours each workweek and pursue their studies during the other 16 hours. The criteria for eligibility include a minimum of one year of service at NRL, a bachelor's or master's degree in an appropriate field, and professional standing in keeping with the candidate's opportunities and experience.

To be eligible for the **Select Graduate Training Program**, employees must have a bachelor's degree in an appropriate field and must have demonstrated ability and aptitude for advanced training. Students accepted into this program receive one-half of their salary and benefits and NRL pays for tuition and travel expenses.

The **Naval Postgraduate School (NPS)**, located in Monterey, California, provides graduate programs to enhance the technical preparation of Naval officers and civilian employees who serve the Navy in the fields of science, engineering, operations analysis, and management. NRL employees desiring to pursue graduate studies at NPS may apply; thesis work is accomplished at NRL. Participants continue to receive full pay and benefits during the period of study. NRL also pays for tuition and travel expenses.

In addition to NRL and university offerings, application may be made to a number of noteworthy programs and fellowships. Examples of such opportunities are the **Capitol Hill Workshops**, the **Legislative Fellowship (LEGIS) program**, the **Federal Executive Institute (FEI)**, and the **Executive Leadership Program for Mid-Level Employees**. These and other programs are announced from time to time, as schedules are published.

### CONTINUING EDUCATION

**Undergraduate and graduate courses** offered at local colleges and universities may be subsidized by NRL for employees interested in improving their skills and keeping abreast of current developments in their fields.

NRL offers **short courses** to all employees in a number of fields of interest including administrative subjects and supervisory and management techniques. Laboratory employees may also attend these courses at nongovernment facilities. HRO advertises training opportunities on the NRL intranet, HRO website, and in the email newsletter, *HRO Highlights*.

For further information on any of the above Graduate and Continuing Education programs, contact the Employee Development and Management Branch (Code 1840) at (202) 767-8306 or via email at [Training@hro.nrl.navy.mil](mailto:Training@hro.nrl.navy.mil).

The **Scientist-to-Sea Program (STSP)** provides opportunities for Navy R&D laboratory/center personnel to go to sea to gain first-hand insight into operational factors affecting system design, performance, and operations on a variety of ships. NRL is a participant of this Office of Naval Research (ONR) program. Contact (202) 404-2701.

## PROFESSIONAL DEVELOPMENT

NRL has several programs, professional society chapters, and informal clubs that enhance the professional growth of employees. Some of these are listed below.

The **Department of the Navy Civilian Employee Assistance Program (DONCEAP)** provides confidential assessment, referral, and short-term counseling for employees (or their eligible family members) regarding personal concerns to help avoid adversely affecting job performance. Types of personal concerns may include challenging relationships (at work or at home); dealing with stress, anxiety, or depression; grief and loss; or substance abuse. The DONCEAP also provides work/life referral services such as live or on-demand webinars; discussion groups; and advice on parenting, wellness, financial and legal issues, education, and much more. Contact (844)-366-2327 or visit <http://donceap.foh.hhs.gov>.

The NRL chapter of **Women In Science and Engineering (WISE)** was established to address current issues concerning the scientific community of women at the NRL such as networking, funding, work-life satisfaction, and effective use of our resources. We address these issues by empowering members through the establishment of a supportive and constructive network that serves as a sounding board to develop solutions that address said issues, and then serve as a platform in which members work together to implement these solutions. The NRL chapter of WISE has started several new initiatives for the 2013–2014 year, including

a seminar series entitled “Working Smarter Not Harder at NRL — Effective Use of Our Resources” and a Science as Art competition, which is open to all NRL sites. Membership is open to all employees. For more information, contact (202) 404-3355.

**Sigma Xi**, The Scientific Research Society, encourages and acknowledges original investigation in pure and applied science. It is an honor society for research scientists. Individuals who have demonstrated the ability to perform original research are elected to membership in local chapters. The NRL Edison Chapter, comprising approximately 200 members, recognizes original research by presenting annual awards in pure and applied science to two outstanding NRL staff members per year. In addition, an award seeking to reward rising stars at NRL is presented annually through the Young Investigator Award. The chapter also sponsors several lectures per year at NRL on a wide range of topics of general interest to the scientific and DoD community. These lectures are delivered by scientists from all over the world. The highlight of the Sigma Xi Lecture Series is the Edison Memorial Lecture, which traditionally is given by an internationally distinguished scientist. Contact (202) 767-5528.

The **NRL Mentor Program** was established to provide an innovative approach to professional and career training and an environment for personal and professional growth. It is open to permanent NRL employees in all job series and at all sites. Mentees are matched with successful, experienced colleagues having more technical and/or managerial experience who can provide them with the knowledge and skills needed to maximize their contribution to the success of their immediate organization, to NRL, to the Navy, and to their chosen career fields. The ultimate goal of the program is to increase job productivity, creativity, and satisfaction through better communication, understanding, and training. NRL Instruction 12400.1B provides policy and procedures for the program. For more information, please contact [mentor@hro.nrl.navy.mil](mailto:mentor@hro.nrl.navy.mil) or (202) 767-6736.

Employees interested in developing effective self-expression, listening, thinking, and leadership potential are invited to join the NRL Forum Toast-



masters Club, a chapter of **Toastmasters International**. Members of this club possess diverse career backgrounds and talents and learn to communicate not by rules but by practice in an atmosphere of understanding and helpful fellowship. NRL's Commanding Officer and Director of Research endorse Toastmasters. Contact (202) 404-4670.

## **EQUAL EMPLOYMENT OPPORTUNITY (EEO) PROGRAMS**

Equal employment opportunity (EEO) is a fundamental NRL policy for all employees regardless of race, color, national origin, sex, religion, age, sexual orientation, genetic information, or disability. The NRL EEO Office is a service organization whose major functions include counseling employees in an effort to resolve employee/management conflicts, processing formal discrimination complaints and requests for reasonable accommodation, providing EEO training, and managing NRL's MD-715 and affirmative employment recruitment programs. The NRL EEO Office is also responsible for sponsoring special-emphasis programs to promote awareness and increase sensitivity and appreciation of the issues or the history relating to females, individuals with disabilities, and minorities. Contact the NRL Deputy EEO Officer at (202) 767-8390 for additional information on programs or services.

## **OTHER ACTIVITIES**

The award-winning **Community Outreach Program** directed by the NRL Public Affairs Office fosters programs that benefit students and other community citizens. Volunteer employees assist with and judge science fairs, give lectures, provide science demonstrations and student tours of NRL, and serve as tutors, mentors, coaches, and classroom resource teachers. The program sponsors student tours of NRL and an annual holiday party for neighborhood children in December. Through the program, NRL has active partnerships with three District of Columbia public schools. Contact (202) 767-2541.

Other programs that enhance the development of NRL employees include sports groups and the

**Amateur Radio Club**. The **NRL Fitness Center** at NRL-DC, managed by Naval Support Activity Washington Morale, Welfare and Recreation (NSAW-MWR), houses a fitness room with treadmills, bikes, ellipticals, step mills, and a full strength circuit; a gymnasium for basketball, volleyball, and other activities; and full locker rooms. The Fitness Center is free to NRL employees and contractors. Various exercise classes are offered for a nominal fee. NRL employees are also eligible to participate in all NSAW-MWR activities held on Joint Base Anacostia-Bolling and Washington Navy Yard, less than five miles away.

## **Programs for Non-NRL Employees**

Several programs have been established for non-NRL professionals. These programs encourage and support the participation of visiting scientists and engineers in research of interest to the Laboratory. Some of the programs may serve as stepping-stones to Federal careers in science and technology. Their objective is to enhance the quality of the Laboratory's research activities through working associations and interchanges with highly capable scientists and engineers and to provide opportunities for outside scientists and engineers to work in the Navy laboratory environment. Along with enhancing the Laboratory's research, these programs acquaint participants with Navy capabilities and concerns and may provide a path to full-time employment.

## **POSTDOCTORAL RESEARCH ASSOCIATESHIPS**

Every year, NRL hosts several postdoctoral research associates through the National Research Council (NRC) and American Society for Engineering Education (ASEE) postdoctoral associateship and fellowship programs. These competitive positions provide postdoctoral scientists and engineers the opportunity to pursue research at NRL in collaboration with NRL scientists and engineers. Research associates are guest investigators, not employees of NRL.

**NRL/NRC Cooperative Research Associateship Program:** The National Research Council conducts a national competition to recommend and make awards to outstanding scientists and engineers at recent postdoctoral levels for tenure as guest researchers at participating laboratories. The objectives of the NRC program are (1) to provide postdoctoral scientists and engineers of unusual promise and ability opportunities for research on problems, largely of their own choice, that are compatible with the interests of the sponsoring laboratories and (2) to contribute thereby to the overall efforts of the Federal laboratories. The program provides an opportunity for concentrated research in association with selected members of the permanent professional laboratory staff, often as a climax to formal career preparation.

NRL/NRC Postdoctoral Associateships are awarded to persons who have held a doctorate less than five years at the time of application, and are made initially for one year, renewable for a second and possible third year. Information and applications may be found at <http://www.national-academies.org/rap>. To contact NRL's program coordinator, call (202) 767-8323 or email [nrc@hro.nrl.navy.mil](mailto:nrc@hro.nrl.navy.mil).

**NRL/ASEE Postdoctoral Fellowship Program:** The ASEE program is designed to significantly increase the involvement of creative and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Navy. Fellowship awards are based upon the technical quality and relevance of the proposed research, recommendations by the Navy laboratory, academic qualifications, reference reports, and availability of funds.

NRL/ASEE Fellowship awards are made to persons who have held a doctorate for less than seven years at the time of application, and are made for one year, renewable for a second and possible third year. Information and applications may be found at <http://www.asee.org/nrl/>. To contact NRL's program coordinator, call (202) 767-8323 or email [asee@hro.nrl.navy.mil](mailto:asee@hro.nrl.navy.mil).

## FACULTY MEMBER PROGRAMS

The **Office of Naval Research Summer Faculty Research and Sabbatical Leave Program** provides for university faculty members to work for ten weeks (or longer, for those eligible for sabbatical leave) with professional peers in participating Navy laboratories on research of mutual interest. Applicants must hold a teaching or research position at a U.S. college or university. Contact NRL's program coordinator at [sfrp@hro.nrl.navy.mil](mailto:sfrp@hro.nrl.navy.mil).

The **NRL/United States Naval Academy Cooperative Program for Scientific Interchange** allows faculty members of the U.S. Naval Academy to participate in NRL research. This collaboration benefits the Academy by providing the opportunity for USNA faculty members to work on research of a more practical or applied nature. In turn, NRL's research program is strengthened by the available scientific and engineering expertise of the USNA faculty. Contact NRL's program coordinator at [usna@hro.nrl.navy.mil](mailto:usna@hro.nrl.navy.mil).

## PROFESSIONAL APPOINTMENTS

**Faculty Member Appointments** use the special skills and abilities of faculty members for short periods to fill positions of a scientific, engineering, professional, or analytical nature at NRL.

**Consultants and experts** are employed because they are outstanding in their fields of specialization or because they possess ability of a rare nature and could not normally be employed as regular civil servants.

**Intergovernmental Personnel Act Appointments** temporarily assign personnel from state or local governments or educational institutions to the Federal Government (or vice versa) to improve public services rendered by all levels of government.

## STUDENT PROGRAMS

The student programs are tailored to high school, undergraduate, and graduate students to provide employment opportunities and work experience in naval research.

The **Naval Research Enterprise Intern Program (NREIP)** is a ten-week summer research opportunity for undergraduate sophomores, juniors, and seniors, and graduate students. The Office of Naval Research (ONR) offers summer appointments at Navy laboratories to current college sophomores, juniors, seniors, and graduate students from participating schools. Application is online at [www.asee.org/nreip](http://www.asee.org/nreip) through the American Society for Engineering Education. Electronic applications are sent for evaluation to the point of contact at the Navy laboratory identified by the applicant. Contact NRL's program coordinator at [nreip@nrl.navy.mil](mailto:nreip@nrl.navy.mil).

The **National Defense Science and Engineering Graduate Fellowship Program** helps U.S. citizens obtain advanced training in disciplines of science and engineering critical to the U.S. Navy. The three-year program awards fellowships to recent outstanding graduates to support their study and research leading to doctoral degrees in specified disciplines such as electrical engineering, computer sciences, material sciences, applied physics, and ocean engineering. Award recipients are encouraged to continue their study and research in a Navy laboratory during the summer. Contact NRL's program coordinator at (202) 404-7450 or [ndseg@hro.nrl.navy.mil](mailto:ndseg@hro.nrl.navy.mil).

The **Pathways Intern Program** (formerly STEP and SCEP) provides students enrolled in a wide variety of educational institutions, from high school to graduate level, with opportunities to work at NRL and explore Federal careers while still in school and while getting paid for the work performed. Students can work full-time or part-time on a temporary or non-temporary appointment. Students must be continuously enrolled on at least a half-time basis at a qualifying educational institution and be at least 16 years of age. The primary focus of our **Non-temporary** intern appointment is to attract students enrolled in undergraduate and graduate programs in engineering, computer science, or the physical sciences. Students on non-temporary appointments are eligible to remain on their appointment until graduation and may be noncompetitively converted to a permanent appointment within 120 days after completion of degree requirements. Conversion is not guaranteed. Conversion is dependent on work performance, completion of at least 640 hours of

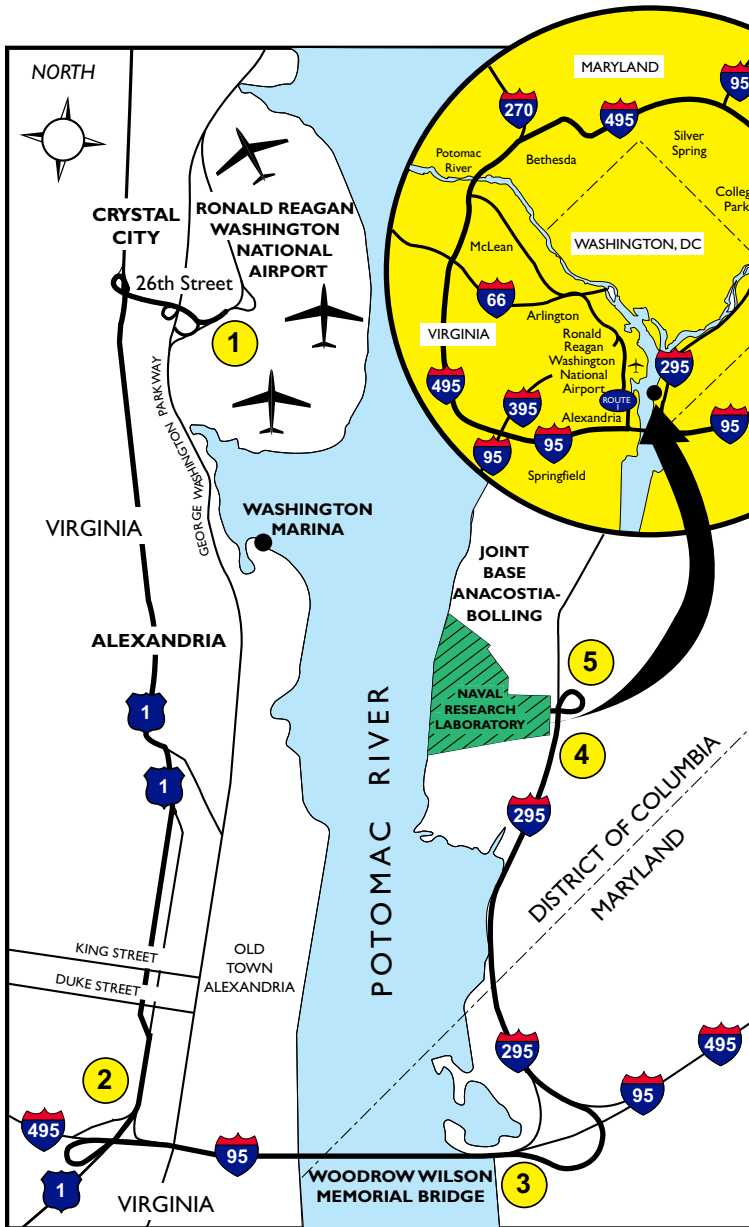
work under the intern appointment before completion of degree requirements, and meeting the qualifications for the position. The **Temporary** intern appointment is initially a one year appointment. This program enables students to earn a salary while continuing their studies and offers them valuable work experience. NRL's Pathways Intern Program opportunities are announced on USA-JOBS four times per year. Visit USAJOBS at <https://www.usajobs.gov/> to create an account, search for jobs, set up an email notification alert of when positions of interest are posted (see "Saved Searches") and apply for our intern opportunities when posted. For additional information on NRL's Intern Program, visit [http://hroffice.nrl.navy.mil/student/student\\_only.asp](http://hroffice.nrl.navy.mil/student/student_only.asp) or contact (202) 767-8313.

The **Department of Defense Science and Engineering Apprenticeship Program (SEAP)** provides an opportunity for high school students who have completed at least grade 9, and are at least 15 years of age, to serve as junior research associates. Under the direction of a mentor, for eight weeks in the summer, students gain a better understanding of research, its challenges, and its opportunities through participation in scientific, engineering, and mathematics programs. Criteria for eligibility are based on science and mathematics courses completed and grades achieved; scientific motivation, curiosity, the capacity for sustained hard work; a desire for a technical career; teacher recommendations; and exceptional test scores. The NRL program is the largest in the Department of Defense. For detailed information visit <http://seap.asee.org/>, or call (202) 767-8324, or email [seap@hro.nrl.navy.mil](mailto:seap@hro.nrl.navy.mil).

## VOLUNTEER OPPORTUNITIES

The **Student Volunteer Program** helps students gain valuable experience by allowing them to voluntarily perform educationally related work at NRL. It provides exposure to the work environment and also provides an opportunity for students to make realistic decisions regarding their future careers. Applications are accepted year-round. For additional information, visit [http://hroffice.nrl.navy.mil/student/student\\_only.asp](http://hroffice.nrl.navy.mil/student/student_only.asp) or contact (202) 767-8313.

# GENERAL INFORMATION

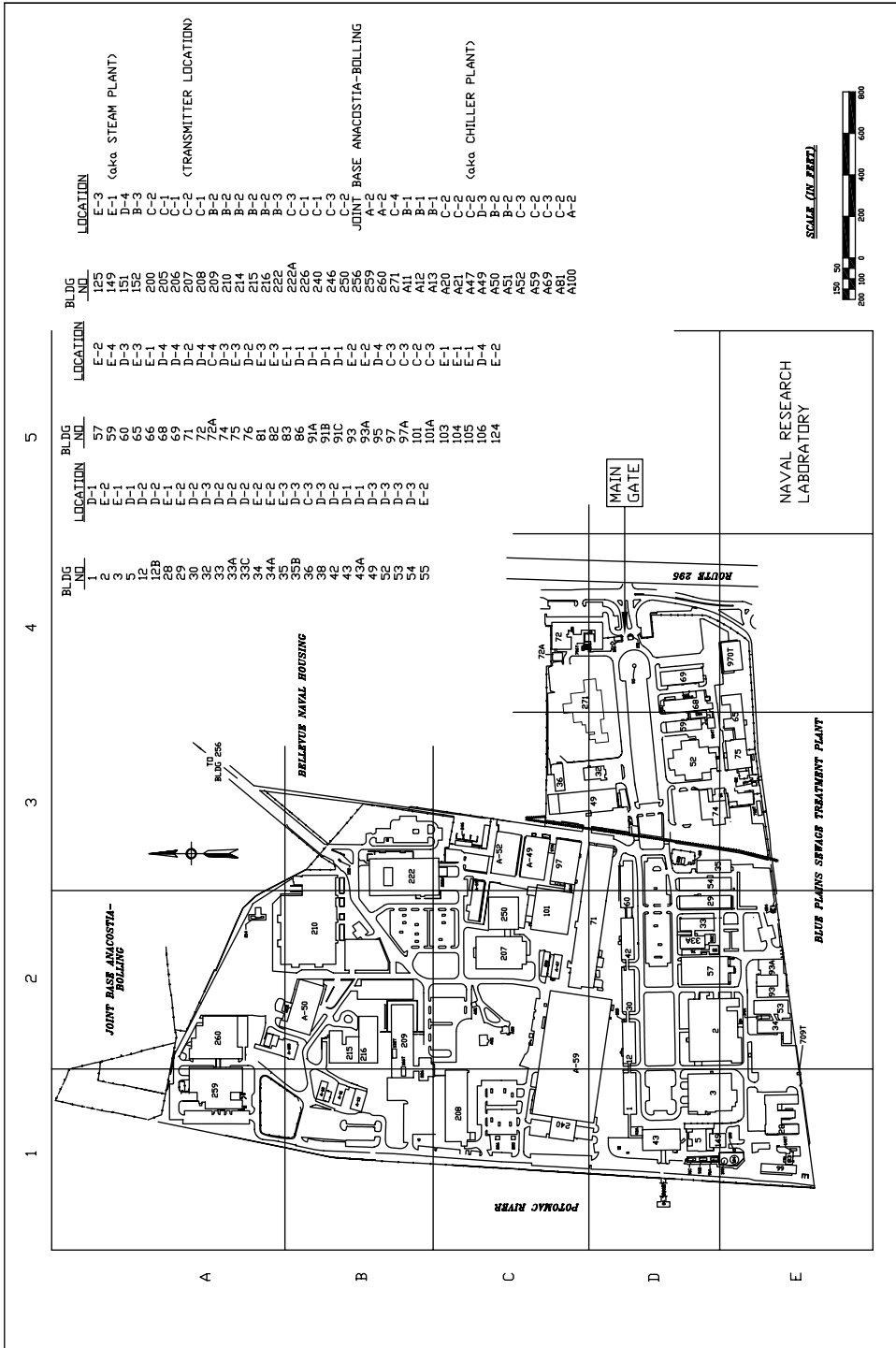


U.S. Naval Research Laboratory  
 4555 Overlook Avenue, SW  
 Washington, DC 20375-5320  
 (202) 767-3200 – DSN 297-3200

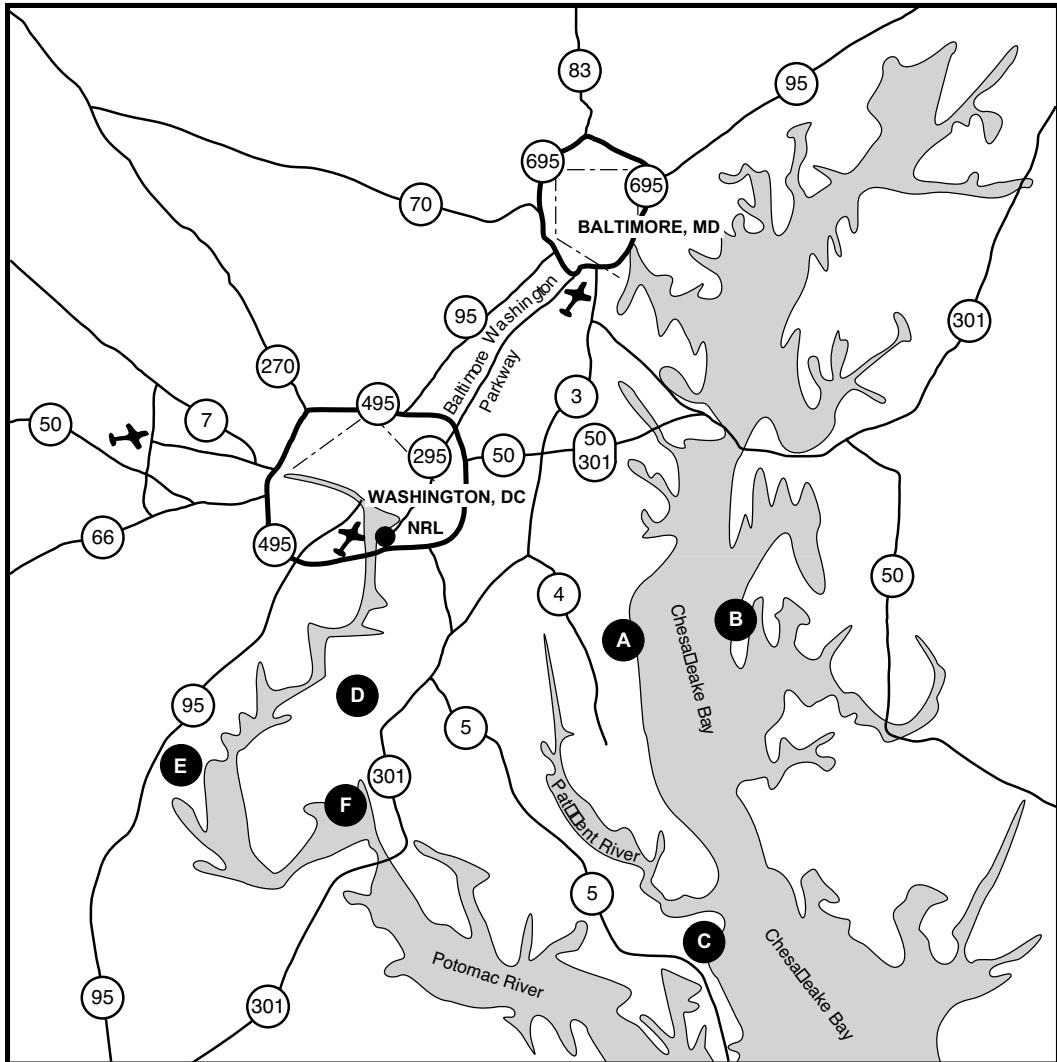
### Directions TO NRL from Ronald Reagan Washington National Airport

- 1 Follow Route 1 South for approximately 3 miles to the Beltway I-95/I-495.
- 2 Exit right to the Beltway. This exit curves to the right and then divides. Take the left fork to I-95 (Baltimore). Stay in local lanes.
- 3 Stay in the right lane on the Woodrow Wilson Bridge. After crossing the Woodrow Wilson Bridge, take the first exit (I-295). This exit divides. Take the left fork to I-295 North.
- 4 NRL is the first exit off of I-295 (approximately 2 miles) after crossing the Woodrow Wilson Bridge.
- 5 Make a right at the traffic light in front of the main gate (Overlook Avenue). Then make an immediate left into the parking lot. The Visitor Control Center (Building 72) is located on the corner in the brick building next to the main gate.

# Location of Buildings at NRL Washington

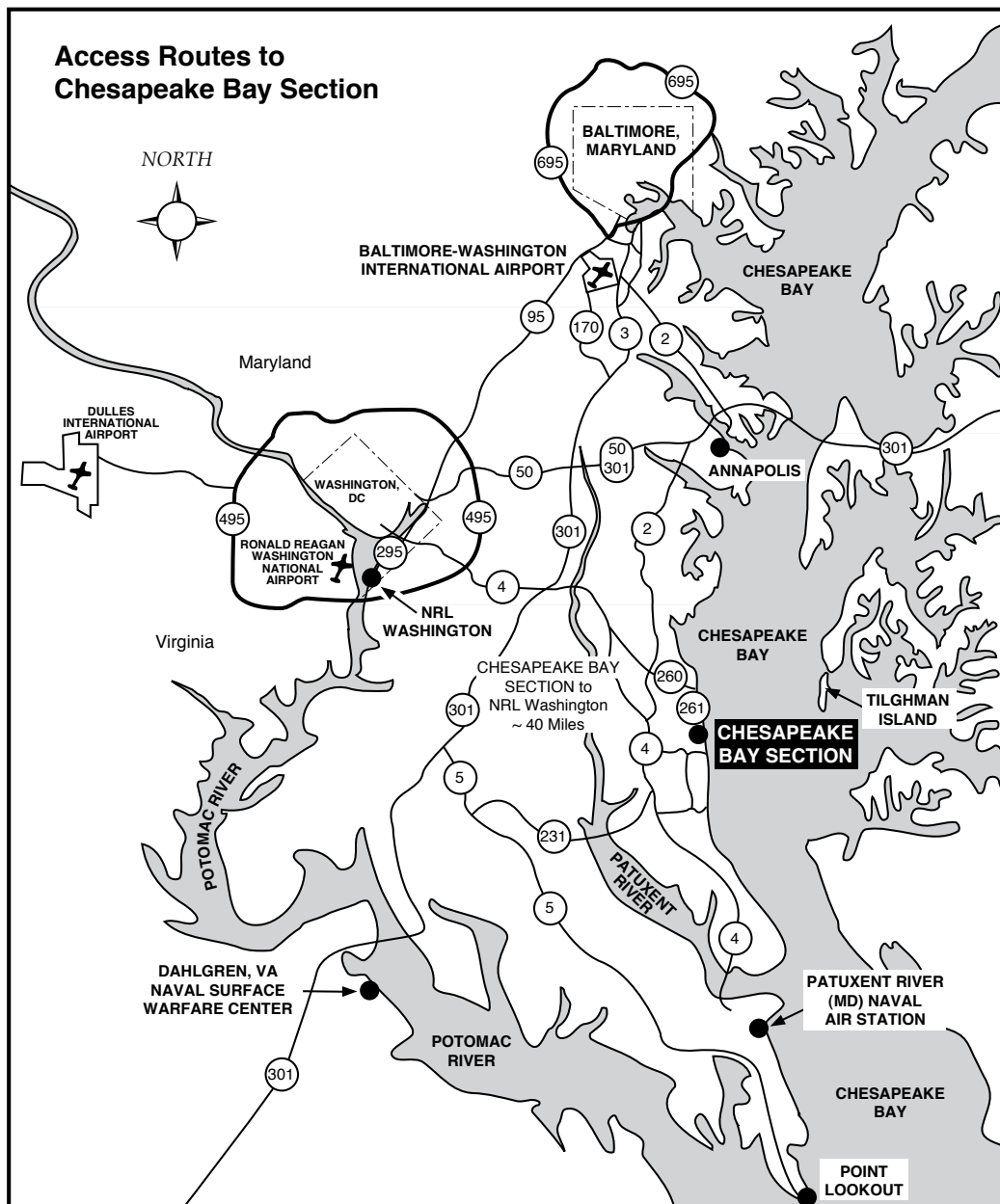


# Location of Field Sites in the NRL Washington Area



<u>Location</u>	<u>Approximate Mileage from NRL Washington</u>	<u>Cognizant Code</u>
A - Chesapeake Bay Section, Chesapeake Beach, MD	40	3522
B - Tilghman Island, MD	110	3522
C - Patuxent River (MD) Naval Air Station	64	1600
D - Pomonkey, MD	20	8124
E - Midway Research Center, Quantico, VA	38	8140
F - Blossom Point, MD	40	8140

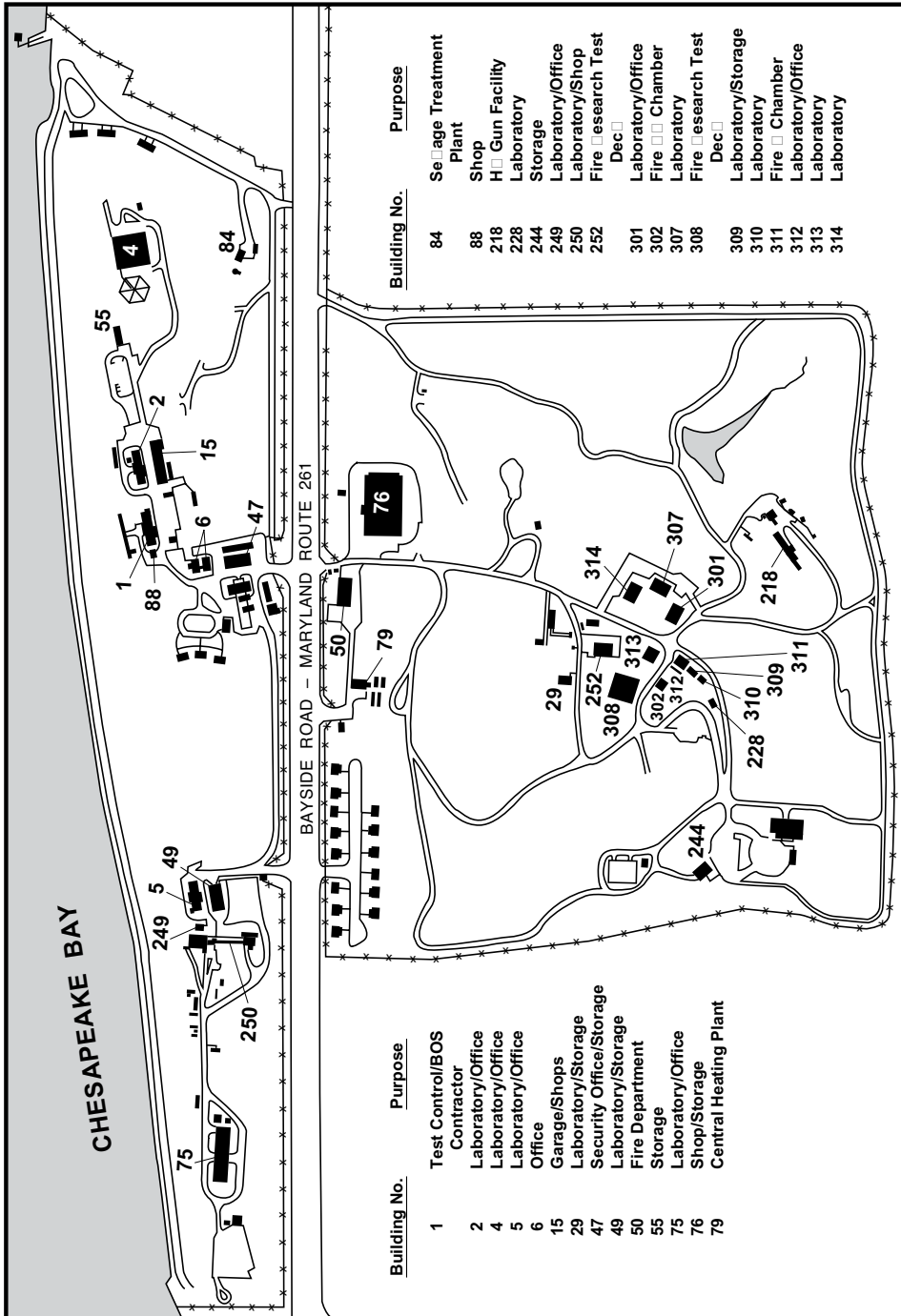
# Chesapeake Bay Section (Chesapeake Beach, Maryland)



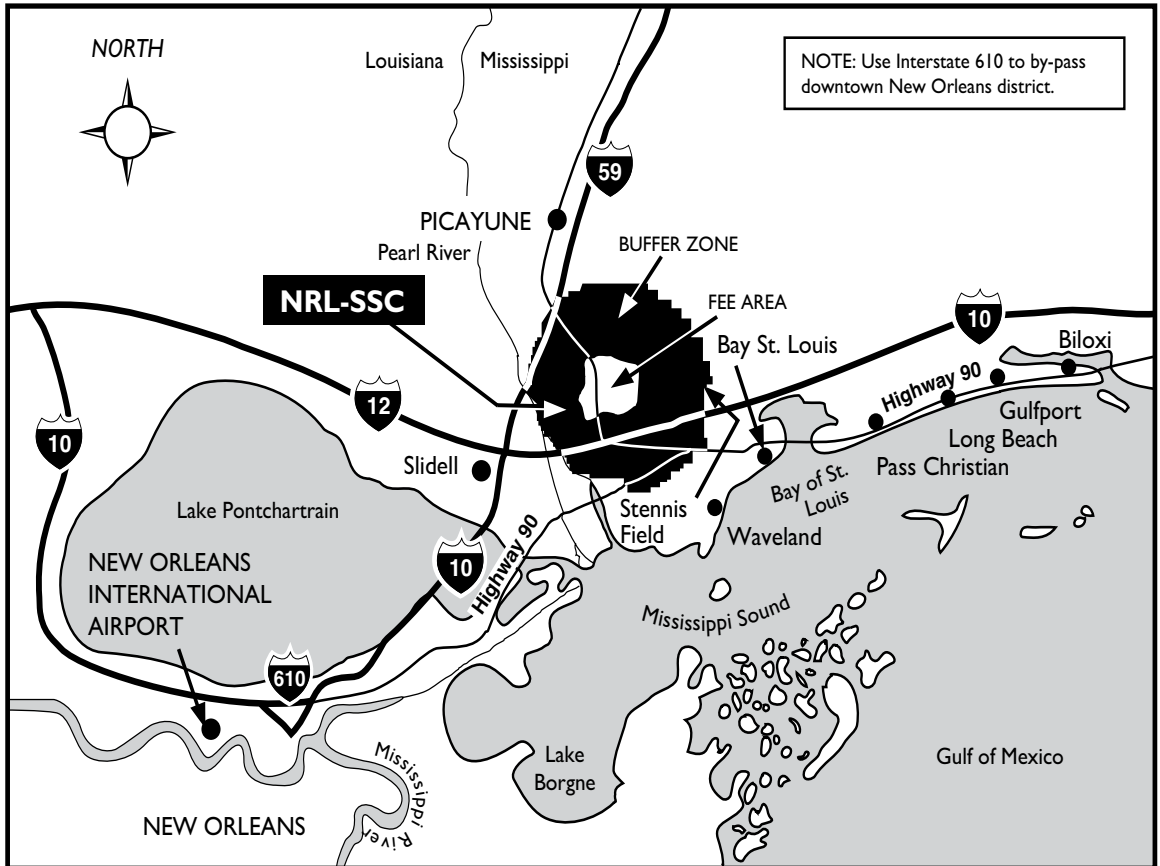
U.S. Naval Research Laboratory  
Chesapeake Bay Section  
5813 Bayside Road  
Chesapeake Beach, MD 20732  
(301) 257-4002



# Location of Buildings at the Chesapeake Bay Section



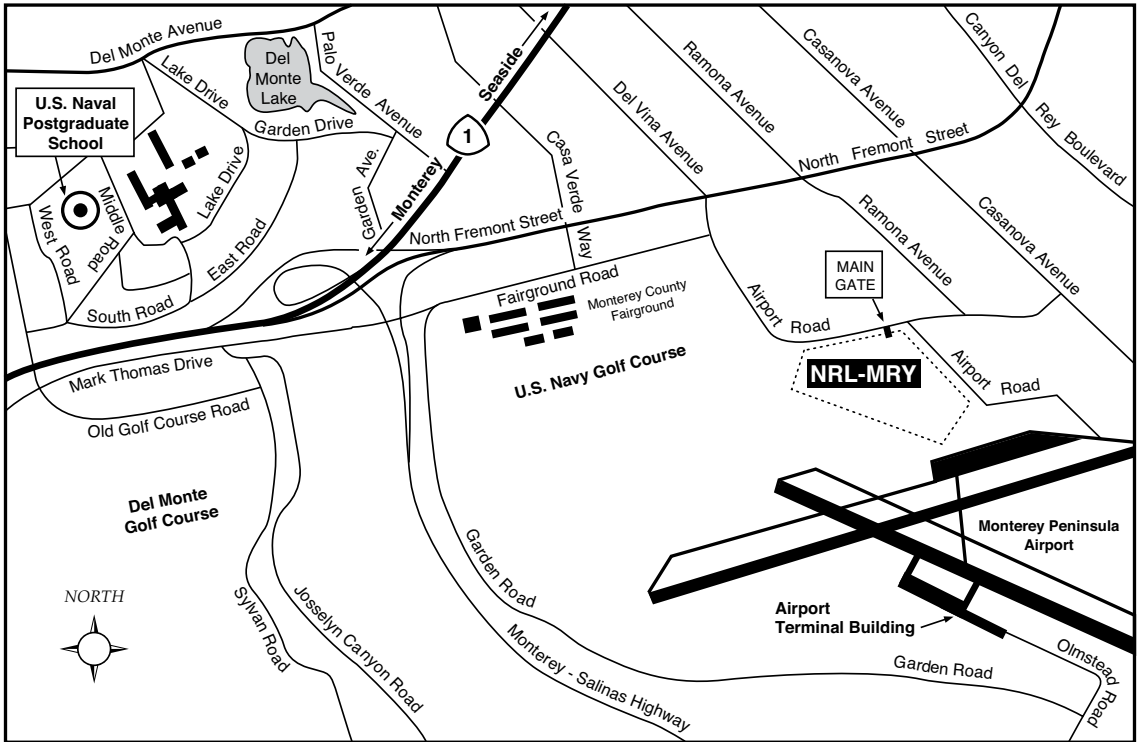
# John C. Stennis Space Center (Stennis Space Center, Mississippi)



NOTE: Use Interstate 610 to by-pass downtown New Orleans district.

U.S. Naval Research Laboratory  
 John C. Stennis Space Center  
 Stennis Space Center, MS 39529-5004  
 (228) 688-3390

# U.S. Naval Research Laboratory Monterey (Monterey, California)



U.S. Naval Research Laboratory  
Marine Meteorology Division  
7 Grace Hopper Avenue  
Monterey, CA 93943-5502  
(831) 656-4721

# Key Personnel

**DSN: NRL Washington 297- or 754-; NRL/SSC 828-; NRL/Monterey 878-;  
NRL VXS-1/Patuxent River 342-**

<b>Code</b>		<b>Telephone</b>
<b>EXECUTIVE DIRECTORATE</b>		
1000	Commanding Officer	(202) 767-3403
1000.1	Inspector General	(202) 404-3309
1001	Director of Research	(202) 767-3301
1001.1	Executive Assistant to the Director of Research	(202) 767-2445
1001.2	Head, Strategic Workforce Planning	(202) 767-3421
1001.3	Executive Assistant for Technology Deployment	(202) 767-0851
1002	Chief Staff Officer	(202) 767-3621
1004	Head, Office of Technology Transfer	(202) 767-3083
1006	Head, Office of Program Administration and Policy Development	(202) 767-1312
1008	Head, Office of Counsel	(202) 767-2244
1030	Head, Strategic Communications Office	(202) 404-3322
1100	Director, Institute for Nanoscience	(202) 767-1803
1200	Head, Command Support Division	(202) 404-1004
1220	Head, Information Assurance and Communications Security	(202) 767-0213
1400	Head, Military Support Division	(202) 767-2273
1600	Commanding Officer, Scientific Development Squadron One (VXS-1) (PAX River NAS)	(301) 342-3751
1700	Director, Laboratory for Autonomous Systems Research	(202) 767-0792
1800	Director, Human Resources Office	(202) 767-3792
1830	Deputy Equal Employment Opportunity Officer	(202) 767-8390
3005	Deputy for Small Business	(202) 767-0666
3540	Head, Safety Branch	(202) 767-2232
<b>BUSINESS OPERATIONS DIRECTORATE</b>		
3000	Associate Director of Research for Business Operations	(202) 767-2371
3005	Deputy for Small Business	(202) 767-0666
3030	Head, Management Information Systems Office	(202) 404-3659
3200	Head, Contracting Division	(202) 767-5227
3300	Head, Financial Management Division	(202) 767-3405
3400	Head, Supply and Information Services Division	(202) 767-3446
3500	Director, Research and Development Services Division	(202) 404-4054
<b>SYSTEMS DIRECTORATE</b>		
5000	Associate Director of Research for Systems	(202) 767-3525
5300	Superintendent, Radar Division	(202) 404-2700
5500	Superintendent, Information Technology Division/NRL Command Information Officer	(202) 767-2903
5600	Superintendent, Optical Sciences Division	(202) 767-3171
5700	Superintendent, Tactical Electronic Warfare Division	(202) 767-6278
<b>MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE</b>		
6000	Associate Director of Research for Materials Science and Component Technology	(202) 767-3566
6040	Director, Laboratories for Computational Physics and Fluid Dynamics	(202) 767-3055
6100	Superintendent, Chemistry Division	(202) 767-3026
6300	Superintendent, Materials Science and Technology Division	(202) 767-2926
6700	Superintendent, Plasma Physics Division	(202) 767-2723
6800	Superintendent, Electronics Science and Technology Division	(202) 767-3693
6900	Director, Center for Bio/Molecular Science and Engineering	(202) 404-6000

**DSN: NRL Washington 297- or 754-; NRL/SSC 828-; NRL/Monterey 878-;  
NRL VXS-1/Patuxent River 342-**

**Code**

**Telephone**

**OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY DIRECTORATE**

7000	Associate Director of Research for Ocean and Atmospheric Science and Technology	(202) 404-8690
7030	Head, Office of Research Support Services	(228) 688-4010
7100	Superintendent, Acoustics Division	(202) 767-3482
7200	Superintendent, Remote Sensing Division	(202) 767-3391
7300	Superintendent, Oceanography Division	(228) 688-4670
7400	Superintendent, Marine Geosciences Division	(228) 688-4650
7500	Superintendent, Marine Meteorology Division	(831) 656-4721
7600	Superintendent, Space Science Division	(202) 767-6343

**NAVAL CENTER FOR SPACE TECHNOLOGY**

8000	Director, Naval Center for Space Technology	(202) 767-6547
8100	Superintendent, Space Systems Development Department	(202) 767-4593
8200	Superintendent, Spacecraft Engineering Department	(202) 404-3727

The *NRL Fact Book* is a reference source for information about the U.S. Naval Research Laboratory (NRL). It is updated and placed on NRL's Web site (<http://www.nrl.navy.mil>) annually. To provide additional information to the reader, a point of contact is listed for each activity.

NRL has a continuing need for physical scientists, mathematicians, engineers, and support personnel. Vacancies are filled without regard to age, race, creed, sex, or national origin. Information concerning current vacancies is furnished on request. Address all such inquiries to:

Human Resources Office  
 Personnel Operations Branch (Code 1810)  
 U.S. Naval Research Laboratory  
 Washington, DC 20375-5320

**Technical Information Services Branch  
 Production Staff**

**Coordination, Design, and Layout**  
*Jonna Atkinson*

**Editorial Assistance**  
*Beth Dalton*  
*Kathy Parrish*

**Photography**  
*Jamie Hartman*  
*Gayle R. Fullerton*  
*James Marshall*

[www.nrl.navy.mil](http://www.nrl.navy.mil)



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REVIEWED AND APPROVED  
 NRL/PU/3430--16-608  
 RN: 16-1231-2308  
 August 2016

Mark C. Bruington, Captain, USN  
 Commanding Officer

**Quick Reference Telephone Numbers**

	NRL-DC	NRL-SSC	NRL VXS-1 NRL-MRY	NRL CBD	Patuxent River
Hotline	(202) 767-6543	(202) 767-6543	(202) 767-6543	(202) 767-6543	(202) 767-6543
Personnel Locator	(202) 767-3200	(228) 688-3390	(831) 656-4763	(410) 257-4000	(301) 342-3751
DSN	297- or 754-	828	878	—	342
Direct-in-Dialing	767- or 404-	688	656	257	342
SCO	(202) 767-2541	(228) 688-5328	(202) 767-2541	—	(202) 767-2541

Additional telephone numbers are listed on pages 131 and 132.