

THE NAVY'S CORPORATE LABORATORY

FACT 2018 BOOK

U.S. NAVAL
RESEARCH
LABORATORY

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

www.nrl.navy.mil



<http://www.facebook.com/USNRL>
<http://www.twitter.com/USNRL>

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 133 and 134.

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).

Contents

1 INTRODUCTION TO THE NAVAL RESEARCH LABORATORY

- 5 NRL Functional Organization
- 6 NRL Sites and Facilities
- 7 Current Research

11 EXECUTIVE DIRECTORATE

- 12 Executive Directorate – Code 1000 and Code 1001
- 14 Commanding Officer
- 15 Director of Research
- 16 Executive Council
- 17 Research Advisory Committee
- 19 Office of Technology Transfer
- 20 Office of Program Administration and Policy Development
- 21 Office of Counsel
- 22 Institute for Nanoscience
- 24 Command Support Division
- 25 Military Support Division
- 26 Scientific Development Squadron ONE (VXS-1)
- 28 Laboratory for Autonomous Systems Research
- 30 Human Resources Office
- 32 Ruth H. Hooker Research Library

33 BUSINESS OPERATIONS DIRECTORATE

- 35 Business Operations Directorate – Code 3000
- 36 Associate Director of Research for Business Operations
- 38 Contracting Division
- 40 Financial Management Division
- 42 Supply and Information Services Division
- 44 Research and Development Services Division

47 SYSTEMS DIRECTORATE

- 49 Systems Directorate – Code 5000
- 50 Associate Director of Research for Systems
- 52 Radar Division
- 54 Information Technology Division
- 56 Optical Sciences Division
- 58 Tactical Electronic Warfare Division

61 MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE

- 63 Materials Science and Component Technology Directorate – Code 6000
- 64 Associate Director of Research for Materials Science and Component Technology
- 66 Laboratories for Computational Physics and Fluid Dynamics
- 68 Chemistry Division

- 70 Materials Science and Technology Division
- 72 Plasma Physics Division
- 74 Electronics Science and Technology Division
- 76 Center for Bio/Molecular Science and Engineering

79 OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY DIRECTORATE

- 81 Ocean and Atmospheric Science and Technology Directorate – Code 7000
- 82 Associate Director of Research for Ocean and Atmospheric Science and Technology
- 84 Office of Research Support Services (NRL-SSC)
- 86 Acoustics Division
- 88 Remote Sensing Division
- 90 Oceanography Division
- 92 Marine Geosciences Division
- 94 Marine Meteorology Division
- 96 Space Science Division

99 NAVAL CENTER FOR SPACE TECHNOLOGY

- 101 Naval Center for Space Technology – Code 8000
- 102 Director of Naval Center for Space Technology
- 104 Space Systems Development Department
- 106 Spacecraft Engineering Department

109 TECHNICAL OUTPUT, FISCAL, AND PERSONNEL INFORMATION

- 111 Technical Output
- 112 FY 2016/2017 Sources of New Funds (Actual)
- 113 FY 2016/2017 Uses of Funds
- 114 FY 2016 Total New Funds by Category
- 115 FY 2017 Total New Funds by Category
- 116 Personnel Information

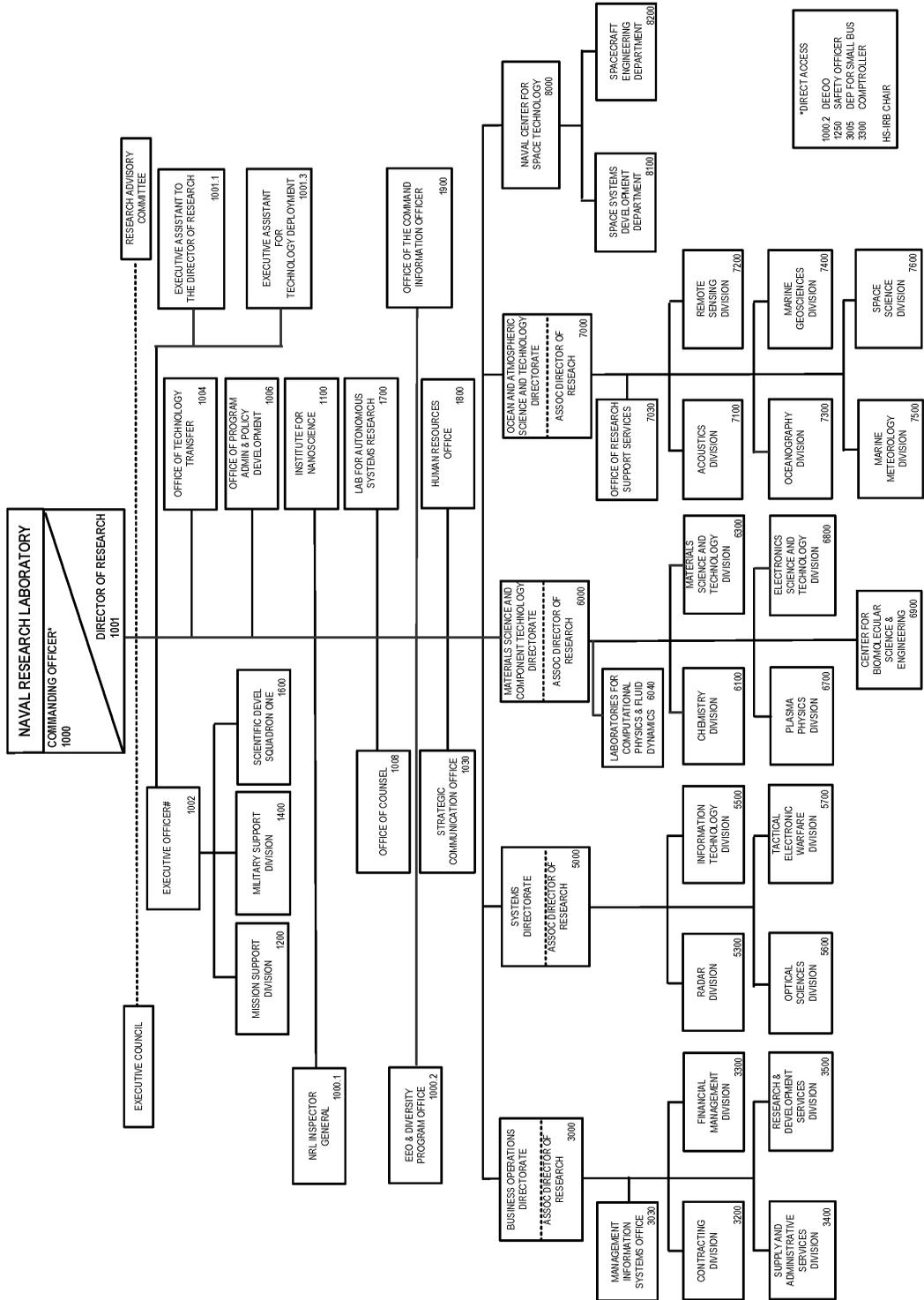
117 PROFESSIONAL DEVELOPMENT

- 118 Programs for NRL Employees
- 121 Programs for Non-NRL Employees

125 GENERAL INFORMATION

- 126 Maps
- 133 Key Personnel

NRL Functional Organization



NRL Sites and Facilities

SITE	ACREAGE		BUILDINGS/ STRUCTURES
	LAND OWNED/LEASED	EASEMENT/ LICENSE-PERMIT	
District of Columbia NRL and Joint Base Anacostia-Bolling*	131/0	0/10.13	95/32
Virginia Midway Research Center Quantico*	162/0	0/0	7/12
Maryland NRL Scientific Development Squadron One (VXS-1), NAS Patuxent River*	Tenant		
Chesapeake Bay Section and Dock Facility Chesapeake Beach*	168/0	.6/.02	52/70
Multiple Research Site Tilghman Island*	3/0	0/0	3/3
Free Space Antenna Range Pomonkey*	141/0	0/0	10/12
Blossom Point Tracking Facility*	0/0	0/265	22/23
Florida Marine Corrosion Facility Key West	Tenant		
California NRL Marine Meteorology Division Monterey*	Tenant		
Port Hueneme	Tenant		
Mississippi Stennis Space Center Bay St. Louis*	Tenant		
Guam (Finegayan)	Tenant		
Diego Garcia	Tenant		

PROPERTY

Land: 605 acres	Buildings:		Replacement Costs:	
	RDT&E	3,163,638 ft ²	Buildings Plant Replacement	
	Administrative	281,526 ft ²	Value (PRV) ¹	\$1,321,972,183
	Other	284,206 ft ²	Equipment Costs ²	\$892.6 million

¹ Per DON Facilities Asset Data System standard cost factors.

² NRL Accountable Property Acquisition Costs.

* See maps in the General Information section (page 125).

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
- Computational Electronics and Electromagnetics

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 systems modeling/simulation/emulation
- Cognitive radio/dynamic spectrum awareness and spectrum agility
- 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

- Seafloor physical and acoustic properties, methane gas and methane hydrates
- Laboratory measurements of a wide variety of sediment physical, elastic, geotechnical, and acoustic properties
- Numerical simulation and prediction of seafloor sediment properties
- Generation and analysis of interface (Scholte) waves to characterize shear strength of marine sediments
- Acoustic, electro-optic, and electromagnetic sensing for seafloor mapping and characterization
- Through-the-sensors seafloor characterization
- Production and uncertainty estimation of ocean bathymetry
- Modeling, simulations, and prediction of nearshore and riverine processes
- Geospatial human machine interaction
- Geospatial science and technology for enabling information dominance
- Geophysical machine learning methods

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
- Acoustics signature

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
- Lidar studies of particulates and turbulence in the ocean

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
- Neutral and charged-particle sensors
- Radiation transport modeling and evaluation
- 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

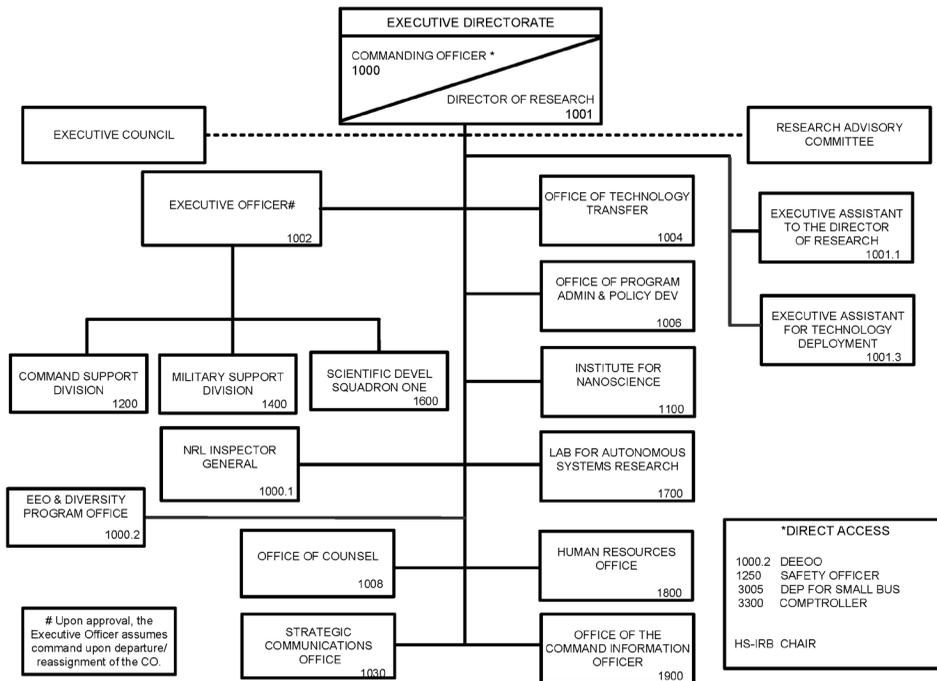
Code 1000 and Code 1001

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.



Upon approval, the Executive Officer assumes command upon departure/reassignment of the CO.

*DIRECT ACCESS
 1000.2 DEEO
 1250 SAFETY OFFICER
 3005 DEP FOR SMALL BUS
 3300 COMPTROLLER
 HS-IRB CHAIR

Key Personnel

CAPT S.D. Moran, USN	Commanding Officer	1000
Dr. B.G. Danly	Director of Research	1001
Mr. D.J. DeYoung	Executive Assistant to the Director of Research	1001.1
Vacant	Executive Assistant for Technology Deployment	1001.3
Dr. A.L. Callahan	NRL Historian	1001.15
Mr. P.M. Clark, Sr.	Inspector General	1000.1
Ms. L.L. Hill	Deputy Equal Employment Opportunity Officer	1000.2
Mr. I.M. Kearl	Managers' Internal Control (MIC) Program Coordinator	1000.12
CAPT R. Vigil, USN	Executive Officer	1002
Ms. A.M. Horansky-McKinney	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 ⁺	Director, Institute for Nanoscience	1100
Mr. T. Brewer	Head, Mission Support Division/STILO	1200
Mr. K.J. Pawlovich	Head, Safety Branch	1250
CDR J.K. Tran, USN	Head, Military Support Division	1400
CDR E.M. Thomas, USN	Commanding Officer, Scientific Development Squadron ONE (VXS-1)	1600
Vacant	Director, Laboratory for Autonomous Systems Research	1700
Ms. M.V. Kisamore	Director, Human Resources Office	1800
Mr. K.A. Rohwer ⁺	Head, Office of the Command Information Officer (OCIO)	1900
Ms. M.N. Robinson [*]	Deputy for Small Business	3005

^{*}Acting ⁺Additional duty

Commanding Officer



Captain Scott D. Moran is a career naval aviator who completed multiple combat tours flying the EA-6B Prowler, culminating with operational command of the VAQ-130 “Zappers,” a carrier-based Electronic Attack Squadron. He is also a Defense Acquisition Corps member with experience across a broad spectrum of acquisition career fields, including shore tours in program management, requirements generation, and test and evaluation specialties.

Within the Office of the Chief of Naval Operations (OPNAV) staff, he served as Assistant Requirements Officer for Airborne Electronic Attack (AEA) programs, including the EA-6B Improved Capability (ICAP) III and EA-18G aircraft programs, both recognized with the David Packard Excellence in Acquisition Award. As one of the initial cadre of EA-18G “plank owners,” Captain Moran helped draft and coordinate foundational documents including the Test and Evaluation Master Plan (TEMP) and Manpower Estimate Report (MER) that supported a successful Milestone B decision for this Acquisition Category (ACAT) ID program.

As an Integrated Product Team (IPT) leader for multiple Advanced Sensor Technology (AST) programs, Captain Moran supervised and coordinated the successful delivery of approximately \$1 billion of hardware and software products to fleet users. Prior to that, he served as Deputy Commander for a joint unit in Baghdad, Iraq, that fielded, maintained, and tested systems designed to protect against Radio Controlled Improvised Explosive Devices.

Captain Moran earned a B.S. degree in aero/astro engineering from the Massachusetts Institute of Technology, and was inducted into Sigma Gamma Tau and Tau Beta Pi engineering honor societies. He completed the Naval Postgraduate School/United States Naval Test Pilot School Cooperative Program, receiving an M.S. degree in aeronautical engineering in addition to qualifying as a Navy Test Pilot. He earned a second M.S. degree as a distinguished graduate of the Eisenhower School for National Security and Resource Strategy (formerly the Industrial College of the Armed Forces). He has received multiple awards for research and writing, including peer reviewed work published in the *Defense Acquisition Review Journal*.

In addition to earning certifications in five defense acquisition career fields, Captain Moran is a certified Project Management Professional (PMP®). He has received individual recognition within his warfare community as Junior Officer (Fodor Award) and Senior Officer (Ford Award) of the year. His military decorations include the Legion of Merit, Bronze Star, Meritorious Service Medal (two awards), and Air Medal (Individual with Combat “V” and 4 Strike/Flight awards).

Director of Research



Dr. Bruce Danly was selected as the Director of Research for the U.S. Naval Research Laboratory (NRL) in December 2016, and has been in various roles at NRL since 1995.

He was appointed to the Senior Executive Service (SES) in February 2008. From 2008 through 2016, Dr. Danly served as Superintendent, Radar Division. The division is responsible for basic and applied research and development in radar and related sensors for the Navy and Marine Corps. The division also provides support to the Navy acquisition community and to the operational Navy on quick-reaction tasks.

Prior to his appointment to the SES, Dr. Danly served as Branch Head, Microwave Technology Branch, in NRL's Electronics Science and Technology Division (ESTD) from 2006 to 2008. This branch carries out R&D on both wide-bandgap and narrow-bandgap semiconductor devices and passive and active microwave components. Dr. Danly originally entered government service in 1995 as Head of the High Power Devices Section, Vacuum Electronics Branch, in the ESTD. From 1995 to 2006,

he led a group that developed high-power millimeter-wave technology for application to radar, communications, and electronic warfare systems.

He represented the U.S. Navy to the Technology Cooperation Program Intelligence Surveillance Tracking Acquisition and Reconnaissance Technical Panel 2 on RF Sensing from 2010 to 2016, and was appointed chairman of the panel in 2016. He also served as a U.S. at-large member to the NATO Sensors and Electronics Technology Panel from 2014 to 2016.

Dr. Danly received a bachelor's degree in physics from Haverford College in 1978 and a doctorate in physics from the Massachusetts Institute of Technology in 1983. His thesis work was in the field of quantum electronics. Prior to his arrival at NRL in 1995, Dr. Danly was on the research staff at the MIT Plasma Fusion Center, as a research scientist from 1983 to 1992, and as a Principal Research Scientist from 1992 to 1995, where he worked on high power microwave and millimeter wave sources for fusion, accelerator, and defense applications.

Dr. Danly was elected as a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) in 2003 for his work on millimeter-wave sources. His other awards include the Robert L. Woods award from the Advisory Group on Electron Devices of the Office of Secretary of Defense in 1999 for leadership in the vacuum electronics community and the Navy Meritorious Unit Commendation as a member of the NRL research staff from September 11, 2001 to 2006. Dr. Danly was awarded a group award in 2002 for development of the WARLOC High-Power Millimeter-Wave Radar, and received NRL Technology Transfer Awards in 2000 and 2003. Dr. Danly is a member of the American Physical Society and IEEE, and served on the IEEE Aerospace and Electronic Systems (AES) Radar Systems Panel from 2008 to 2013. He has published more than 70 papers in scientific and technical journals.

Executive Council



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

- Commanding Officer, Chairperson
- Inspector General
- 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
- Deputy Equal Employment Opportunity Officer
- Strategic Communications 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

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 the Managers' Internal Control Program, and is the primary point of contact and liaison with all inspections and audit agencies outside NRL.



Ms. L.L. Hill

Deputy Equal Employment Opportunity Officer — Code 1000.2

The Deputy Equal Employment Opportunity Officer (DEEOO) is the EEO program manager and the advisor to the Commanding Officer on all EEO matters. The DEEOO manages the discrimination complaint and reasonable accommodation processes, provides workplace accommodations, and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Employment for Individuals with Disabilities, and Hispanic Employment). The DEEOO coordinates barrier analysis efforts to identify barriers to EEO for minorities and women in the workplace and develops/recommends strategies for eliminating existing barriers.



CAPT R. Vigil, USN

Executive Officer — Code 1002

The Executive 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, Maryland, Code 1600) report directly to the Executive Officer.



Mr. V. Chen

Strategic Communications Officer — Code 1030

The Strategic Communications Officer (SCO) 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 SCO plans and directs a program of public information dissemination on official NRL activities. The SCO 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 SCO is also responsible for coordinating all actions within the Laboratory that respond to requirements of the Freedom of Information Act (FOIA) and coordinates support from Technical Information Services and Digital and Visual Information for publications, printing and duplication, graphics, videography, photography, and archival services for photos/videos.

Office of Technology Transfer

Code 1004



Head: Ms. A.M. Horansky-McKinney

Point of Contact: Ms. E.R. Metcalf
Code 1004
(202) 767-7229

Key Personnel

Ms. A.M. Horansky-McKinney	Head, Technology Transfer Office	1004
Vacant	Sr. Licensing Associate	1004
Mr. C.P. Childs	Sr. Partnerships Manager	1004
Mr. G. Letscher	Licensing Associate	1004
Dr. H. Ricks-Laskoski	Licensing Associate	1004
Ms. E.R. Metcalf	Sr. Management Analyst	1004
Ms. H.O. Sofola	Administrative Assistant	1004

Personnel: 7 full-time civilian

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.J. Edelen
Code 1006.2
(202) 767-2668

Key Personnel

Ms. M.E. Dixon	Head, Office of Program Admin and Policy Development	1006
Ms. M.E. Dixon*	Head, Program Administration Staff	1006.1
Ms. D.J. Edelen	Administrative Officer	1006.2
Ms. M.M. Webb	Head, Executive Management and Policy Development Staff	1006.3
Ms. M.E. Barton	Directives	1006.31
Ms. M.E. Dixon*	Head, Conference Facilities Staff	1006.4
Vacant	Special Assistant	1006.6
Mr. K. Szczublewski	Administrative Resources Manager	1006.7
Ms. T.M. Chops	Protocol Officer	1006.8

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⁺

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

⁺Additional Duty

Key Personnel

Dr. E.S. Snow ⁺	Director, Institute for Nanoscience	1100
Ms. C.A. Habron	Position Assistant	1100
Mr. D.R. St. Amand	Facilities Manager	1100
Dr. A.K. Boyd	Facilities Manager	1100
Mr. W.A. Spratt	Facilities Manager	1100

Personnel: 4.5 full-time civilian

⁺Additional Duty

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
- Nano/bio systems
- Warfighter health monitoring and healing
- Neuromorphic computing

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 ft² 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 ft² 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 ± 0.5 °C and four to within ± 0.1 °C.

Major Research Capabilities and Facilities

Clean room (5000 ft²), quiet (4000 ft²), and ultra-quiet (1000 ft²) 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 μ 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
He ion microscope

Mission 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, Mission Support Division	1200
Vacant	Deputy Head, Mission Support Division	1201
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
Mr. K.J. Pawlovich	Head, Safety Branch	1250

Personnel: 113 full-time civilian

Basic Responsibilities

The Mission Support Division is responsible for NRL security and safety policy, management, and oversight. The Division Head serves as the NRL Security Manager and NRL Senior Intelligence Officer (SIO). Primary areas of security concern include cyber security, information security, personnel security, industrial security, classification management, foreign disclosure, physical security, force protection, antiterrorism, counter intelligence, operations security, communications security, and special security programs. In addition, the Division provides required security education across all security disciplines and conducts internal inspections for compliance with security-related governance. Primary areas of safety concern include safety and occupational health, explosives safety, and industrial hygiene programs. The Division is responsible for the development, implementation, and maintenance of comprehensive safety programs that support NRL research as well as ensuring NRL compliance with all appropriate federal, state, DoD, DON, and NRL regulations. The Division partners with other support and research Divisions to ensure that NRL's research is conducted in an appropriately secure and safe environment.

Military Support Division

Code 1400



Head: CDR J.K. Tran, USN

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

Key Personnel

CDR J.K. Tran, 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 J. Chatfield, USN	Project Officer	1430
LT B. Bullen, USN	Project Officer	1430A
LT W.J. McCrone, 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 E.M. Thomas, USN

Point of Contact: LT O.O. Abegunde, USN
Code 1610
(301) 995-4122

Key Personnel

CDR E.M. Thomas, USN	Commanding Officer, VXS-1	1600
CDR J.A. Tharp, USN	Executive Officer	1601
ATCS C.E. McCan, USN	Senior Enlisted Leader	1600.2
Vacant	Executive Secretary	1600.4
LT O.O. Abegunde, USN	Administrative Officer	1610
LT D.E. Miller, USN	Operations Officer	1630
LCDR M.M. McLean, USN	Projects Director	1630.1
LCDR C. Felice, USN	Maintenance Officer	1640
LT R.R. Clarida, USN	NATOPS/Training Officer	1670
Mr. S. Rorke	Projects Liaison Officer	1690

Personnel: 4 full-time civilian; 65 military

Staff Activity Areas

Projects Director
Operations
Safety/NATOPS/Training
Administration
Aircraft Maintenance
Quality Assurance
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. Additionally, the squadron performs aircraft reporting custodian duties for nine Scan Eagle unmanned systems operating out of Dahlgren, Virginia, and will add a UV-18 Twin Otter to its aircraft inventory in 2018. 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 800 flight hours, and in its 52 year history, Scientific Development Squadron ONE (VXS-1) has amassed 73,000 hours of mishap-free flying.



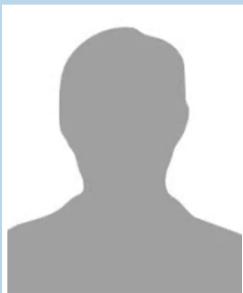
Scientific Development Squadron One hangar



Aircraft maintenance

Laboratory for Autonomous Systems Research

Code 1700



Director: Vacant

Point of Contact: Ms. D.E. Thorp
Code 1700
(202) 767-0653

Key Personnel

Vacant	Director, Laboratory for Autonomous Systems Research	1700
Mr. A. O'Hara	Facilities Manager	1700
Ms. D.E. Thorp	Financial and Administrative Management	1700

Personnel: 2 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

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. S.M. Cummings	Head, Employee Development and Management Branch	1840
Ms. L. Beck	Head, Employee Relations Branch	1850

Personnel: 30 full-time civilian

*Acting

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.



Human Resources Office Staff



Personnel Operations 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
Ms. J.E. Griffin	Head, Research Reports and Bibliography Section	5596.3
Mr. J.C. Haesloop	Library IT Director	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



Mr. 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

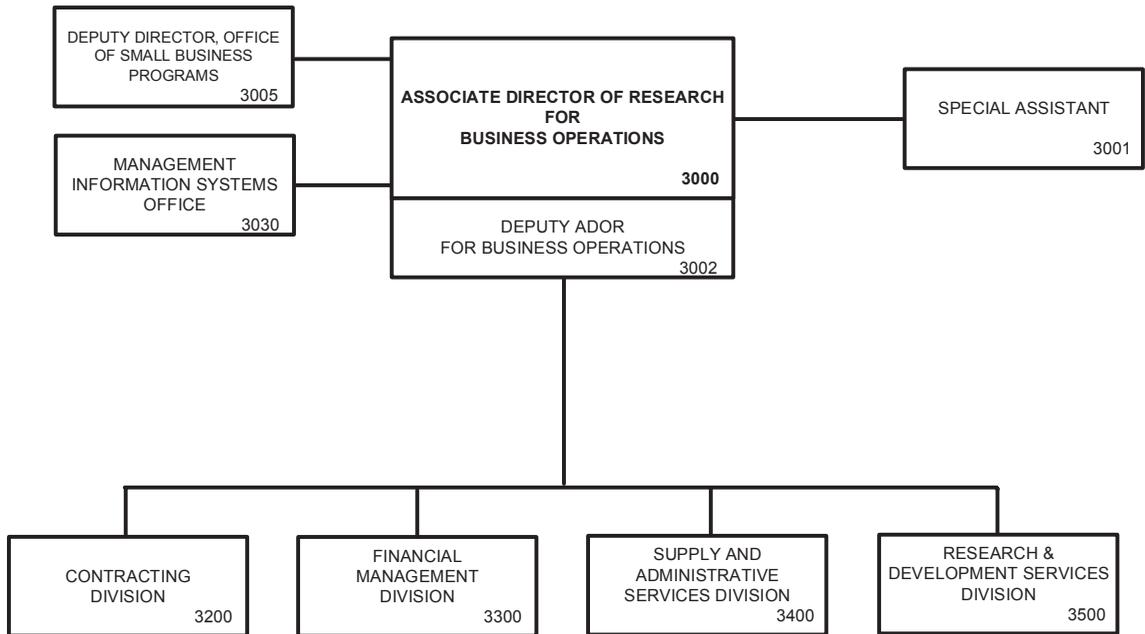
he was appointed Budget Officer of the DNL's seven Navy Industrial Fund R&D laboratories.

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
Ms. Kelly Rice	Deputy Associate Director of Research for Business Operations	3002
Ms. M.N. Robinson*	Deputy Director for Small Business	3005
Mr. D.K. Therning	Enterprise Resource Planning (ERP) Business Office	3010
Ms. P.W. Lowery	Head, Management Information Systems Office	3030
CDR G.A. Wright*	Head, Contracting Division	3200
Mr. E.L. Williams*	Head, Financial Management Division/Comptroller	3300
Mr. B.W. Belcastro	Head, Supply and Administrative Services Division	3400
Mr. T.K. Hull, Jr.	Director, Research and Development Services Division	3500

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

*Acting

Contracting Division

Code 3200



Head: CDR G.A. Wright*

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

*Acting

Key Personnel

CDR G.A. Wright*	Head, Contracting Division	3200
CDR G.A. Wright	Deputy Head	3201
Ms. K.P. Best	Administrative Officer	3202
Ms. M.N. Robinson	Contracts Support Branch	3210
Ms. L.T. Kellstrom	Head, Contracts Branch 1	3220
Ms. M.L. Lackey	Head, Contracts Branch 2	3230
Ms. B.J. Green	Head, Contracts Branch 3	3240
Vacant	Team Lead, Contracts Section, SSC	3235

Personnel: 52 full-time civilian

*Acting

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.



Specialists discuss small business programs.



Procurement Technician performs contract administration.



Procurement Technician reviews a contract file.

Financial Management Division

Code 3300



Head: Mr. E.L. Williams*

Point of Contact: Ms. C.A. Hornig
Code 3302
(202) 767-6914

*Acting

Key Personnel

Mr. E.L. Williams*	Head, Financial Management Division/Comptroller	3300
Ms. C.A. Hornig	Administrative Officer	3302
Vacant	Financial Management Division/Assistant Comptroller	3303
Ms. E. Mitchell	Head, Financial Improvement and Audit Readiness Office	3305
Mr. E.L. Williams	Head, Budget and Funds Management Branch	3310
Ms. A.D. Kolbe	Head, Funding Section	3311
Ms. E.L. Williams	Head, Internal Budget Section	3312
Mr. W. Wong	Head, Corporate Budget Section	3313
Ms. S.V. Greenwell	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
Vacant	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: 50 full-time civilian

*Acting

Staff Activity Areas

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

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 Administration 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. P.J. Willis	Head, Purchasing Branch	3410
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
Customer Support and Program Management
Material Control
Administrative Services
Automated Internal Costing of Supplies
Disposal and Storage

Basic Responsibilities

The Supply and Information Services Division provides the Laboratory and its field activities with contracting, supply management, logistics, and administrative services. Specific functions include: procuring required equipment, material, and services; receiving, inspecting, 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 mailroom services and correspondence management.



Employees of the Administrative Services Branch discuss NRL electronic forms.



Woodworkers prepare boxes for shipping.



Disposal and storage in Building 49.



Customers and employee at the Supply store.

Research and Development Services Division

Code 3500



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

Point of Contact: Ms. K.B. Spohn
Code 3502
(202) 404-4312

Key Personnel

Mr. T.K. Hull, Jr.	Director, Research and Development Services Division	3500
Ms. K.B. Spohn	Administrative Officer	3502
Mr. G.L. Gray	Head, Customer Liaison Staff	3505
Mr. S.Y. Chan	Head, Support Services Branch	3520
Mr. H.W. Rolfs	Head, Chesapeake Bay Section	3522
Mr. E.T. Smith	Head, Shop Services Section	3523
Mr. U.E. Irby	Head, Production Control Section	3524
Ms. J. Cheswick	Head, Technical Services Branch	3530
Ms. J. Cheswick	Head, Engineering Section	3531
Mr. S.M. Tkacik	Head, Facilities, Planning and Operations Section	3535
Mr. D.R. Smith	Head, Environmental Section	3536
Ms. L. Jeffrieshunter	Head, Environmental Response Unit	3536.1

Personnel: 130 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 environmental programs and permitting.

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
- 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

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 teams of autonomous land, sea, and air vehicles to carry sensors, communications relays, or jammers;
- 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; and
- Artificial intelligence and machine learning to enable more capable and intelligent decision aids.

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

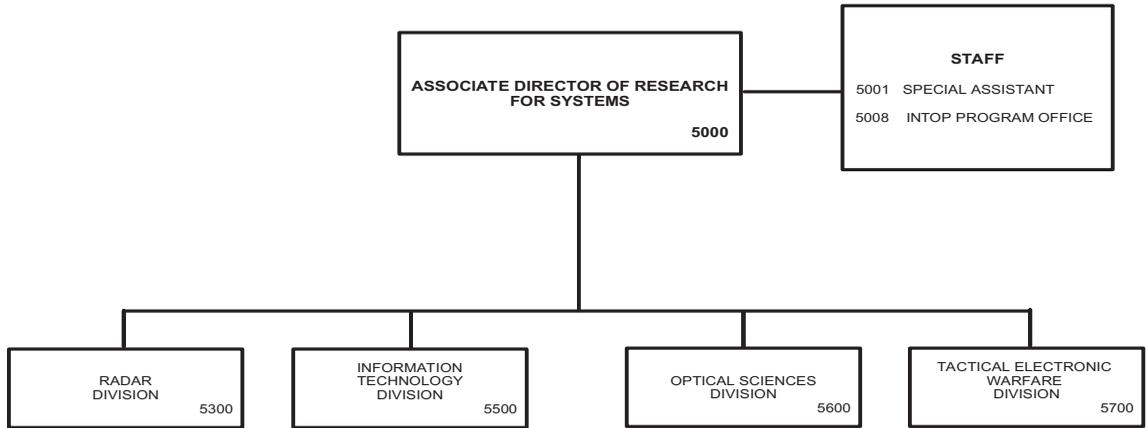


Dr. Gerald M. Borsuk is the Associate Director of Research for the Systems Directorate at NRL in Washington, DC. He provides executive direction and leadership to four major NRL research divisions that conduct a broad multi-disciplinary program of scientific research and advanced technological development in the areas of optics, electromagnetic warfare, information technology, and radar with combined funding in fiscal year 2017 of \$510 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, Maryland.

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. M.F. Walder	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. J.M. Stone, Code 5000A, (202) 767-3324

Radar Division

Code 5300



Superintendent: Mr. M.F. Walder

Point of Contact: Mr. M.F. Walder
Code 5300
(202) 404-8378

Key Personnel

Mr. M.F. Walder	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. C.T. Rodenbeck	Head, Advanced Concepts Group	5307
Mr. M.G. Parent/Mr. R.D. Lipps*	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

*Acting

Staff Activity Areas

- Radar Systems Engineering
- Shipboard and Airborne Radar Systems
- Small Target Detection
- Maritime Domain Awareness
- Networked and Distributed Radar Concepts
- Computational Electromagnetics
- High Frequency Radar
- Electronic Protection
- Ultra-wideband Antennas
- Multi-Function Systems
- Millimeter-wave radar
- Advanced Waveforms and Signal Processing
- Radar Imaging

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
- Electromagnetic Maneuver Warfare Testbed

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

Airborne 94 GHz radar system

Radar signature calculation facility

Computational Electromagnetics facility

Compact range and near-field 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, Information Technology Division	5500
Dr. B.J. Cadwell	Associate Superintendent	5501
Ms. A.W. Colpitts	Administrative Officer	5502
Vacant	Director, Navy Center for Applied Research in Artificial Intelligence	5510
Dr. P.M. 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.A. Rohwer	Director, Center for Computational Science/Command Information Officer ^o	5590
Ms. S.M. Ryder	Chief Librarian, Ruth H. Hooker Research Library	5596

Personnel: 212 full-time civilian

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

- 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
- Configurable Synthetic and Merged Environment (CSME) Laboratory

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.M. Nichols	Associate Superintendent	5601
Ms. C. Woods	Administrative Officer	5602
Dr. J.R. Meyer	Head, Senior Scientific Staff	5604
Dr. B.L. Justus	Head, Optical Physics Branch	5610
Dr. J.S. 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: 136 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
- Bio-aerosol containment chamber for testing the limits of new optical detection strategies

Tactical Electronic Warfare Division

Code 5700



Superintendent: Dr. F.J. Klemm

Point of Contact: Mr. G.K. Weissbach
Code 5701
(202) 767-5937

Key Personnel

Dr. F.J. Klemm	Superintendent, Tactical Electronic Warfare Division	5700
Dr. J. Heyer	Senior Scientist for Electronic Warfare Technologies	5700.1
Mr. G.K. Weissbach*	Associate Superintendent	5701
Ms. J.C. Johnson	Administrative Officer	5702
Mr. G.K. Weissbach	Head, Electronic Warfare Lead Laboratory Staff	5705
Mr. E.M. Van Meter	Electronic Warfare Operations and Liaison Organization	5706
Dr. D.L. Smith*	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.S. Spath	Head, Aerospace Electronic Warfare Systems Branch	5730
Mr. M.J. Monsma	Head, Surface Electronic Warfare Systems Branch	5740
Dr. J.M. Auxier*	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

*Acting

Staff Activity Areas

EW Strategic Planning
Signature Technology Office
Effectiveness of Naval EW Systems (ENEWS)
Electronic Warfare Operations Research and Liaison Organization

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

- Signature Analysis
- Offboard Countermeasures
- Electronic Warfare Support Measures
- Aerospace Electronic Warfare Systems
- Surface Electronic Warfare Systems
- Advanced Techniques
- Integrated EW Simulation
- EW Modeling and Simulation

Major Research Capabilities and Facilities

- Visualization display room
- Transportable step frequency radar
- Vehicle development laboratory
- Offboard test platform
- Compact antenna range facility
- Millimeter-Wave Antenna Range Facility
- TEWD Mechanical Fabrication Shop
- RFCM techniques development chamber facility
- Low-power anechoic chamber
- 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
- Classified material lay-up facility
- Classified computing facilities
- RF measurement laboratory
- Wet chemistry laboratory
- Ultra-near-field test facility
- RF and millimeter-wave laboratory
- Optical laboratory
- Paint room
- Secure laboratories for classified projects
- Offboard Test Platform (Wind Tunnel)
- Near and Far Field Antenna Measurement Facility

**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.

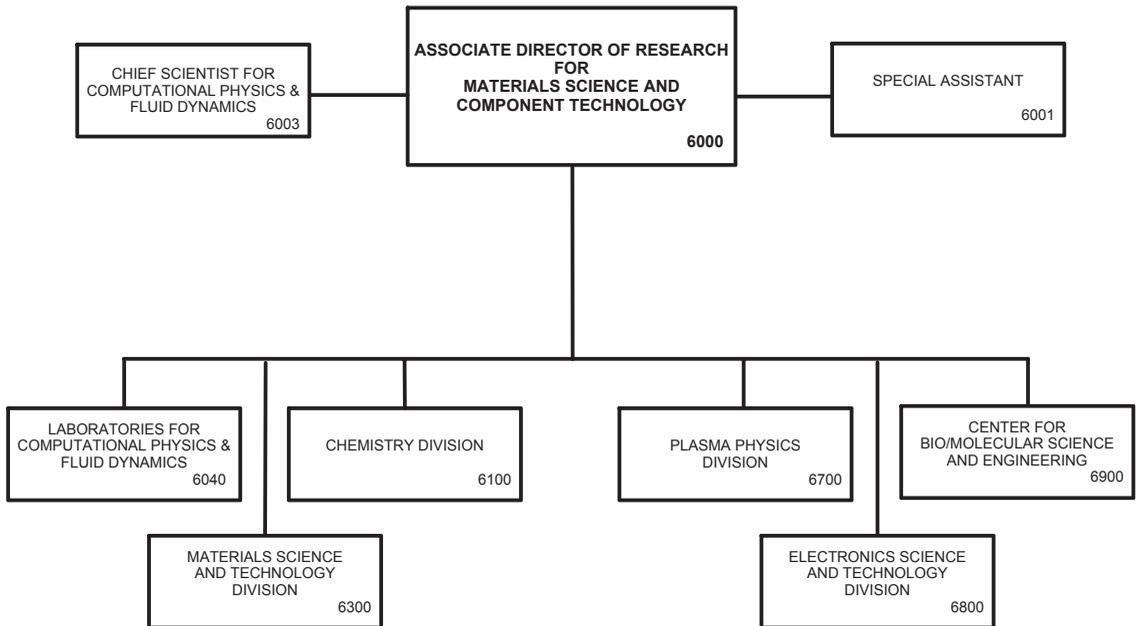
Additionally, major thrusts are directed in advanced sensing, detection, reactive flow physics, computational physics, and plasma sciences. Areas of particular emphasis include nanoscience and technology, fluid mechanics and hydrodynamics, nuclear weapon effects simulations, high energy density materials 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



Dr. Banahalli Ratna received her B.S. degree in physics, chemistry, and mathematics and M.S. degree in physics from University of Bangalore, India. She received her M.Tech degree from the Indian Institute of Science and a Ph.D. in condensed matter physics from the University of Mysore. Dr. Ratna was a researcher at the Raman Research Institute in Bangalore, India, before she joined the Naval Research Laboratory in 1994. She has served at NRL as a researcher and as a branch head in the Center for Bio/Molecular Science and Engineering (CBMSE). In 2009, she became the director of CBMSE, when she was selected to the Senior Executive Service (SES). Since September 2017, she has been acting as the Associate Director of Research for the Materials Science and Component Technology directorate. Dr. Ratna is recognized in the fields of liquid crystal and bio/nano science and technologies. Dr. Ratna has over 240 technical publications with over 5000 citations and an h-index of 40. She has also authored 25 patents. She has received several NRL research publication awards for her work. She has given more than 150 invited and contributed talks at national and international meetings and universities. She has co-organized a number of national and international conferences. She is a

member of the American Physical Society, American Chemical Society, and International Liquid Crystal Society. She is currently a member of Counter Weapons of Mass Destruction – Community of Interest (CWMD–COI). She serves on the Executive Steering Committee for the Applied Research for the Advancement of s7T Priorities (ARAP) on synthetic biology. Dr. Ratna was inducted as Fellow of the American Institute of Medical and Biological Engineering in 2015. She received the Meritorious Presidential Rank Award in 2016.



Key Personnel

Dr. B.R. Ratna*	Associate Director of Research for Materials Science and Component Technology	6000
Mr. R.A. Wynter	Special Assistant	6001
Dr. J.P. Boris	Chief Scientist for Computational Physics and Fluid Dynamics	6003
Dr. D.R. Mott*	Director, Laboratories for Computational Physics and Fluid Dynamics	6040
Dr. J.N. Russell, Jr.	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
Ms. A.W. Kusterbeck*	Director, Center for Bio/Molecular Science and Engineering	6900

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

*Acting

Laboratories for Computational Physics and Fluid Dynamics

Code 6040



Director: Dr. D.R. Mott*

Point of Contact: Ms. C. Collier
Code 6040.2
(202) 767-8713

*Acting

Key Personnel

Dr. D.R. Mott*	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.R. Mott	Head, Laboratory for Multiscale Reactive Flow Physics	6043

Personnel: 22 full-time civilian

*Acting

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. J.N. Russell, Jr.

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

Key Personnel

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

Personnel: 137 full-time civilian; 3 military; 1 intermittent; 1 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, Florida)

Fire/Damage Control Test Facility (at Chesapeake Beach, Maryland)

Wave pool (at Mobile, Alabama)

Small boat test platforms (at Mobile, Alabama)

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

Pressurized test chambers (small, medium, large)

Materials Science and Technology Division

Code 6300



Superintendent: Dr. P. Matic

Point of Contact: Ms. S.L. Willett
Code 6302
(202) 767-2458

Key Personnel

Dr. P. Matic	Superintendent, Materials Science and Technology Division	6300
Dr. B.T. Jonker	Senior Scientist	6300.1
Dr. K.M. Bussmann	Associate Superintendent	6301
Ms. S.L. Willett	Administrative Officer	6302
Mr. J.H. O'Donnell	Head, Special Projects Group	6304
Dr. V.G. DeGiorgi	Head, Multifunctional Materials Branch	6350
Dr. A. Piqué	Head, Materials and Systems Branch	6360
Dr. S.C. Erwin	Head, Center for Materials Physics and Technology	6390

Personnel: 93 full-time civilian

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
- Film deposition by thermal/sputter/MBE/PLD/MOCVD/aerosol/ALD
- 2D materials: graphene, MoS₂, other TMDs
- Parylene coater
- Laser direct write system
- 3D-printing of polymers
- Polymer extruder, synthesis and characterization
- Channel reactors for fuels synthesis
- Laser cutting facility
- Biomechanical surrogate fabrication

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
Dr. A.L. Velikovich	Senior Scientist, Radiation Physics and High Energy Density Materials	6705
Dr. G.I. Ganguli	Senior Scientist, Intense Particle Beams and Plasma Processes	6709
Dr. J.L. Giuliani, Jr.	Head, Radiation Hydrodynamics Branch	6720
Dr. S.P. Obenschain	Head, Laser Plasma Branch	6730
Dr. W.E. Amatucci	Head, Charged Particle Physics Branch	6750
Dr. J.W. Schumer	Head, Pulsed Power Physics Branch	6770
Dr. J.R. 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

Pulsed Power

- 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
- Railgun Materials Testing Facility
- Small Railgun (SRG)

Inertial Confinement Fusion and High Energy Density Physics

- NIKE krypton fluoride laser facility
- ELECTRA: repetitive-pulsed electron beam and excimer laser facility
- Z-pinch and plasma radiation source modeling

Space Plasmas

- Space Physics Simulation Chamber
- Ionospheric sensing, modification, and modeling
- Radiation belt physics
- Solar physics and space weather

Directed Energy and Active Sensing

- MATRICES ultrafast laser facility (sources spanning wavelength range from ultraviolet to far infrared)
- Directed Energy Physics Facility (fiber lasers for weapons and power beaming applications)
- Remote underwater laser acoustics system (RULAS)
- SWOrRD: Swept-Wavelength Optical resonant Raman Device
- High-power microwave sources

Materials Processing and Related Applications

- Plasma Applications Laboratory (low temperature plasmas at atmospheric and reduced pressures)
- Microwave facility for processing of advanced materials
- Plasma chemistry modeling and applications

Nonlinear Dynamics and Applied Mathematics

- Autonomous swarm behavior
- Coupled systems with delay

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.A. McConnell	Administrative Officer	6802
Vacant	Theoretical Consultant	6807
Dr. T.L. Reinecke	Senior Scientist for Nanoelectronics	6877
Dr. E.H. Aifer*	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

*Acting

Research Activity Areas

Quantum Information Science and Technology
Nanoelectronics
Surface and Interface Sciences
Electronic Materials Growth, Characterization, and Processing
Theoretical and Computational Electronics and Electromagnetics
Power Electronics
Microwave, Millimeter, and Submillimeter Wave Solid State and
Vacuum Electronics Technologies
Optoelectronics
Photovoltaics
Radiation Effects

Basic Responsibilities

The Electronics Science and Technology Division conducts programs of basic science and applied research and development. Our technically diverse staff of experimental, theoretical, and computational physicists, surface and materials scientists, chemists, and electrical, electronic, chemical and mechanical engineers reflects the multidisciplinary nature of the Division's research. The synergy that results from the collaboration between these experts ensures the development of world-class electronics science and technology. Our well-equipped laboratories and unique fabrication facilities provide the research tools needed to move rapidly from a flash of inspiration to real-world demonstration. In-house efforts include research and development in the following areas: quantum information science and technology; nanoelectronics; surface and interface sciences; electronics material growth, characterization, and processing; theoretical and computational electronics and electromagnetics; power electronics; microwave, millimeter-wave, and submillimeter-wave solid-state and vacuum electronics technologies; optoelectronics; photovoltaics; radiation effects.

Major Research Capabilities and Facilities

Compound Semiconductor Processing Facility
Laboratory for Advanced Materials Synthesis
Center for Advanced Materials Epitaxial Growth and Characterization (Epicenter)
Electronic Transport Laboratory
Advanced Silicon Carbide Epitaxial Research Laboratory
Solar Cell Characterization Laboratory
Ultrafast Laser Facility
Ultraviolet Photolithography Laboratory for Submillimeter-Wave Devices
Millimeter-Wave Vacuum Electronics Fabrication Facility
Solid-State Qubit Coherent Spectroscopy Laboratory
3D Laser Lithography Laboratory
Optoelectronic Scanning Electron Characterization Facility
Infrared Materials and Detectors Characterization Laboratory
Atomic Layer Deposition System
Atomic Layer Epitaxy System
Facility for Nanopowders Processing and Enhanced Pressure Assisted Sintering

Center for Bio/Molecular Science and Engineering

Code 6900



Director: Ms. A.W. Kusterbeck*

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

*Acting

Key Personnel

Ms. A.W. Kusterbeck*	Head, 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
LT N.D. Reynolds	Military Deputy	6900
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 characterization and prediction of seafloor and terrestrial regions, dynamic littoral and riverine processes, and geospatial sciences and technology. Areas of emphasis in marine meteorology include atmospheric dynamics and coupled processes ranging from theater to tactical scales, coupled data assimilation and prediction systems, and meteorological application systems. 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



Dr. D.G. Todoroff is currently Acting Associate Director of Research for Ocean and Atmospheric Science and Technology and the Superintendent of the Acoustics Division at the Naval Research Laboratory. In this capacity, he leads and directs a world-class research organization that conducts basic and applied research in ocean acoustics, physical acoustics, signal processing, and acoustic systems. Dr. Todoroff was appointed to the Senior Executive Service in April 2009, and has over 20 years of Federal service.

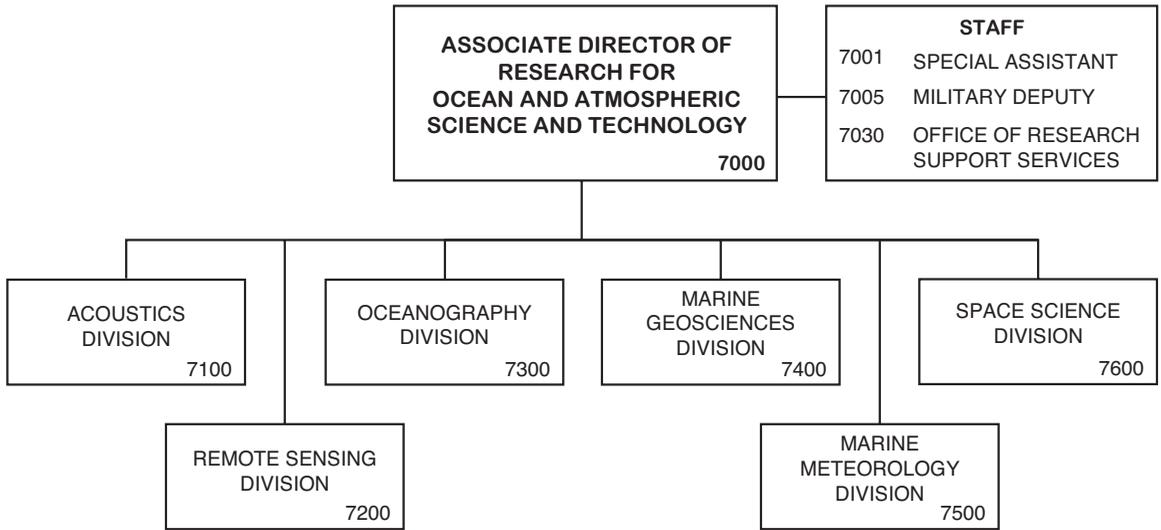
Prior to joining the Naval Research Laboratory, Dr. Todoroff held a three-year appointment to NATO (on leave from the Office of Naval Research) as the Deputy Director and Chief Scientist at the NATO Undersea Research Centre, La Spezia, Italy. As Deputy Director, he was responsible for the overall operation of the laboratory, including the management and operation of the Centre's two research vessels (NRV *Alliance* and CRV *Leonardo*). As the

Chief Scientist, Dr. Todoroff led the scientific and technical staff, and was responsible for the development and execution of the Centre's Scientific Program of Work.

Dr. Todoroff joined the Office of Naval Research in 1994. He managed the Navy's mine warfare S&T programs, led the development of the Organic Mine Countermeasures Future Naval Capability, and led the development of the ONR basic research program to counter Improvised Explosive Devices. While at ONR, Dr. Todoroff was active in international efforts, serving as the U.S. Head of Delegation to NATO Naval Group 3, the U.S. National Lead for Panel 13 of The Technical Cooperation Program, and the U.S. Alternative Representative on the Scientific Committee of National Representatives for the NATO Undersea Research Centre.

From May 1988 through November 1994, Dr. Todoroff served as Division Head, Branch Head, and researcher at the Naval Coastal Systems Station, Panama City, Florida. He also conducted research on acoustic scattering, and was the Chief Scientist for Wake Physics on the Joint U.S./U.K. Surface Ship Torpedo Defense Program.

Dr. Todoroff received a bachelor's degree in physics as well as a master of arts and a doctorate degree (1983) in physics from Kent State University. He is a member of the Liquid Crystal Institute. Dr. Todoroff's awards include the Navy Superior Civilian Service Award, the Navy Meritorious Civilian Service Award, and the Commanding Officer/Technical Director Award for Science and Technology.



Key Personnel

Dr. D.G. Todoroff*	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. R.H. Preller*	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. K.T. Holland/Dr. J. Sample*	Superintendent, Marine Geosciences Division	7400
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 *Additional duty

Office of Research Support Services (NRL-SSC)

Code 7030



Head: Dr. R.H. Preller*

Point of Contact: Dr. R.H. Preller
Code 7030
(228) 688-4704; DSN 828-4704

*Additional duty

Key Personnel

Dr. R.H. Preller*	Head, Office of Research Support Services	7030
Ms. E.H. Rawls*	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.K. Turfitt	HPC Management Office	7030.6
Mr. K.O. Davis	NRL-SSC Network Management Office	7030.8

Personnel: 8 full-time civilian

*Acting *Additional duty

Staff Activity Areas

Facilities
HPC Management
Safety/Environmental
Public Affairs
NRL-SSC Network Management

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.R. Tomlinson	Administrative Officer	7102
Vacant	Military Deputy	7105
Dr. E.G. Williams	Senior Scientist for Structural Acoustics	7106
Dr. B.H. Houston	Head, Physical Acoustics Branch	7130
Dr. G.J. Orris	Head, Acoustic Signal Processing and Systems Branch	7160
Dr. J.P. Fabre	Head, Acoustic Simulation, Measurements, and Tactics Branch	7180

Personnel: 65 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

Additive Manufacturing Center to fabricate structures and devices using 3D printing techniques

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
LCDR D.J. Cheney, 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.E. 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
Vacant	Military Deputy	7305
Dr. G.A. Jacobs	Head, Ocean Dynamics and Prediction Branch	7320
Dr. R.L. Crout	Head, Ocean Sciences Branch	7330

Personnel: 75 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
Ocean Lidar Applications

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 and Turbulence Ocean Lidar (TURBOL) to measure optical properties of the water
- Simulated Turbulence and Turbidity Environment (SITTE) using a Raleigh Bernard Convective Tank with Hybrid Underwater Camera and TURBOL to study both particulates as well as turbulent mixing in underwater environments
- Collaborative system for propagating environment error distributions through disparate dynamical systems

Marine Geosciences Division

Code 7400



Dr. K.T. Holland



Dr. J. Sample

Superintendent: Dr. K.T. Holland/Dr. J. Sample*

Point of Contact: Ms. S.M. Bower
Code 7400
(228) 688-4650; DSN 828-4650

*Acting

Key Personnel

Dr. K.T. Holland/Dr. J. Sample*	Superintendent, Marine Geosciences Division	7400
Vacant	Associate Superintendent	7401
Vacant	Administrative Officer	7402
Dr. K.B. Shaw	Head, Office of Geospatial Science and Tech. Innovation	7403
CDR S. Miller, USN	Military Deputy	7405
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

*Acting

Research Activity Areas

Marine Geology
Marine Geophysics
Geospatial Sciences and Technology
Marine Related 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 computing, analysis, and data, 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 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 as 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 <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>Electronic Charting and Navigation System Test and Validation Facility</p> <p>Comprehensive geotechnical and geoaoustics 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>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.A. Hazard
Code 7502
(831) 656-4314; DSN 828-4314

Key Personnel

Dr. J.A. Hansen	Superintendent, Marine Meteorology Division	7500
Dr. D.L. Westphal	Associate Superintendent	7501
Ms. L.A. Hazard	Administrative Officer	7502
Dr. J.D. Doyle	Senior Scientist for Mesoscale Meteorology	7503
Dr. C.A. Reynolds	Lead Scientist, Probabilistic Prediction Research Office	7504
LCDR D.H. Watson, USN	Military Deputy	7505
Dr. L. Xu	Head, Atmospheric Dynamics and Prediction Branch	7530
Dr. T.R. Holt	Head, Meteorological Applications Development Branch	7540

Personnel: 77 full-time civilian; 1 military

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), the Navy's operational forecast center. NRL-MRY 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

A large 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

Rooftop observation platform, laboratory and calibration facilities, and surface and airborne instrumentation for research on the effects of atmospheric aerosols, clouds and radiation on visibility, naval sensors and Earth's weather and climate

The mobile NRL Cloud Lab equipped with a portable Ka-band scanning Doppler radar, microwave radiometer, ceilometer, fog drop detector and two laser disdrometers for studying cloud evolution

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



Dr. C.R. Englert



Dr. J.E. Grove



Dr. D.G. Socker

Superintendent: Dr. C.R. Englert/Dr. J.E. Grove/
Dr. D.G. Socker*

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

*Acting

Key Personnel

Dr. C.R. Englert/Dr. J.E. Grove/ Dr. D.G. Socker*	Superintendent, Space Science Division	7600
Vacant	Associate Superintendent	7601
Ms. S.L. Swann	Administrative Officer	7602
Vacant	Military Deputy	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

*Acting

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 series of 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

Fast Neutron Spectrometer (FNS) deployable stand-off neutron radiation detection system

Strontium Iodide Radiation Instrumentation (SIRI) satellite instrument series

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 for Solar PRobe (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



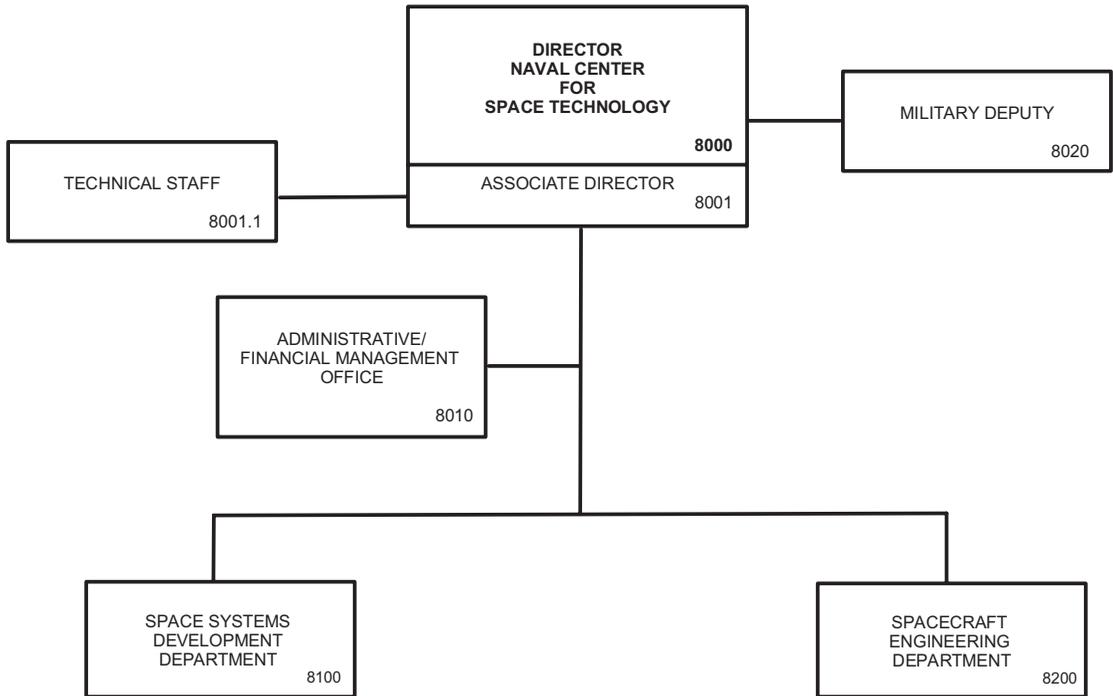
Mr. John P. Schaub is the Director of the Naval Center of Space Technology (NCST) at the U.S. Naval Research Laboratory (NRL). As DNCST, Mr. Schaub leads a highly skilled workforce of engineers, scientists, and technicians who conduct cutting-edge spacecraft research and development programs to meet 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
Vacant	Military Deputy	8020
Mr. C. Dwyer	Superintendent, Space Systems Development Department	8100
Dr. G.S. Sandhoo	Superintendent, Spacecraft Engineering Department	8200

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

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: 147 full-time civilian; 1 part-time civilian; 11 student civilian; 1 military

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
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: Dr. G.S. Sandhoo

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

Key Personnel

Dr. G.S. Sandhoo	Superintendent, Spacecraft Engineering Department	8200
Mr. G.A. Golba	Associate Superintendent	8201
Ms. C.A. Gross	Administrative Officer	8202
Mr. G.A. Golba*	Head, Programs Support Office	8204
Mr. G.A. Golba*	Head, Blossom Point Satellite Command and Tracking Facility	8206
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: 154 full-time civilian; 2 part-time civilian; 21 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
- 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)

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 2016 and 2017 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 2016

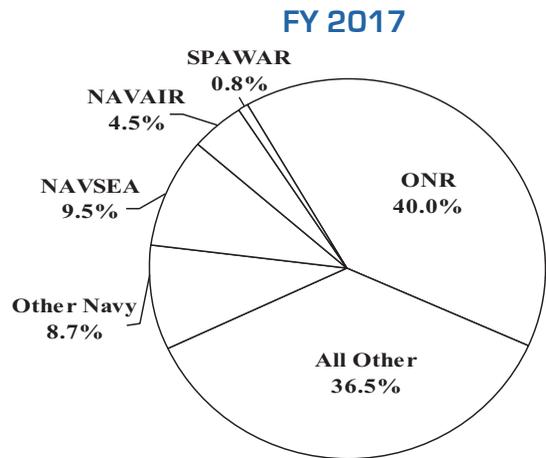
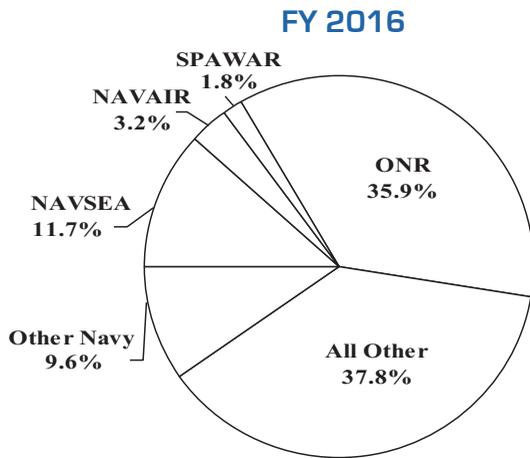
Type of Contribution	Unclassified	Classified	Total
Articles in periodicals, chapters in books, and papers in published proceedings	1268*	0	1268*
Oral Presentations	1146	0	1146
NRL Formal Reports	4	3	7
NRL Memorandum Reports	39	2	41
Books	3	0	3
U.S. patents granted	103	0	103
Foreign patents granted	21	0	21
U.S. Trademark Registrations	1	0	1

Calendar Year 2017

Type of Contribution	Unclassified	Classified	Total
Articles in periodicals, chapters in books, and papers in published proceedings	1236*	0	1236*
Oral Presentations	1484	0	1484
NRL Formal Reports	3	3	6
NRL Memorandum Reports	42	2	44
Books	2	0	2
U.S. patents granted	115	1	116
Foreign patents granted	14	0	14
U.S. Trademark Registrations	1	0	1

*This is a provisional total based on information available to the Ruth H. Hooker Research Library on February 13, 2018. Total includes refereed and non-refereed publications.

FY 2016/2017 Sources of New Funds (Actual)



FY 2016 Source of Funds

FY 2016	\$M		Total
	Reimbursable	Direct Cite	
Office of Naval Research (ONR)	364.2	37.6	401.8
Naval Sea Systems Command (NAVSEA)	45.4	85.1	130.5
Space and Naval Warfare Systems Command (SPAWAR)	16.6	3.3	19.9
Naval Air Systems Command (NAVAIR)	14.7	20.8	35.5
Other Navy	87.6	20.3	107.9
All Other	<u>353.4</u>	<u>69.6</u>	<u>423.0</u>
Total Funds	881.9	236.7	1,118.6

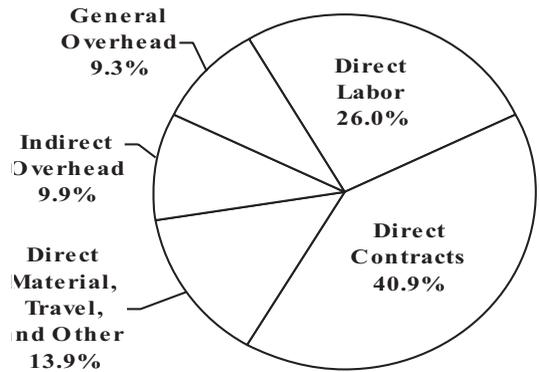
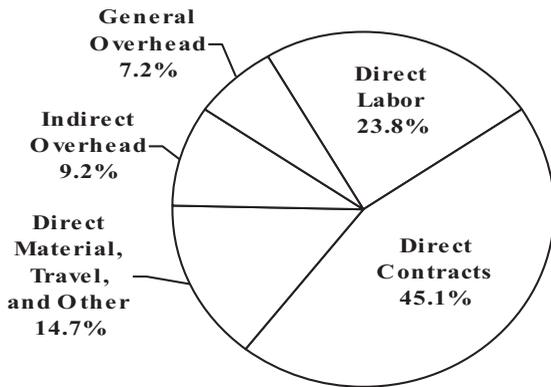
FY 2017 Source of Funds

FY 2017	\$M		Total
	Reimbursable	Direct Cite	
Office of Naval Research (ONR)	412.0	36.9	448.9
Naval Sea Systems Command (NAVSEA)	44.3	63.0	107.3
Space and Naval Warfare Systems Command (SPAWAR)	8.4	0.6	9.0
Naval Air Systems Command (NAVAIR)	28.4	21.7	50.1
Other Navy	85.4	12.1	97.5
All Other	<u>358.6</u>	<u>50.7</u>	<u>409.3</u>
Total Funds	937.1	185.0	1,122.1

FY 2016/2017 Uses of Funds

FY 2016

FY 2017



FY 2016 Distribution of Funds

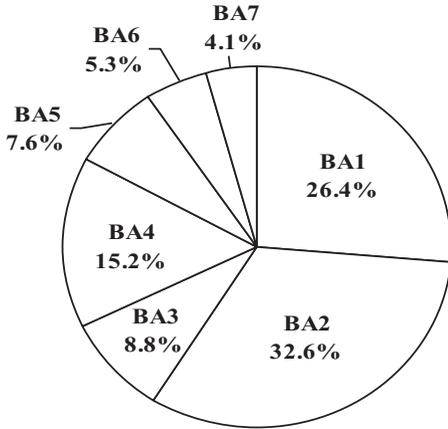
	\$M
Direct Labor	264.4
General Overhead	79.8
Indirect Overhead	102.2
Direct Material, Travel, and Other	162.4
Direct Contracts	<u>499.9</u>
Total Costs*	1,108.7

FY 2017 Distribution of Funds

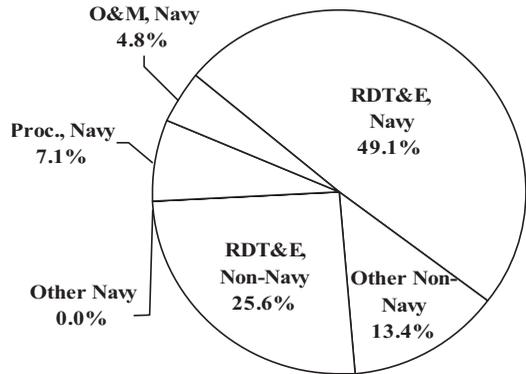
	\$M
Direct Labor	272.4
General Overhead	97.8
Indirect Overhead	103.9
Direct Material, Travel, and Other	145.6
Direct Contracts	<u>428.1</u>
Total Costs*	1,047.8

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

FY 2016 Total New Funds by Category



Distribution of RDT&E, Navy (%)
(\$549.5)

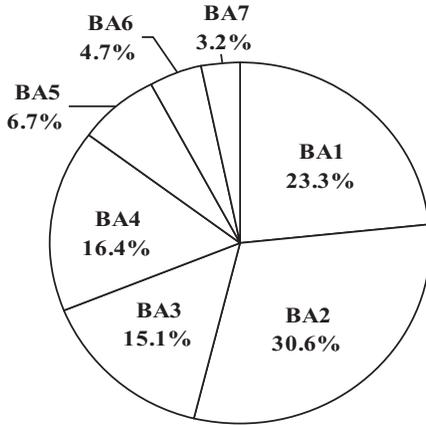


Distribution of Total (%)
(\$1,118.6)

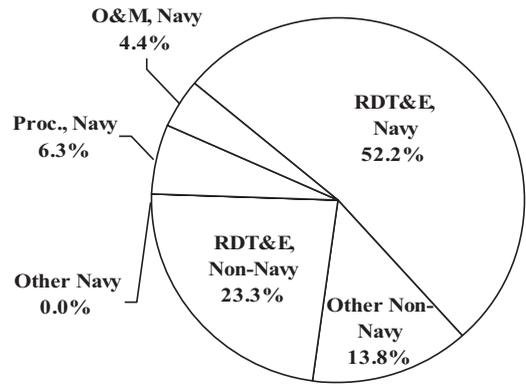
FY 2016

Category	\$M		
	Navy	Non-Navy	Total
BA1 Basic Research	145.1	6.2	151.3
BA2 Applied Research	179.0	26.9	205.9
BA3 Advanced Technology Development	48.3	200.3	248.6
BA4 Advanced Component Development Prototypes	83.6	11.2	94.8
BA5 System Development and Demonstration	41.8	7.9	49.7
BA6 RDT&E Management Support	29.3	9.4	38.7
BA7 Operational System Development	<u>22.4</u>	<u>24.2</u>	<u>46.6</u>
Subtotal RDT&E	549.5	286.1	835.6
Operations and Maintenance	53.7	32.2	85.9
Procurement	79.1	30.8	109.9
Other	<u>0.0</u>	<u>87.2</u>	<u>87.2</u>
Total New Funds	682.3	436.3	1,118.6

FY 2017 Total New Funds by Category



Distribution of RDT&E, Navy (%)
(\$586.1)



Distribution of Total (%)
(\$1,122.1)

FY 2017

		\$M		
Category		Navy	Non-Navy	Total
BA1	Basic Research	136.7	8.2	144.9
BA2	Applied Research	179.1	31.9	211.0
BA3	Advanced Technology Development	88.6	162.7	251.3
BA4	Advanced Component Development Prototypes	96.2	12.3	108.5
BA5	System Development and Demonstration	39.2	13.5	52.7
BA6	RDT&E Management Support	27.5	13.5	41.0
BA7	Operational System Development	<u>18.8</u>	<u>19.0</u>	<u>37.8</u>
	Subtotal RDT&E	586.1	261.1	847.2
	Operations and Maintenance	48.9	38.7	87.6
	Procurement	71.1	40.1	111.2
	Other	<u>0.0</u>	<u>76.1</u>	<u>76.1</u>
	Total New Funds	706.1	416.0	1,122.1

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	36
Enlisted	<u>55</u>
Total Military On-Board	91
(Military Allowance)	106

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

	2011	2012	2013	2014	2015	2016	2017
Research divisions	5.3	6.0	4.2	6.7	7.5	8.1	6.8
Nonresearch areas	13.5	11.1	8.3	10.6	15.7	16.4	12.9
Entire Laboratory	6.9	7.0	5	7.5	9.1	9.8	8

Highest Academic Degrees Held by Civilian Full-Time Permanent Employees

Bachelors	617
Masters	463
Doctorates	883

*All data is as of December 31, 2017.

PROFESSIONAL DEVELOPMENT

Professional Development

Programs for NRL Employees

The NRL Human Resources Office (HRO) 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 current and future needs of NRL and enhance their own personal development.

LONG-TERM TRAINING AND DEVELOPMENTAL PROGRAMS

The **Advanced Graduate Research Program** enables selected professional employees to pursue collaborative research in their own field or a related field on a full-time basis for up to one year at an institution or research facility of their choice. Participants receive full pay and 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, the ability and special aptitude for advanced training, 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 by the commencement of the program.

The **Edison Memorial Graduate Training Program** enables employees to pursue graduate-level work that may lead to a graduate degree at a local university. Participants in this program normally work 24 hours per week at the work site, while carrying an appropriate academic load of either graded, credited classes or dissertation research credits. The criteria for eligibility include a minimum of one year of Federal service at NRL by program commencement, a bachelor's degree in an appropriate field, professional stature consistent with the applicant's opportunities and experience, and the ability and special aptitude for advanced training.

The **Select Graduate Training Program** develops employees of exceptional talent by assisting them in full-time graduate study that may lead to the acquisition of a graduate degree at a facility of

their choice within the continental United States. To be eligible for this program, employees must possess at least a bachelor's degree in an appropriate field, have completed at least one full year of Federal service at NRL by program commencement, and have demonstrated ability and aptitude for advanced training. Students accepted into this program receive one-half of their salary and one-half of their benefits. 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. This program enables employees to pursue full-time graduate studies that may lead to the completion of a graduate degree. Thesis work will be accomplished at NRL. To be eligible for this program, employees must possess at least a bachelor's degree in an appropriate field and must have maintained at least a 3.0 GPA in undergraduate course work or previous graduate studies. Employees must also have completed at least two full years of Federal service at NRL, have demonstrated the ability and aptitude for advanced training, and have professional stature consistent with the applicant's opportunities and experience. Participants in the NPS program will continue to receive full pay and benefits during their periods of study. NRL also pays for tuition and travel expenses.

In addition to NRL and university offerings, applications may be submitted for a number of noteworthy Navy developmental programs. These and other fellowship programs are grade-specific, and the courses vary in length. A few examples of these opportunities are the **Aspiring Leader Program (ALP)**, **Defense Civilian Emerging Leader Program (DCELP)**, **Executive Leadership Development Program (ELDP)**, and the **Defense Senior Leader Development Program (DSLDP)**. Announcements for these programs are posted on the HRO web page 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 Pipeline, the HRO website, and in the email newsletter *HRO Highlights*.

For further information on any of the Long-Term Training, Leadership Development, 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.

The **Scientist-to-Sea Program (STSP)** provides opportunities for Navy R&D laboratory/center personnel to go to sea to gain firsthand insight into operational factors affecting system design, performance, and operations on a variety of ships. NRL is a participant in the program. When these opportunities become available from ONR, NRL divisions are informed to nominate candidates. For further information, call (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 NRL chapter of **Women In Science and Engineering (WISE)** was established to address current issues concerning the scientific community of women at 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 solutions. Recently,

WISE hosted Dr. Stephanie Tompkins of DARPA, Dr. Wen Masters of ONR, and a summer career panel with guest lecturer Dr. Brenda Little. The NRL WISE organization also provided feedback that led to an official NRL lactation policy and NRL's first-ever lactation room as well as support for adding more spaces and other improvements. Membership in WISE is open to all employees. For more information call (202) 767-9549.

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 outstanding research are elected to membership in local chapters. The NRL Edison Chapter, comprising approximately 200 members, recognizes exceptional 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. Call (202) 767-0351.

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 who have more technical or managerial experience and who can provide mentees with the knowledge and skills needed to maximize their contribution to their immediate organization, to NRL, the Navy, and 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 email mentor@hro.nrl.navy.mil or call (202) 767-8324.

Employees interested in developing effective self-expression, listening, thinking, and leadership potential are invited to join the NRL Forum Toastmasters 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. Call (202) 404-4670.

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) to help resolve personal concerns that otherwise might adversely affect job performance, such as challenging relationships (at work or 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. Call (844) 366-2327, or visit <http://donceap.foh.hhs.gov>.

EQUAL EMPLOYMENT OPPORTUNITY (EEO) PROGRAMS

NRL provides equal employment opportunity (EEO) for all employees regardless of race, color, national origin, sex, religion, age, physical or mental disability, or genetic information. The NRL EEO Office is a service organization responsible for counseling employees 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 and services.

OTHER ACTIVITIES

NRL's **Community Outreach Program** emphasizes STEM education. Managed by the Public Affairs Section of the Strategic Communication Office, the program is designed to inspire, engage, educate, and employ the next generation of scientists and educators. The robust program originated in response to our nation placing a high priority on STEM education and workforce development.

The NRL Community Outreach Program continues to grow many STEM initiatives aimed at K-12 and its primary audience of undergraduate, graduate, and post-doctoral students. At the K-12 level, the program partners with researchers to create STEM-inspired presentations that fit education lesson plans for hands-on activities. The program also reaches out to students in institutions of higher learning who are considering STEM careers, and fosters collaboration between colleges and universities and NRL researchers. Lecture series, STEM demonstrations, Q&As, digital engagements, and STEM competitions focused on the needs of the Navy are primary program drivers.

NRL volunteer mentors actively engage in judging science fairs, guiding science projects, and employing interns, and vigorously support STEM competitions. At the end of each year, an annual holiday party is held for DC-neighborhood schoolchildren. Through the Community Outreach Program, NRL has built active partnerships with several District of Columbia public schools. To find out how you can get involved, contact the STEM Outreach Coordinator at (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. NRL employees are also eligible to participate in all NSAW-MWR activities on Joint Base Anacostia-Bolling and Washington Navy Yard, less than five miles down the road from the NRL D.C. campus.

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 two-fold objective is to enhance the quality of the Laboratory's research activities through working associations and interchanges with highly capable scientists and engineers and 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 at NRL.

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 with 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 individuals who have held a doctorate less than five years at the time of application. The awards 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.

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 individuals who have held a doctorate for less than five years at the time of application. The awards 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.

FACULTY MEMBER PROGRAMS

The Office of Naval Research Summer Faculty Research and Sabbatical Leave Program provides opportunities for university faculty members to work for 10 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.

The NRL/United States Naval Academy Cooperative Program for Scientific Interchange allows faculty members of the U.S. Naval Academy (USNA) 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.

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 10-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 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.

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 sci-

ences, 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.

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 non-competitively 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 USAJOBS 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 they are posted. For additional information on NRL's Intern Program, visit http://hroffice.nrl.navy.mil/student/student_only.asp or call (202) 767-8313.

The **STEM Student Employment Program (SSEP)** provides paid employment opportunities for undergraduate and graduate degree-seeking students enrolled in scientific, technical, engineering, or mathematics majors. Appointments are made to Science and Engineering Professional (NP) or Science and Engineering Technical (NR) career track positions in the competitive service. Appointments

can be temporary (NTE 1 year), term (no more than 4 years), or flexible length appointments that expire 120 days after completion of the academic course of study. Upon completion of the degree program, SSEP participants may be noncompetitively converted to permanent NP career track positions, provided the OPM science and engineering qualification requirements are met and the candidate is otherwise eligible. Applicants for NP career track positions must have at least a 3.0 GPA, and applicants for NR career track positions must have at least a 2.5 GPA. Applications are accepted year-round. For additional information, visit https://hroffice.nrl.navy.mil/student/pdf/STEM_StudentDirectHire.pdf.

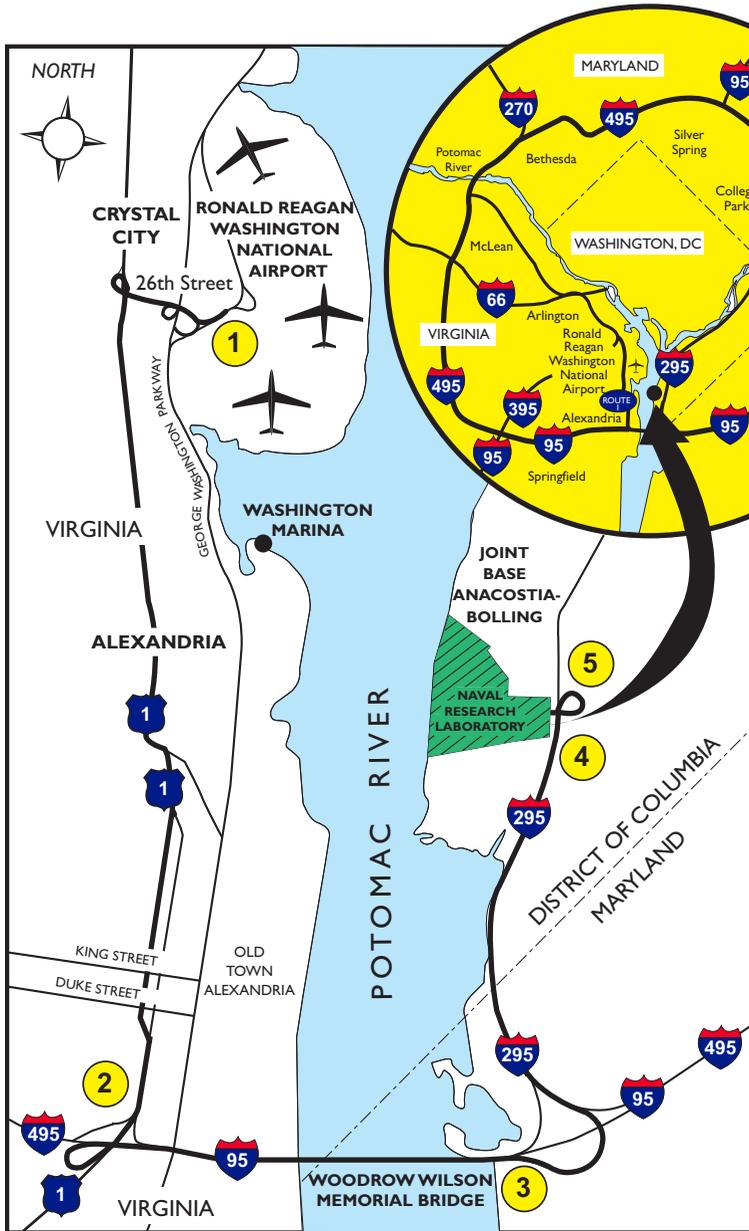
The **Department of Defense Science and Engineering Apprenticeship Program (SEAP)** provides an opportunity for high school students, who have completed at least grade 9 and are at least 15 years of age, to serve as junior research associates. Under the direction of a mentor, for eight weeks in the summer, 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, and 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 <https://seap.asee.org/>, email seap@hro.nrl.navy.mil, or call (202) 767-8324.

The **Summer Research Program for Historically Black College or University (HBCU) or Minority Institution (MI)** is a 10-week summer internship program that provides opportunities for undergraduate and graduate students to participate in research under the guidance of a mentor at NRL. Preference is given to students planning careers in science, technology, engineering, and mathematics (STEM) disciplines. Applicants must be U.S. citizens or have permanent residency and be enrolled at an HBCU, MI, or Tribal College or University. Participating students receive a stipend. Information and application materials are available online at the TWCIAAS-NRL HBCU Information Page. Online applications can be found at <http://nrl.e.twc.edu/>.

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 or call (202) 767-8313.

GENERAL INFORMATION

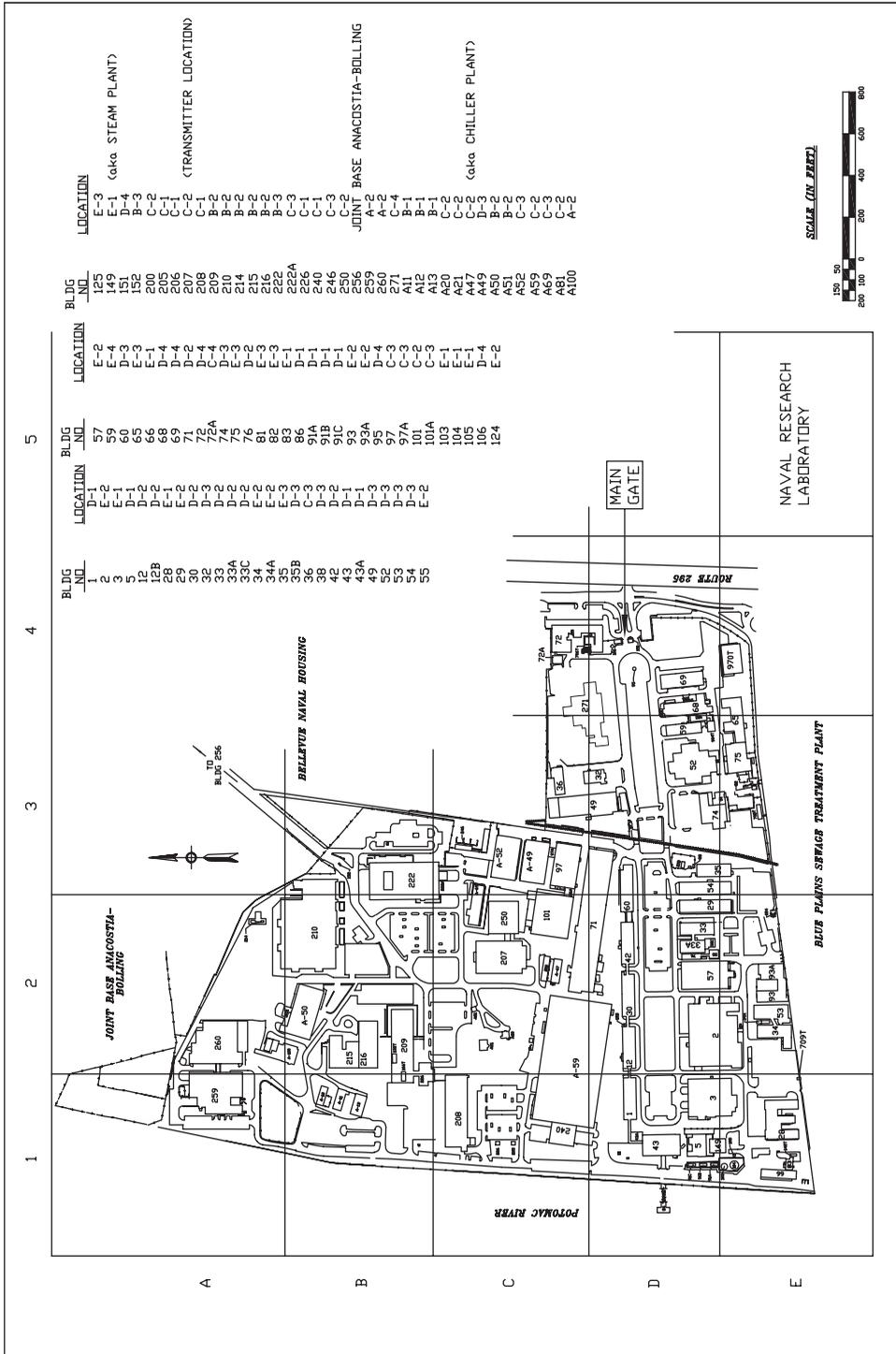


Directions TO NRL from Ronald Reagan Washington National Airport

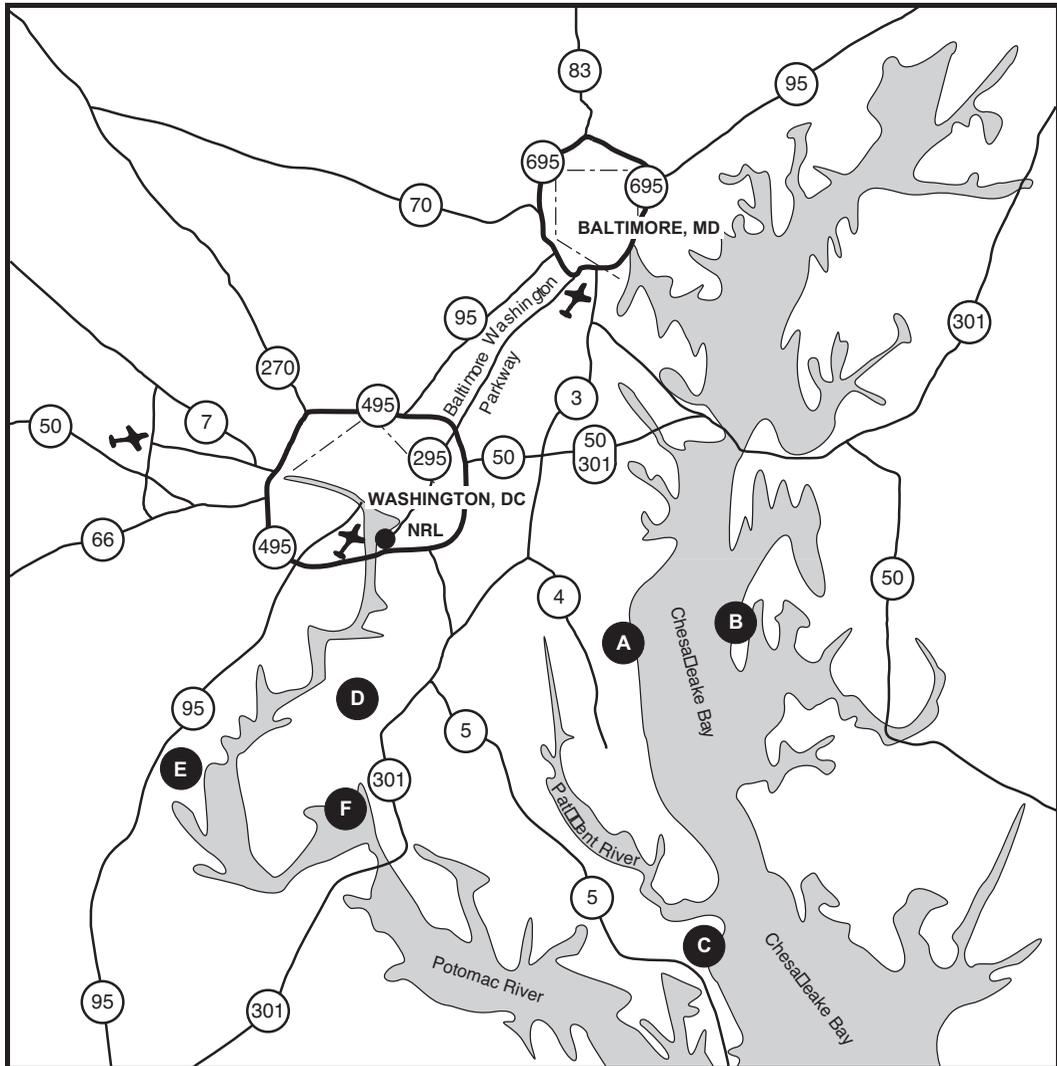
- 1 Follow Route 1 South for approximately 3 miles to the Beltway I-95/I-495.
- 2 Exit right to the Beltway. This exit curves to the right and then divides. Take the left fork to I-95 (Baltimore). Stay in local lanes.
- 3 Stay in the right lane on the Woodrow Wilson Bridge. After crossing the Woodrow 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.

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

Location of Buildings at NRL Washington

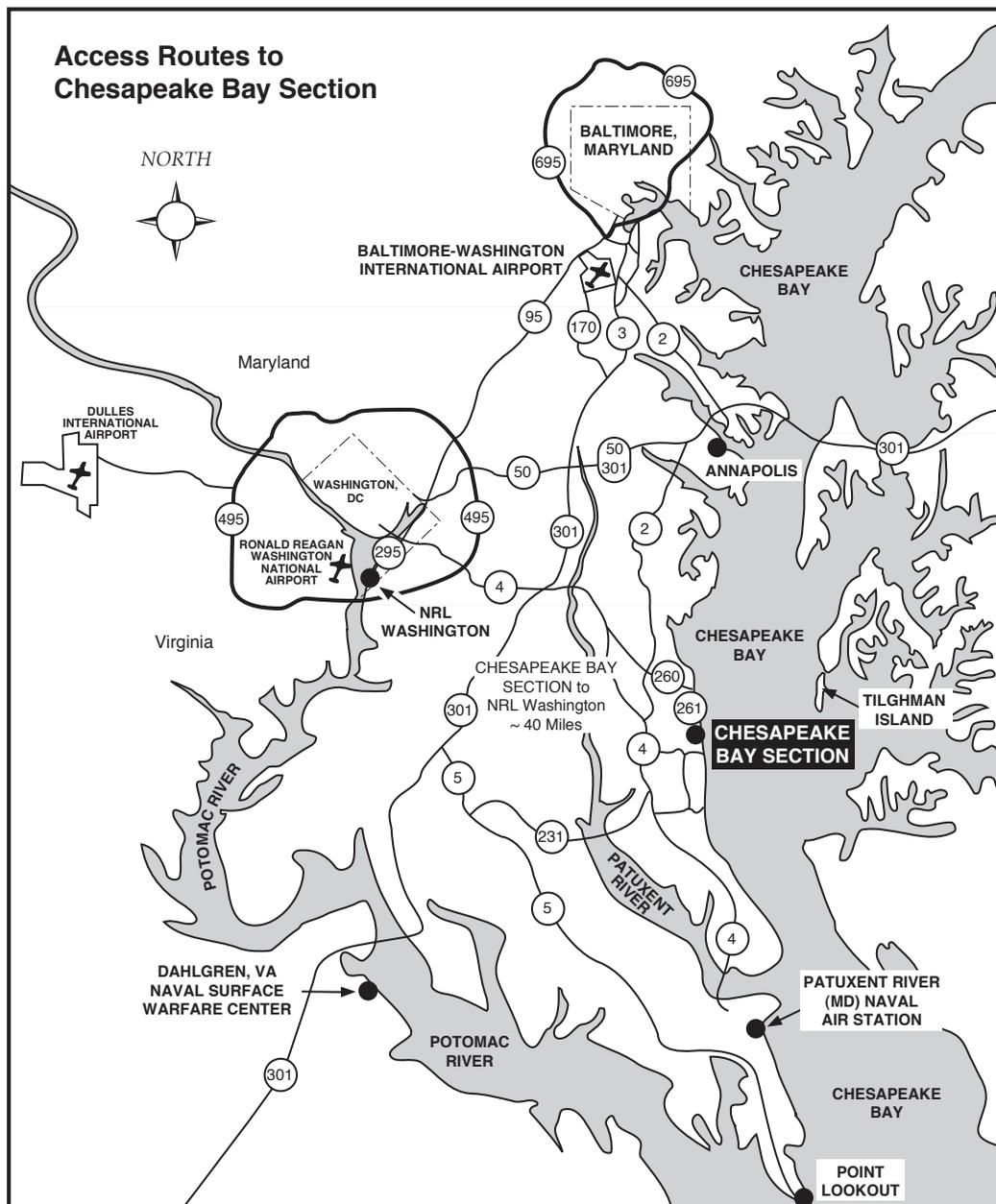


Location of Field Sites in the NRL Washington Area



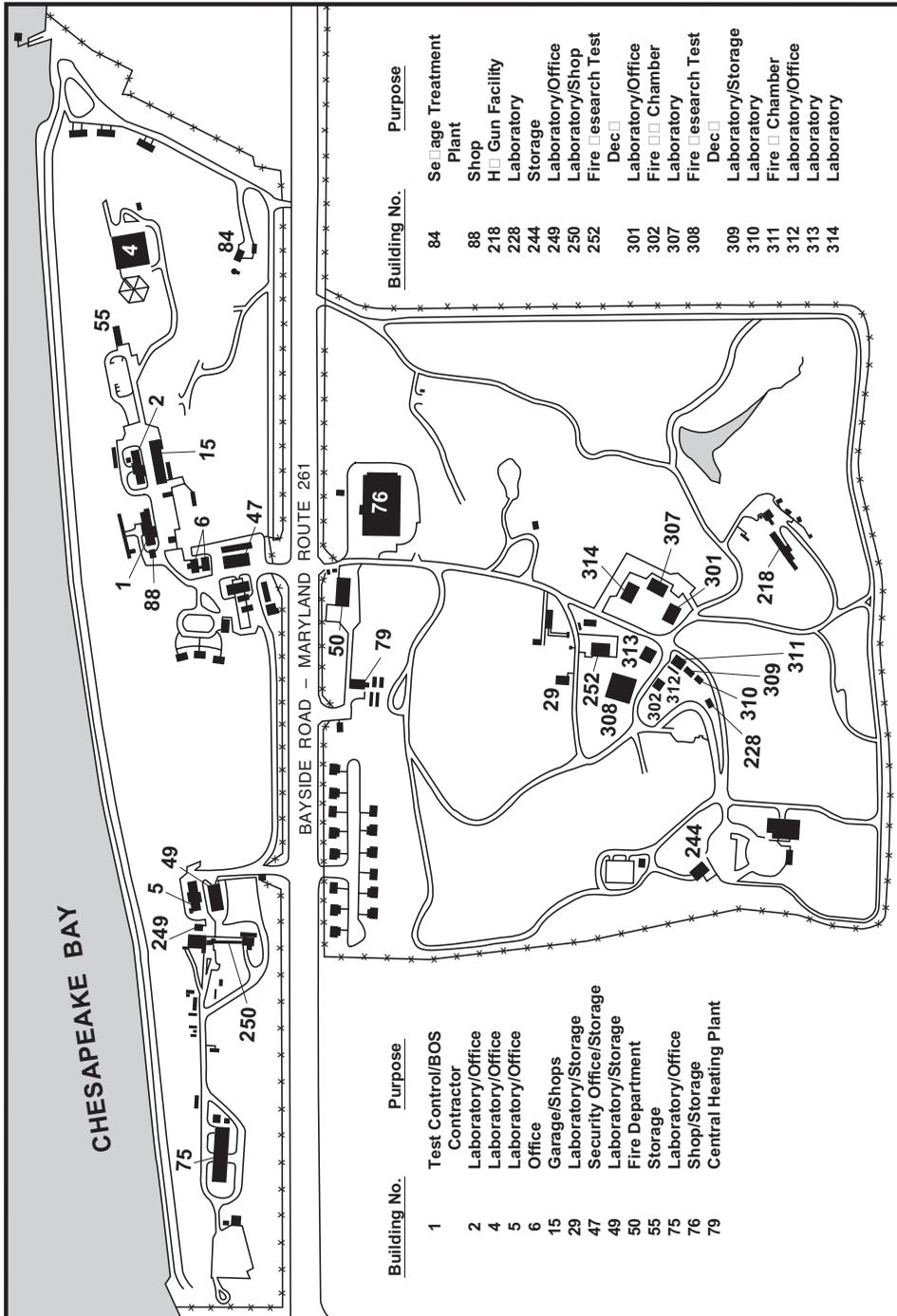
<u>Location</u>	<u>Approximate Mileage from NRL Washington</u>	<u>Cognizant Code</u>
A - Chesapeake Bay Section, Chesapeake Beach, MD	40	3522
B - Tilghman Island, MD	110	3522
C - Patuxent River (MD) Naval Air Station	64	1600
D - Pomonkey, MD	20	8124
E - Midway Research Center, Quantico, VA	38	8140
F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

Chesapeake Bay Section (Chesapeake Beach, Maryland)

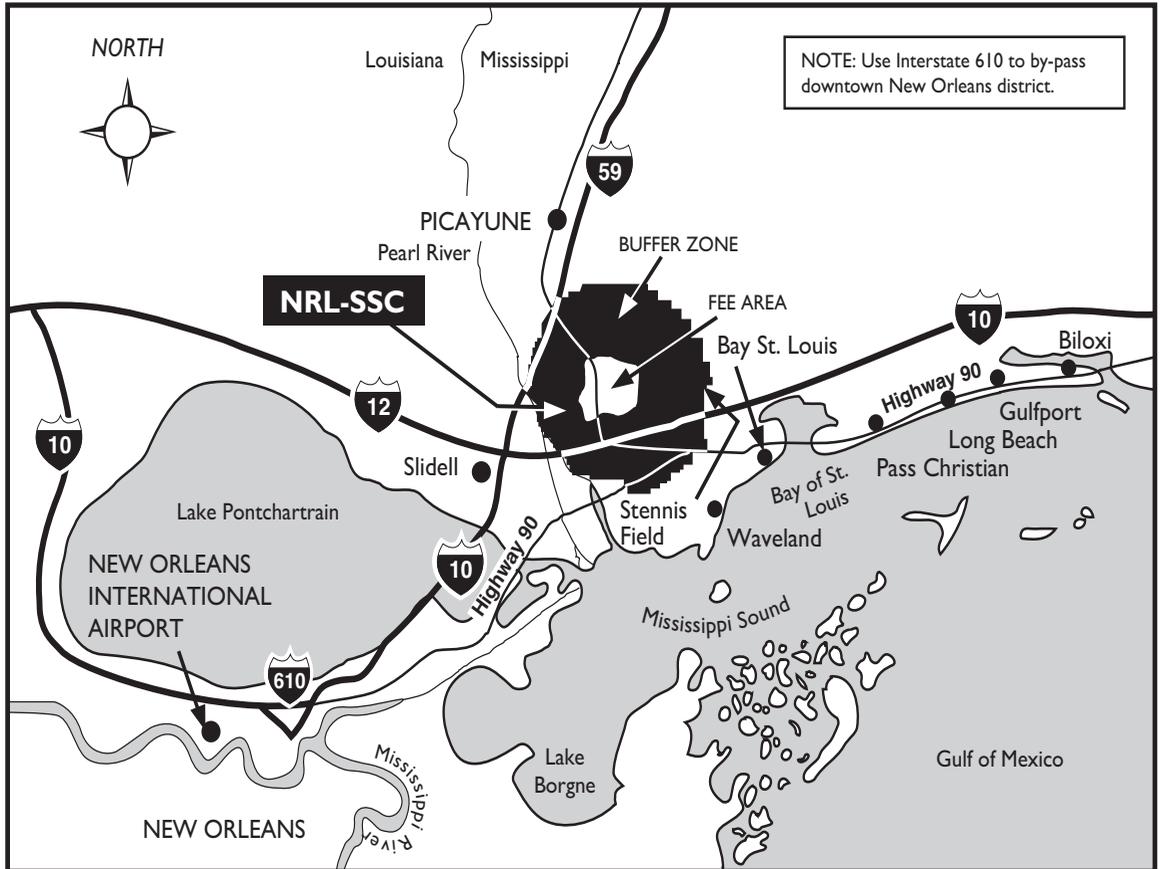


U.S. Naval Research Laboratory
Chesapeake Bay Section
5813 Bayside Road
Chesapeake Beach, MD 20732
(301) 257-4002

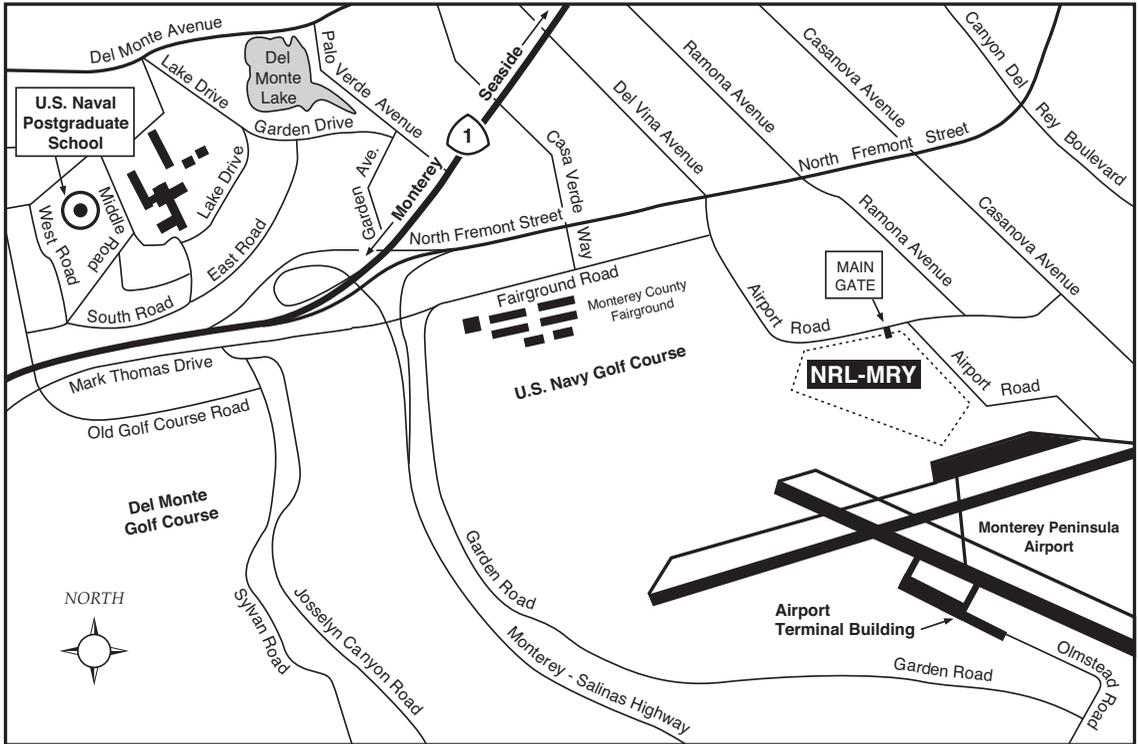
Location of Buildings at the Chesapeake Bay Section



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



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-

Code		Telephone
EXECUTIVE DIRECTORATE		
1000	Commanding Officer	(202) 767-3403
1000.1	Inspector General	(202) 404-3309
1000.2	Deputy Equal Employment Opportunity Officer	(202) 767-8390
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	Executive 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, Mission Support Division/STILO	(202) 404-1004
1220	Head, Information Assurance and Communications Security	(202) 767-0213
1250	Head, Safety Branch	(202) 767-2232
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
1900	Head, Office of the Command Information Officer	(202) 767-9225
3005	Deputy for Small Business	(202) 767-0666
BUSINESS OPERATIONS DIRECTORATE		
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 Administration Services Division	(202) 767-3446
3500	Director, Research and Development Services Division	(202) 404-4054
SYSTEMS DIRECTORATE		
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
MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE		
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

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August 2018

Scott D. Moran, Captain, USN
Commanding Officer



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2018 FACT BOOK