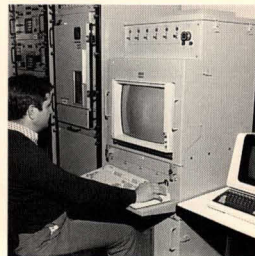


Naval Research Laboratory

Washington, DC 20375-5320
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1992-1993 FACT BOOK

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The NRL Fact Book is prepared as a reference source for information about the Naval Research Laboratory (NRL). Fiscal information, personnel, and organization changes are current as of 1 November 1992. 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
 Staffing Branch (Code 1810)
 Naval Research Laboratory
 Washington, DC 20375-5320

ON THE COVER

Upper left: Last stage of deployment of the Versatile Experimental Kevlar Array (VEKA) off the Oregon coast for a very low frequency experiment. The system is used by the Shallow Water/Coastal Acoustics Section of the NRL Center for Environmental Acoustics, Stennis Space Center. (Photograph taken by Hassan B. Ali, NRL-SSC, Code 7173.)

Upper right: Partial view of the NRL Washington waterfront from across the Potomac River in Alexandria, Virginia

Lower left: "Microscopy Identification of Sediment Constituents"—NRL-Stennis Space Center, Stay in School Program—students learn and work in microscopy and geotechnical laboratories

Lower right: The Tactical Environmental Support System (TESS (3)) at NRL-Monterey supports the fleet with digital environmental data



Quick Reference Telephone Numbers

	NRL WASHINGTON	NRL- SSC	NRL- MONTEREY	NRL USRD	NRL CBD
Hotline	(202) 767-6543	(601) 688-5001	(408) 656-4737	(202) 767-6543	(202) 767-6543
Personnel Locator	(202) 767-3200	(601) 688-3390	(408) 656-4763	(407) 857-5231	(410) 257-4000
AUTOVON (Incoming)	297- or 354-	485	878	—	—
Direct-in-Dialing	767- or 404-	688	656	857	257
Public Affairs	(202) 767-2541	(601) 688-5328	(408) 656-4708	(407) 857-5230	—

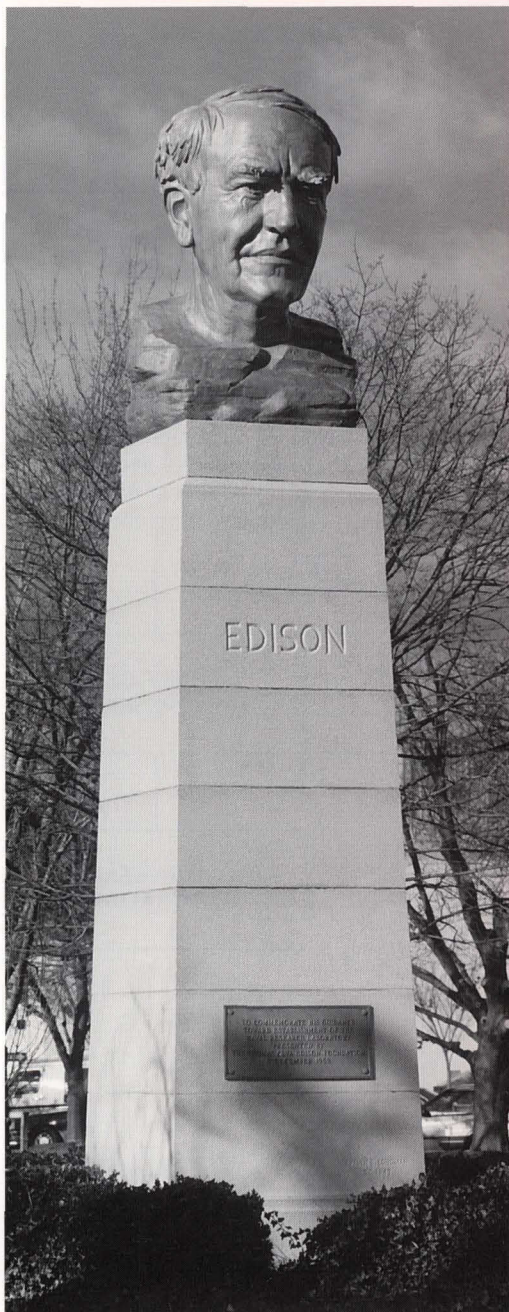
Telephone numbers for key personnel are listed on pages 153 and 154.

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28	Human Resources Office
33	BUSINESS OPERATIONS DIRECTORATE
34	Associate Director of Research for Business Operations
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37	Management Information Systems Staff
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Introduction to the Naval Research Laboratory

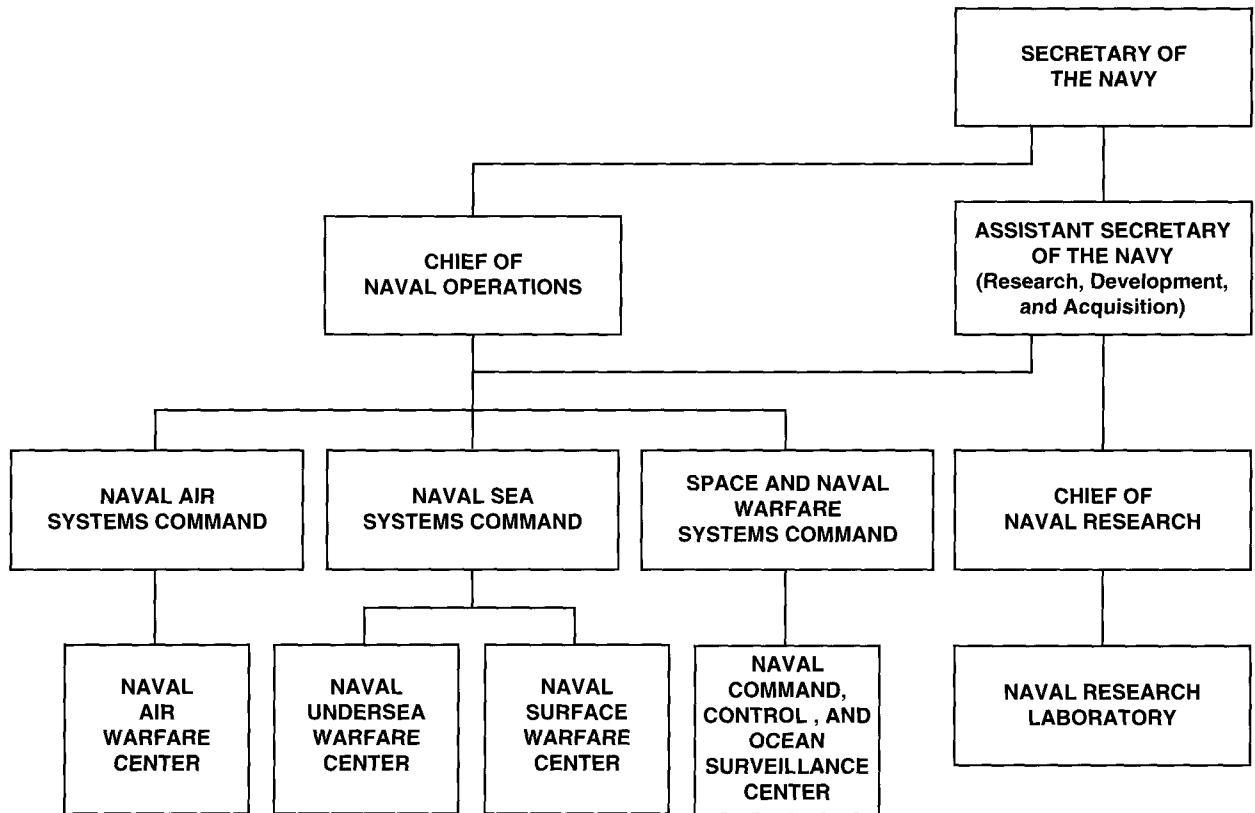


MISSION

To conduct a broadly based multidisciplinary program of scientific research and advanced technological development directed toward maritime applications of new and improved materials, techniques, equipment, systems, and ocean, atmospheric, and space sciences and related technologies.

The Naval Research Laboratory provides

- Primary in-house research for the physical, engineering, space, and environmental sciences
- Broadly based exploratory and advanced development programs in response to identified and anticipated Navy needs
- Broad multidisciplinary support to the Naval Warfare Centers
- Space and space systems technology development and support





The Naval Research Laboratory in the Department of the Navy

NRL is the Department of the Navy's corporate laboratory; it is under the command of the Chief of Naval Research (CNR). As the corporate laboratory of the Navy, NRL is an important component in the Office of Naval Research's effort to meet its scientific research responsibilities.

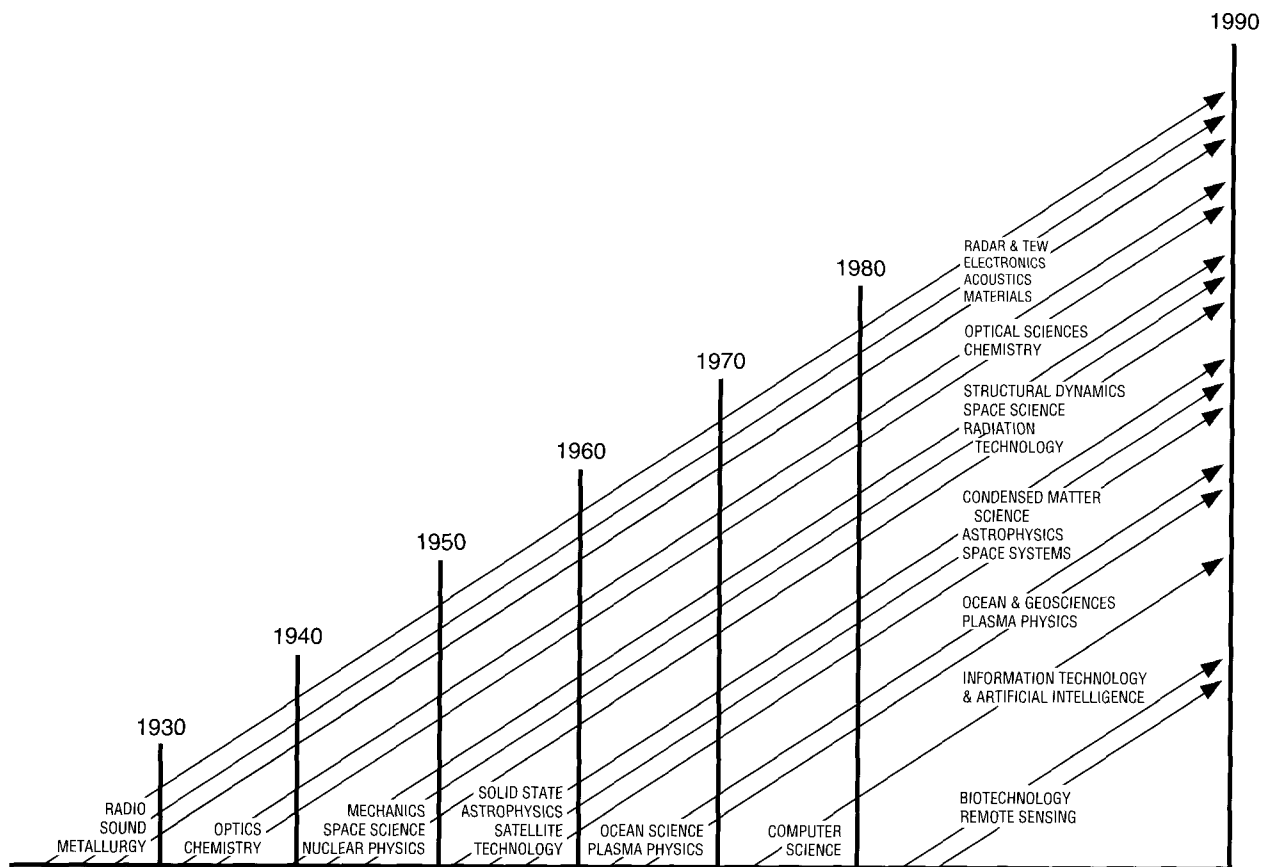
For its basic research effort, the Laboratory receives guidance from the CNR that establishes the level of effort and trend direction. The Laboratory then develops a comprehensive research proposal package that is submitted to the CNR for consideration for Navy basic research support. The total Navy basic research program ultimately is evaluated by Congress.

In addition to internal critical review and the evaluation by the CNR and others, the research at NRL is published in refereed journals and/or reported at national and international scientific conferences. There is an aggressive policy of scientific interaction whereby scientists from around the world visit NRL and are visited by NRL scientists. In this way, NRL research is subject not only to management review but also to peer evaluation.

NRL has had a long and fruitful relationship with industry as a collaborator, contractor, and most recently in Cooperative Research and Development Agreements (CRADA). NRL values this linkage and intends for it to continue to develop.

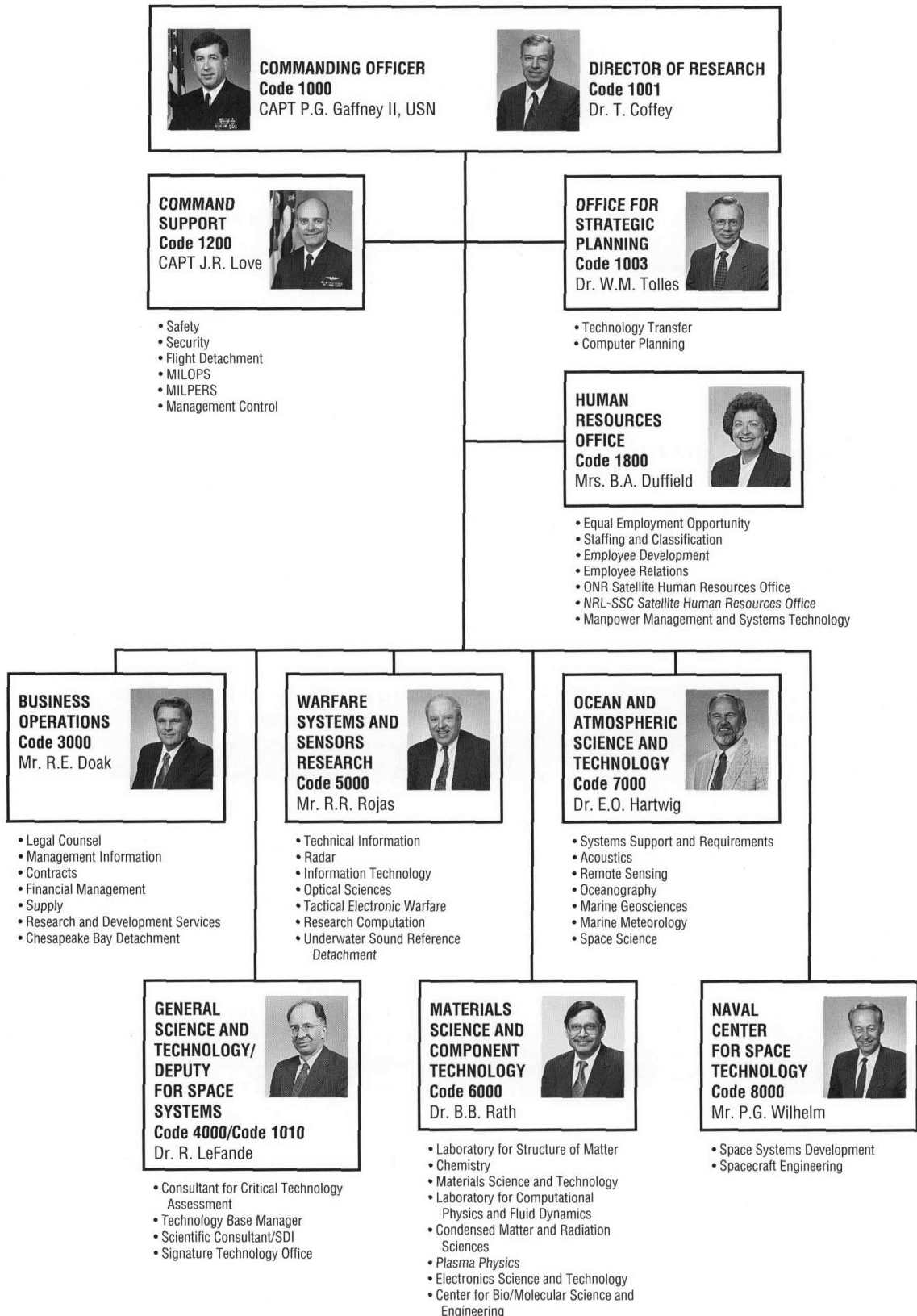
NRL is an important link in the Navy R&D chain. Through NRL, the Navy has direct ties with sources of fundamental ideas in industry and the academic community throughout the world and provides an effective coupling point to the R&D chain for the Office of Naval Research (ONR).

NRL Program Evolution



The Naval Research Laboratory was officially established on July 2, 1923, as the Naval Experimental and Research Laboratory. In almost seven decades, research efforts have expanded as shown above from the two original areas of radio and underwater sound to 19 broad areas of scientific endeavor encompassing many diverse fields.

NRL Functional Organization



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
- EO/MET sensors
- Satellite meteorology
- Precise space tracking
- Radio/Infrared astronomy
- Infrared sensors and phenomenology
- Middle atmosphere research
- Image processing
- VLBI/Astrometry
- Atmospheric effects on low frequency EM communications

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
- Techniques for naval needs
- Expert systems for resource allocation, signal identification, operational planning, target classification, and maintenance advisors
- Algorithms and utilization of massively parallel computing systems
- Visualization of scientific processes
- High-speed networking
- Machine learning

Device Technology

- Integrated optics
- Radiation-hardened electronics
- Microelectronics
- MM wave technology
- Hydrogen masers for GPS
- Aperture syntheses
- Electric field coupling

Directed Energy Technology

- High-energy lasers
- Chemical lasers
- Laser propagation
- High-power microwave sources
- Charged-particle devices
- Pulse power
- DE effects

Electronic Warfare

- Decoys (RF and IR)
- Repeaters/Jammers, EO/IR active countermeasures
- EW/C³CM system concepts
- Simulation

Enhanced Maintainability, Reliability, and Survivability Technology

- Coatings
- Lubricants and greases
- Water additives and cleaners
- Fire safety
- Laser hardening
- Satellite survivability

Environmental Effects on Naval Systems

- Meteorological effects on electro-optical system 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

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

Information Technology

- Antijam communication links
- Network architectures
- Battle management information systems
- Arctic communication links
- Communication/Information security
- Voice processing

Materials

- Superconductivity
- Bio/Molecular engineering
- Materials processing
- Advanced alloy systems
- Rapid solidification technology
- High-temperature materials
- Laser fabrication and processing
- Ceramics and composite materials
- Thin films and coatings
- Metamorphic materials/Smart structures

Space Systems and Technology

- Advanced space systems
- Space sensing technology and applications
- Satellite communications
- Spacecraft design, engineering, and integration
- Satellite ground station design
- Navigation and time technology
- Remote sensing, calibration, and research
- Sea-launched booster technology
- Space recovery technology
- Satellite survivability
- Spacecraft power systems technology
- Spacecraft materials

Surveillance and Sensor Technology

- Point defense technology
- Imaging radars
- Target classification/identification
- Underwater acoustics, including propagation, noise, and reverberation
- Airborne geophysical studies
- Fiber-optic sensor technology
- Shallow water environmental acoustics and sensor systems
- Undersea surveillance system performance modeling, unifying the environment, acoustics, and signal processing
- Sonar transducers
- Electromagnetic sensors—gamma ray to RF wavelengths
- SQUID for magnetic field detection
- Low observables technology
- Ultra-wideband technology
- VHSIC/MIMIC applications

Undersea Technology

- Autonomous vehicles
- Bathymetric technology
- Anechoic coatings
- Oceanographic instrumentation

Oceanography

- Regional ocean forecast
- Shallow water tactical oceanography
- Environmental quality
- In-situ oceanographic sensors
- Bio-optical and fine-scale physical processes
- Bio-corrosion
- Oceanographic tactical decision aids

Marine Geosciences

- Geoacoustic modeling to support acoustic performance prediction
- Marine seismology including propagation and noise
- Geomagnetic modeling to support nonacoustic system performance
- Geotechniques/sediment dynamics affecting mine warfare and mine countermeasures
- Mapping and charting including advanced seafloor mapping and imaging systems

Meteorology

- Air/Sea interaction effects on operations
- Data assimilation techniques
- Global/Regional forecasting
- Tactical system development and application
- Weather effects on targets
- Meteorological tactical decision aids

Ocean Acoustics

- Underwater acoustics, including propagation, noise, and reverberation
- Fiber-optic acoustic sensors
- Shallow water environmental acoustics and sensor systems
- Undersea warfare system performance modeling, unifying the environment, acoustics, and signal processing
- Anechoic coatings
- Target reflection, diffraction, scattering
- Simulations
- Tactical decision aids



Major Research Capabilities and Facilities

(Listed alphabetically by organizational unit)

Acoustics Division (Code 7100)

Large tank instrumented for investigating acoustic echo and radiation characteristics of targets
Tank 30 ft in diameter by 22 ft in depth, automated with computer control and analysis for detailed studies of acoustic fields, transducers, and other underwater devices
Multichannel programmable digital data processing system: a system of DEC computers, high-speed array processors, and peripherals for up to 256 channels; designed for acoustic surveillance array processing
Containerized data processing for acoustic array processing at remote sites and aboard ship
Large acoustic pool facility, incorporating near-field conformal scanners and acoustic arrays for structural acoustics studies of underwater targets
High-powered sound source array
Vertical array with satellite telemetry
Multiple towed acoustic arrays with up to 144 acoustic channels for measuring directional noise
Twin underwater towers supporting sources and hydrophone arrays to measure high-frequency propagation, volume and boundary scattering in shallow water
High-speed maneuverable towed body with MK-50 and synthetic aperture sonars to measure high-frequency boundary scattering and coherence

Center for Bio/Molecular Science and Engineering (Code 6900)

Optical equipment
Confocal fluorescent microscope
CW fluorimeter and microscope
Excimer laser projection exposure system
Dektak surface profilometer
Optical and fluorescence microscopes
Photon correlation spectrometer
Picosecond dye laser system
Raman spectrometers
Scanning and transmission electron microscope
SLM fluorimeter (visible through near IR)
Time resolved fluorimeter (nanosecond)
UV-visible absorption spectrophotometers
Analytical instruments
Atomic force/scanning tunnelling microscope
Capillary electrophoresis unit
Contact angle goniometer
Differential scanning calorimeter

DNA synthesizer; DNA sequencer
HPLC
Patch clamp microelectrodes
Potentiometer for electrochemistry
General facilities
Class 100 clean room
Cold room for storage and preparation
Controlled shelf temperature lyophilizer
Silicon Graphics IRIS Workstation
Freeze-fracture apparatus
High speed ultracentrifuges
Inert atmosphere drybox
Langmuir-Blodgett film balance

Chemistry Division (Code 6100)

Nanometer-scale surface analytical facility
Langmuir-Blodgett film facility
Chemical diagnostic facility
Surface diagnostic facility
Tribology facility
Paint and coating facility
Mechanical and chemical characterization of polymers facility
Surface cleaning facility
Alternate and petroleum-derived fuels facility
Combustion research facilities
High-temperature chemistry facility
Fire research facilities
Navy Technology Center for Safety and Survivability for fire extinguishment research

Condensed Matter and Radiation Sciences Division (Code 6600)

Hypervelocity gun ranges
3-MeV tandem Van de Graaff accelerator
200-keV ion-implantation facility
60-MeV electron linear accelerator
Synchrotron radiation beam lines (at NSLS, Brookhaven, NY)
Microwave test facility
Excimer laser film deposition facility
Bomen infrared spectrometer facility
HYPRES superconducting oscilloscope system
Diffuse light scattering facility

Electronics Science and Technology Division (Code 6800)

Nano- and micro-electronics processing facility
Electron-beam nanowriter

High-resolution transmission electron microscope
Scanning tunneling microscopy and electro-optical analysis
Crystal-growing facilities including bulk growth, molecular beam epitaxy, and organo-metallic chemical vapor deposition
Optical and electrical characterization of materials
Electronic testing and analysis facilities

Information Technology Division (Code 5500)

Extensive computer facilities
Connection machine
HF modem and channel simulation
Brandywine antenna range
Pomomkey test range
Signal analysis laboratory
Artificial intelligence computer network
Distributed simulation and prototyping test bed
HCI laboratory
Certification and INFOSEC engineering laboratory

Laboratory for Computational Physics and Fluid Dynamics (Code 6400)

INTEL iPSC/860 Touchstone Gamma 32 node supercomputer
IBM RS/6000 high capacity workstation class compute servers
256 M/byte CONVEX C210 mini-supercomputer
DEC 3000/400 AXP workstations
SGI IRIS 4D graphics stations
D2 Digital video and animation laboratory
SUN Microsystems 4/470 workstation server
Numerous SUN and MACINTOSH workstations
All computers and workstations have network connections to NICENET allowing access to the NRL CCF, the NRL Connection Machine, and many other computer resources both internal and external to NRL

Laboratory for Structure of Matter (Code 6030)

Siemens area detector system
Two X-ray diffractometers
Zymark robotics
Evans and Sutherland computer graphics display system
Silicon graphics IRIS workstation
Protein and peptide chromatography

Marine Geosciences Division (Code 7400)

Airborne gravimetry, magnetics, and topographic measurement suite coupled with differential

GPS yielding position accuracies of <1.0 meter
Data acquisition and analysis system using Navy's fixed underwater surveillance system (SOSUS) to study earthquakes and whale migration patterns
Deep-Towed Acoustic Geophysical System operating at 250-650 Hz characterizes subseafloor structure including gas clathrate accumulations
Acoustic Seafloor Classification System operating at 15-50 kHz provides underway, real-time prediction of sediment type and consistency
Seafloor probes for measuring sediment pore water pressures and acoustic compressional and shear wave velocities and attenuations
Transmission electron microscope with environmental cell for study of sediment fabric, especially impact of pollutant adsorption
Map Data Formatting Facility compresses map information onto compact disk-read only memory media for masters for use in aircraft
Digital Moving Map systems
Magnetic Observatory conducts measurements of ambient field and other magnetic phenomena
Comprehensive geotechnical and geoacoustics laboratory capability
Airborne ElectroMagnetic (AEM) bathymetry system
Ocean Bottom Magnetometer system
3-D, Multi-spectral, Subbottom Swath imaging system
Ocean Bottom Seismographs (OBS)
In-Situ Sediment Acoustic Measurement System (ISSAMS)
Hydrothermal plume imaging data acquisition and analysis system
Integrated digital databases analysis and display system for bathymetric, meteorological, oceanographic, geoacoustic, and acoustic data

Marine Meteorology Division (Code 7500)

Tactical Environmental Support System (TESS(3))
Prototype-Concurrent 6605 computer
SMQ-11 shipboard antenna system for retrieving orbiting imagery
Naval Environmental Operational Nowcasting System (NEONS)-implemented on two HP9000/835 computers
Numerous PC's and SUN workstation computers
Real-time/archived global atmosphere/ocean databases

Materials Science and Technology Division (Code 6300)

Ultrasonic gas atomizer
Hot isostatic press
Cold isostatic press

- Consumable arc electrode melter for reactive metals
- High-energy, dispersive X-ray analytical system
- Electron microprobe SEM and STEM systems
- Quantitative metallography
- Computer-controlled multiaxial loading and SCC measurement systems
- Computer-interactive, nonlinear, multimode fracture measurement system
- Computer-aided, experimental stress analysis
- Crystallite Orientation Distribution Function (CODF)
- Elevated temperature and structural characterization laboratory
- Impression creep and mechanical property evaluation
- Automated physical constant measurement systems
- Nondestructive evaluation laboratory
- Closed-loop, low- and high-cycle fatigue systems
- Metallic film deposition systems
- Magnetometry
- Mossbauer spectroscopy
- Cryogenic facilities
- High-field magnets
- Marine corrosion facility
- High-resolution analytical electron microscope
- Isothermal heat treating facility
- Vacuum arc melting facility
- Vacuum induction melting facility

Naval Center for Space Technology (Code 8000)

- RF compact range
- RF anechoic chambers
- Thermal-vacuum chambers
- Reverberation chamber
- Shock and vibration test facility
- Clean-room facilities
- Satellite tracking, command, and control facilities
- Spacecraft-fabrication and assembly facility
- Propellant handling facility
- Time and frequency control laboratories
- CAD/CAM facility

Oceanography Division (Code 7300)

- 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
- Environmental Scanning Electron Microscope for detailed studied of Bio-Corrosion in Naval materials

- Self contained bottom mounted upwardlooking acoustic profilers for measuring ocean variability
- VDABS and NDABS self contained, multi-channel insitu recording systems for acoustic and oceanographic measurements
- Cable tester for ocean moorings and equipment
- STAR (Surface towed array) for near surface ocean temperature/conductivity structure
- STEMS (Surface Tension Measuring System) measures surface tension of ocean surface slicks
- Acoustic Doppler Profiler for determining ocean currents while under way
- Fiber optic connection to the Navy's Class 7 Large Scale computer

Optical Sciences Division (Code 5600)

- Electron-beam, electron-beam sustained, x ray, and UV preionized laser devices with spectroscopic and other diagnostic equipment
- Short-pulse excitation apparatus for kinetic mechanisms investigations
- Optical warfare laboratory
- IR laser facility for optical characterization of semiconductors
- Mobile, high-precision optical tracker
- Facilities for synthesis and characterization of optical glass compositions and for the fabrication of optical fibers
- Hybrid optical/digital image processing facilities
- Silica and fluoride fiber-optic fabrication facilities
- Facilities for fabricating and testing integrated optical devices
- Optical probes laboratory to study viscoelastic, structural, and transport properties of molecular systems
- Computer IR/EO technology/systems simulation center
- High-energy pulsed chemical laser laboratory
- 100-J UV laser research facility
- Field-qualified EO/IR measurements devices
- Focal plane array evaluation facility

Plasma Physics Division (Code 6700)

- PAWN, 1-MJ compact inductive storage facility
- Gamble II high-voltage pulsed power generators
- PHAROS III, three-beam neodymium-glass laser and target facility
- 1000-J NRL CO₂ laser
- Dense Z-pinch facility
- High-power relativistic klystron and gyrotron facilities
- Electric mass launchers facility
- Charged particle beam (CPB) propagation range
- Super IBEX 5 MV, 100 kA, 40 ns CPB generator
- Maxibeam 3 MV, 60 kA, 300 ns CPB generator

Radar Division (Code 5300)

Electronic computer-aided design facility
Airborne adaptive array laboratory
Radar cross section prediction facility
Radar research and development test beds at CBD
1. Senrad air-surveillance radar test bed
2. Low-altitude detection demonstration system
IFF ground station
Radar display test bed
Noncooperative target recognition facility
Antenna measurement laboratory
Air and laboratory radar cross section measurement systems

Remote Sensing Division (Code 7200)

Stratified tow channel
Wind-wave tunnel channel (33.5 m)
30.5 m wind-wave tank for studying the dynamics of wind-waves and their interaction with long waves; uses micro-Doppler spectrometry and photometric techniques
Millimeter-wave Atmospheric Sounder (MAS)
MAS data facility
MAS Spacelab instrument
Polar ozone and aerosol monitor space sensor
Ground-based stratospheric water-vapor monitoring system
Digital Image Processing Laboratory (DIPL)
SAR processing facility
SARCOM system
SCI processing facility
MWO optical interferometer site
General purpose image processing
Green Bank interferometer
Washington VLBI correlator
WVMS NDSC instrument
Image working system
IRIS system and processor
IR test facility
SSM/I processing facility
STEMS-II boat
STEMS system
Ocean tower/platform/ship radar
L,S,C,X,K, and W band
Ocean tower/lab/platform/ship radiometers
6,10,14,19,22,35,37,85,90,140,220 GHz
Lidar field system
Aerosol and field measurement facility
Aerostat and blimp instrument system
NRL RP-3A aircraft sensors
Airborne Lidar
MMW imagers (35,90,140,220 GHz)
DMSP SSM/I simulator
LFMR SST simulator

PRT-5 IR radiometer
Imaging real-aperture radar (RAR)
X,C bands
Precision altimeters
X-band, 95 GHz, Lidar
Rotating scatterometer
Tri-frequency-agile radar (TRIFAR)
X-band interferometer
Millimeter-wave (95 GHz) radar
AXBT
Flight-level meteorological sensors
Navigation systems
INS, GPS
Shipboard sensor systems
Surface Met/Ocean obs
Lidar
CTD
Thermistor chains
STAr (Surface Towed Array)
Acoustic Doppler velocity profilers

Research Computation Division (Code 5800)

Central Computing Facility (CCF)
Cray Y-MP EL 2/512 computer, (two CPUs with 512 million bytes of memory) running UNICOS; provides a variety of services including programming languages, math libraries, electronic mail, bulletin board, database management, document preparation, graphics, and telecommunications processing
Consultant's Desk, staffed by the RCD to assist CCF users on weekdays 9 a.m. to 5 p.m.
Customer Service Counter (CSC), staffed by CCF operators who register users, service the magnetic tape library, distribute reference material and printer output, etc.
NICEnet, the NRL Integrated Communications Environment Network, connects most NRL buildings for computer communications, video services, and gateways to networks and computer systems worldwide (e.g., Internet, DDN/MILNET, SURANET/NSFnet,NSI)
Satellite dishes, two "Cs" and two "Kus," provide video and data reception for NICEnet; including news, weather, seminars, and training programs
Microwave antennas (2), receive ITV from the University of Maryland and George Washington University
File Server/Archiver (FS/A) system, a Laboratory-wide central permanent file storage/archival system accessible via NICEnet, is a two-level system comprising 64 gigabytes of online disk storage and 1.5 terabytes of nearline storage. The online storage is provided by Control Data disk

array subsystems. The nearline storage is supplied in the form of an automated tape cartridge system featuring advanced robotics. A dedicated Control Data 4680 RISC architecture processor with a 16.7 ns clock functions as the file server.

The Visualization Laboratory offers a wide variety of visualization platforms including a Macintosh IIcx with a Mirrus Film Recorder; a Macintosh Quadra 900 with a direct video interface for video capture, serving as a multimedia station; a Sun SPARCstation 1; an SGI Personal IRIS 35/GT; an SGI Crimson with Elan graphics, a digitizer pad, button and dial boxes, optical disk drive and Seiko thermal printer; an HP 9000/720; a Stardent Vistra 800 EX and an IBM R6000/320. Video productions are possible with a Panasonic super VHS recorder, a Photron scan converter, a Lyon-Lamb animation controller and a Sony TV monitor.

RCD training facility, serves the CCF user community as a training room for hands-on courses that are taught by User Services

Research and Development Services

Division (Code 3500)

- Military construction
- Scientific program
- ONR facilities support
- Research support engineering
- Full range of facility contracting, including construction, architect/engineering services, facilities support, and base operating services
- Transportation
- Environmental
- Planning
- Maintenance and repair of buildings, grounds, and communication and alarm systems
- Shops for machining, sheet metal, welding, castings, and plating
- Radar experimental test site, which includes a variety of radars; ancillary equipment for test and evaluation of equipment, concepts, and techniques; and overwater ranges
- Tactical electronic warfare test site
- Communications facilities for transmission to and from land, sea, and air
- Hypervelocity gun for ballistics research
- Ship-motion simulator with 12-ton payload capacity
- Boat services

Space Science Division (Code 7600)

- E.O. Hulburt Center for Space Research
- Development and test facilities for spaceborne instruments to perform astrophysical, solar,

- high-atmospheric, and space-environment sensing

- Clean-room facilities

- Extensive computer-assisted data manipulation and interpretive capability for space-data imaging and modeling

- Backgrounds Data Center (BDC) for analysis and archival storage of SDI-relevant natural backgrounds

- Low-temperature laboratory

- Gamma Ray Observatory (OSSE) operations and data analysis center

- Solar Instrument Test Facility

Tactical Electronic Warfare Division (Code 5700)

- Mobile infrared signature measurement and simulation facility

- Mobile ESM laboratory

- Hybrid RF/IR missile-seeker simulation facility

- Central target simulation facility for developing, testing, and evaluating EW systems and techniques, using real-time, hardware-in-the-loop models

- RF simulation laboratory and signal simulators

- Radar cross-section measurement facility (at CBD)

- Search radar ECM simulator

- Advanced tactical EW environment simulator

- Electronic warfare coordination test bed

- Scale-model analysis facility

- Wind tunnel for performance measurements of low Reynolds number vehicles

- Optical integration laboratory

- Tempest signal-processing laboratory

- Simulated ship-mast facility

- Secure supercomputer facility

- Vehicle development laboratory

- Visualization laboratory

Technical Information Division (Code 5200)

- DICOMED (computer graphics system)

- Electronic publishing

- Research library (1,100 current subscriptions, 165,000 monographs and bound journals, 1,600 rolls of microfilmed journals, 1,170,000 technical reports (325,000 hard copy, 800,000 microfiche, and 45,000 stored as digital page images), and 1,000 microcomputer software packages)

- STILAS (Scientific and Technical Information Library Automation System) on-line library catalog

- InfoNet campus-wide Information System for desktop access to CD-ROM and other locally mounted databases and Internet resources

Microcomputer Software Support Center
Photographic laboratories
Writing, editing, publications consultation
Graphic design services
Video recording and productions
Electronic imaging
Scientific and technical photographers

Underwater Sound Reference Detachment (Code 5900)

28,000-m² (7-acre) lake for electroacoustic transmitting, receiving, directivity, and research and development measurements in the frequency range 50 Hz to 500 Hz

1.22 x 1.22 x 3.05-m temperature-controlled tank for electroacoustic transmitting, receiving, directivity, and research and development measurements in the frequency range 20 kHz to 2 MHz

37.9-m³ (10,000-gal), 6.89-MPa (1000-psi) reverberation-suppressed, temperature-controlled pressure vessel simulating ocean depths to 689 m for making high-power electroacoustic transmitting, receiving, directivity, high-power impedance, insertion loss, echo reduction, and research and development measurements in the frequency range 2 kHz to 1 MHz

114-m³ (30,000-gal), 20.7-MPa (3000-psi) temperature-controlled acoustic measurement pressure vessel that is being outfitted similar to the 10,000-gal pressure vessel. Additionally, it will simulate ocean depths to 2068 m, and has a main port that will allow for entry of 1.75-m wide acoustic panels.

28-cm diam, 13.8-MPa (2000-psi) temperature-controlled, standing wave pressure vessel simulating depths to 1379 m for measuring electroacoustic receiving sensitivity measurements in the frequency range 0.1 to 2000 Hz

20-cm diam vertical and 38-cm diam horizontal, 68.9-MPa (10,000-psi) temperature-controlled, traveling wave pressure vessels simulating ocean depths to 6895 m for measuring electroacoustic receiving sensitivity in the range 100 to 4000 Hz and 100 to 1750 Hz, respectively. Both vessels operate in the standing wave mode in the frequency range 1 to 100 Hz

50-m deep spring with very low ambient noise for transmitting, receiving, directivity, and scattering measurements in the frequency range 5 Hz to 150 kHz

15-cm diam explosive-driven, conical shock tube that simulates the most severe open-water shock specified in MIL-S-901D (NAVY)



Major NRL Sites and Facilities

SITE	ACREAGE		BUILDINGS/ STRUCTURES
	LAND OWNED/LEASED	EASEMENT/ LEASE	
District of Columbia NRL and Artificial Intelligence Center at Bolling AFB	129/0	6.7	106/25
Virginia Midway Research Center Quantico	162/0		9/1
Maryland NRL Flight Support Detachment, NAS Patuxent River*	Tenant		
Chesapeake Bay Detachment and Dock Facility Chesapeake Beach*	168/0	0.60	64/87
Multiple Research Site Tilghman Island*	2/0		3/3
NRL Waldorf Annex Waldorf*	24/0	35.16	20/24
Radio Astronomy Observatory Maryland Point*	24/0		10/16
Radio Antenna Range USAF Receiver Site Brandywine*		22.98	
Free Space Antenna Range Pomomkey*	37/0	28.40	9/11
Florida Underwater Sound Reference Detachment, Orlando and Leesburg*	11/65		25/19
Marine Corrosion Facility Key West	Tenant		
California NRL Monterey Monterey*	Tenant		
Mississippi Stennis Space Center Bay St. Louis*	Tenant		
Alabama Ex-USS <i>Shadwell</i> (LSD-15) Mobile Bay	Tenant		
	Decommissioned 457-ft vessel used for fire research		

*See maps in the General Information section.

PROPERTY

Land:

Owned 557 acres
Leased 65 acres

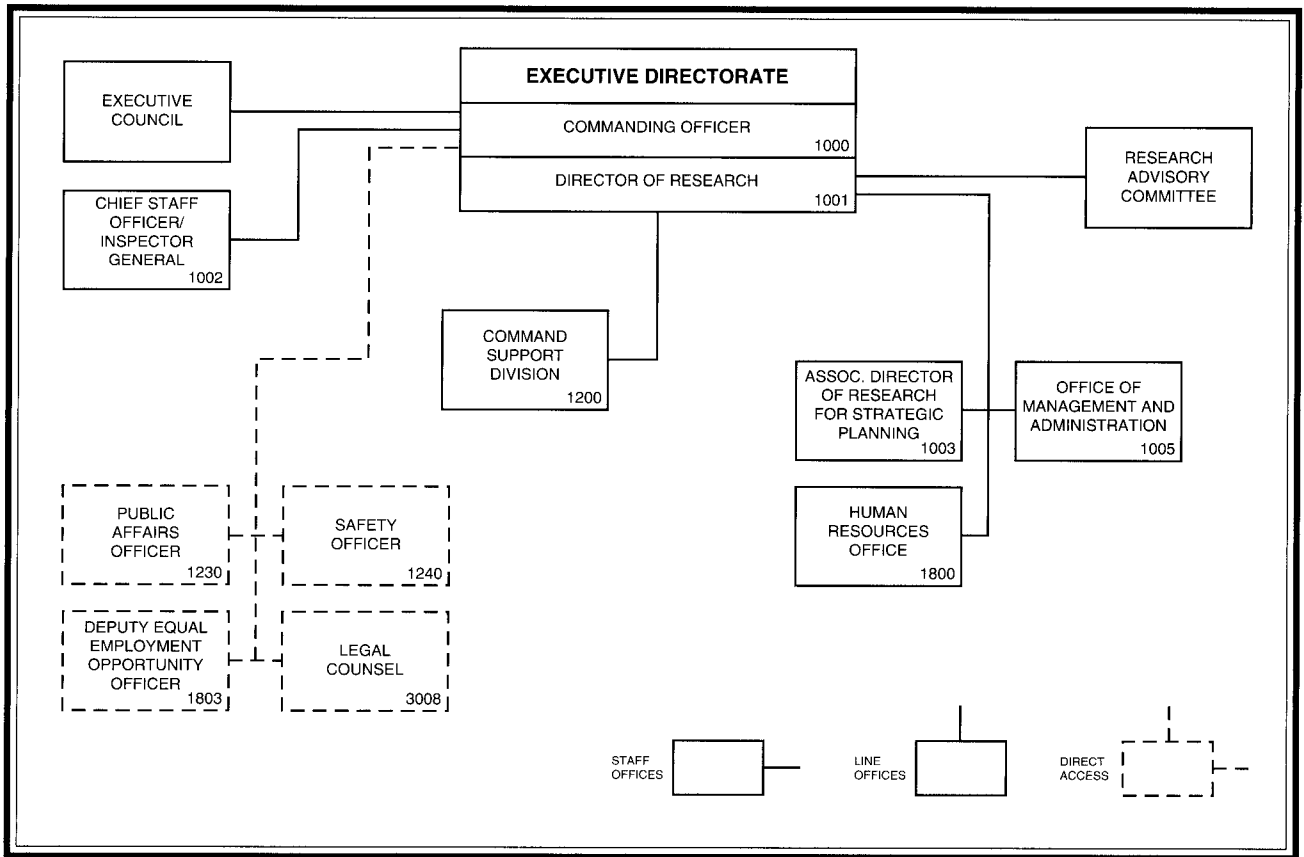
Buildings:

RDT&E 3,052,431 ft²
Administrative 223,416 ft²
Other 420,037 ft²

Acquisition Costs:

Real property \$786.7 million
Equipment \$267.1 million

		Executive Directorate		



Key Personnel

Name	Title	Code
CAPT P.G. Gaffney II, USN	Commanding Officer	1000
Dr. T. Coffey	Director of Research	1001
CAPT J.R. Love, USN	Chief Staff Officer/Inspector General	1002/1200
Dr. W.M. Tolles	Associate Director of Research for Strategic Planning	1003
Mrs. M.C. Oliver	Head, Office of Management and Administration	1005
Mr. J.W. Gately, Jr.	Head, Public Affairs Branch	1230
Mr. K.J. King	Head, Safety Branch	1240
Mrs. B.A. Duffield	Director, Human Resources Office	1800
Ms. D.E. Erwin	Deputy Equal Employment Opportunity Officer	1803
Ms. H.J. Halper	Legal Counsel	3008

Executive Directorate



The Commanding Officer and the Director of Research 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, as well as 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 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 four 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.

Commanding Officer (Code 1000)

CAPT Paul G. Gaffney II, USN, the former Assistant Chief of Naval Research (ACNR) at the Office of the Chief of Naval Research (OCNR), became the 30th Naval officer to head the Naval Research Laboratory on February 22, 1991.

CAPT Gaffney began his military career as the operations officer aboard the USS *Whippoorwill* in Sasebo, Japan, from 1969 to 1971. In 1971, he began a series of oceanographic assignments, beginning with duty as the Commander Naval Forces Vietnam Staff Oceanographer and Advisor to the Vietnamese Navy Combat Hydrographic Survey Team. He then served as the Oceanographic Services Officer for Fleet Weather Central in Rota, Spain. From 1975 to 1978, he served as the executive assistant and aide to the Oceanographer of the Navy in Washington, D.C.

After graduating from the Naval War College with highest distinction in 1979, CAPT Gaffney became the commanding officer of Oceanographic Unit FOUR embarked on USNS *Chauvenet* and U.S. Director of the AMINDO-Jaya Survey, Republic of Indonesia from 1979 to 1980. In 1980, he was assigned to the Office of Naval Research as acting director of the Arctic and Earth Sciences Division. He was selected and served as the military assistant to the Assistant Secretary of Defense (International Security Affairs) from 1981 to 1983. Following this tour, he reported as executive officer, then commanding officer, of the Naval Oceanography Command Facility, Jacksonville, Florida, until 1986. From 1986 to 1989, CAPT Gaffney was director of the Resources Division for the Oceanographer of the Navy, in the office of the Chief of Naval Operations.

A 1968 graduate of the U.S. Naval Academy, CAPT Gaffney was selected for the Immediate Graduate Education Program. He has received an M.S.E. in ocean engineering from the Catholic University of America (Washington, D.C.) in 1969 and an M.B.A. from Jacksonville University (Florida) in 1986.

CAPT Gaffney has been the recipient of many honors and awards during his career. These include: Defense Superior Service Medal, Legion of Merit (2 awards), Bronze Star with "V", Meritorious Service Medal, Combat Action Ribbon, and the J. William Middendorf II Prize for Outstanding Tactical/Strategic Research at the Naval War College. CAPT Gaffney is a member of the Explorer's Club and Sigma Xi.

CAPT Gaffney resides in Burke, Virginia, with his wife, Linda, and their daughter, Crista.



Director of Research (Code 1001)

Dr. Timothy Coffey [REDACTED] He graduated from the Massachusetts Institute of Technology in 1962 with a B.S. degree in electrical engineering, and obtained his M.S. (1963) and Ph.D. (1967), both in physics, from the University of Michigan.

During his graduate career, Dr. Coffey worked as a research assistant at the University of California (1963-64), a research physicist at the Air Force Cambridge Research Laboratories (1964-65), and a teaching fellow and research assistant in physics at the University of Michigan (1965-66). As a scientific consultant for EG&G, Inc. (1966-71), he was involved in investigations in theoretical and mathematical physics.

Dr. Coffey came to the Naval Research Laboratory in 1971 as Head of the Plasma Dynamics Branch, Plasma Physics Division. In this position, he directed research in the simulation of plasma instabilities, the development of multidimensional fluid and magnetohydrodynamic codes, and the development of computer codes for treating chemically reactive flows. In 1975, he was named Superintendent, Plasma Physics Division; he was appointed Associate Director of Research for General Science and Technology on January 1, 1980. On November 28, 1982, he was named Director of Research.

Dr. Coffey is recognized as an authority on the theory of nonlinear oscillations and has played a major role in the national program on high-altitude nuclear effects. The author or co-author of over 70 publications and reports, he has made several fundamental contributions to the theory of electron beam/plasma interaction and to the understanding of plasma processes in the Earth's ionosphere.

Dr. Coffey is a fellow of the American Physical Society and a fellow of the Washington Academy Sciences. In 1981, he was awarded the Presidential Rank of Meritorious Executive, in 1987 he received the Distinguished Presidential Rank award, in 1991 was awarded the Delmer S. Fahrney Medal, Franklin Institute, and in October 1991 was awarded the DoD Distinguished Civilian Service Award.

Executive Council



The Executive Council consists of executive, management, and administrative personnel. The monthly Executive Council meeting is a scheduled forum that provides the Commanding Officer a personal means to relay new policy or changes to current policy that affects all divisions and allows the other members of the Council to advise the Commanding Officer and Director of Research on matters relating to the administration of the Laboratory. The council also provides an opportunity for information exchange among its members. The Executive Council members include:

- Commanding Officer, chairperson
- Director of Research
- Associate Directors of Research
- Chief Staff Officer
- Director, Naval Center for Space Technology
- Heads of Divisions
- Head, Laboratory for Structure of Matter
- Head, Laboratory for Computational Physics and Fluid Dynamics
- Head, Center for Bio/Molecular Science and Engineering
- Head, Human Resources Office
- Public Affairs Officer
- Deputy Equal Employment Opportunity Officer
- Head, Office of Management and Administration
- Head, Safety Branch
- Head, Management Information Systems Staff
- NRL Counsel

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:

- Director of Research, chairperson
- Commanding Officer
- Associate Directors of Research
- Chief Staff Officer (Observer)

Chief Staff Officer/Inspector General Code 1002



CAPT J.R. LOVE, USN

The Chief Staff Officer serves as the Deputy to the Commanding Officer and acts for the Commanding Officer in his absence. The Chief Staff Officer is the Laboratory's Inspector General, and when directed, he 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; safety and occupational health; personnel discipline, morale, and welfare; management practices, command relationships, and organizational structure; and fraud and waste. He serves as principal advisor to the Commanding Officer on all inspection matters and audits and is the principal point of contact and liaison with all agencies outside NRL.

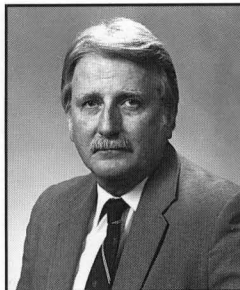
Deputy for Space Systems Code 1010



DR. R. LEFANDE

The Deputy for Space Systems is the principal advisor to the Commanding Officer and the Director of Research on all matters pertaining to the Naval Research Laboratory's Space Program. As such, he coordinates and provides direction to the total range of physical, engineering, and space sciences which support the NRL Space Program, ensuring that the full scientific resources of the Naval Research Laboratory are brought to bear to preserve and enhance a strong space technology base. He acts as a focal point in providing the continuity of the NRL space efforts within the Joint Space Systems Technology Programs activity (Code 1009), and the Naval Center for Space Technology (Code 8000).

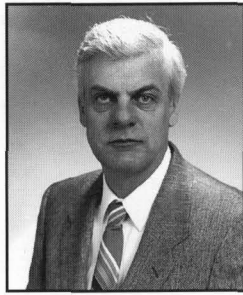
Public Affairs Officer Code 1230



MR. J.W. GATELY, JR.

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

Safety Officer Code 1240



Mr. K.J. KING

The Safety Officer is the program manager for Occupational Safety and Health, Explosives Safety, Industrial Hygiene, Radiological Safety, and Non-Ionizing Radiation Safety. The Safety Officer must ensure that each program complies with the appropriate federal, state, Navy, and NRL regulations. Specific functions include the development, implementation, and maintenance of comprehensive safety programs in support of the Laboratory's unique areas of research and development.

Deputy Equal Employment Opportunity Officer Code 1803

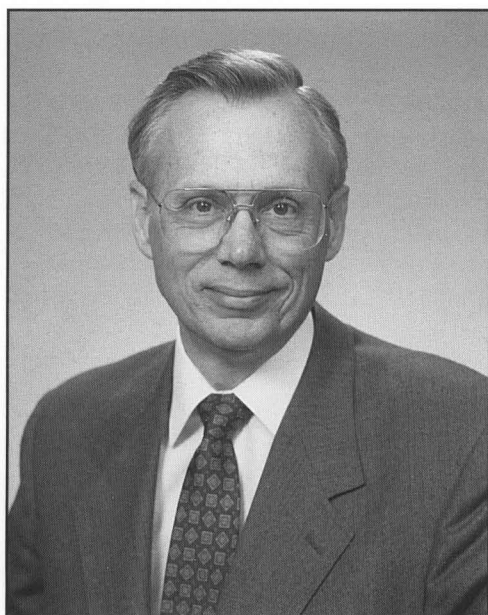


Ms. D.E. ERWIN

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 process and directs the Laboratory's affirmative action plans and special emphasis programs (Federal Women's, Hispanic Employment, Black Employment, Asian-Pacific Islanders, American Indian Employment, Individuals with Handicaps, and Disabled Veterans). The DEEOO recruits affirmative action candidates for those areas when underrepresentation exists. Duties also include reviewing, coordinating, and monitoring implementation of EEO policies and developing local guidance, directives, and implementation procedures for the EEO programs.

Associate Director of Research for Strategic Planning

The Office of Strategic Planning (Code 1003), formed in December 1987, is headed by the Associate Director of Research for Strategic Planning. He is a member of the NRL Research Advisory Committee (RAC). This office carries out the function of strategic planning for NRL, which involves extensive examinations of the internal resources at NRL and the environments external to NRL (with particular emphasis on requirements within DoD and opportunities within the R&D community). Information examined includes projections for R&D, system engineering, resource requirements, computer and information technology projections, and the integration of these projections within the framework of Navy requirements. The office has responsibility to handle NRL's technology transfer functions; address other issues related to NRL's long-term future; and integrate directorate and division technology needs into an overall laboratory plan by defining the areas to be addressed and the levels of investment that are required.



Dr. W.M. Tolles [REDACTED] He obtained his undergraduate degree in chemistry from the University of Connecticut in 1958, and his Ph.D. in chemistry from the University of California, Berkeley in 1962. Subsequently, he spent one year as a Postdoctoral Fellow at Rice University.

In 1962, he assumed an appointment as Assistant Professor of Chemistry at the Naval Postgraduate School. His research there included electron paramagnetic resonance of energetic materials and radiation-damaged species and quantum mechanical calculations of molecular properties.

He served as a consultant for the Naval Weapons Center, China Lake, between the years of 1965 and 1975, where he did considerable research involving the microwave properties of materials.

During a five-month period in 1975, he performed research at NRL involving the introduction of Coherent Antistokes Raman Spectroscopy (CARS), nonlinear optical spectroscopic methods (including variations on the Raman Induced Kerr Effect Spectroscopy (RIKES)), and related techniques.

In 1977, as a full professor, Dr. Tolles took the position of Dean of Research at the Naval Postgraduate School, and for four years, he also occupied the position of Dean of Science and Engineering.

He arrived at NRL in February 1984 as the Superintendent of the Chemistry Division. In 1987, he was appointed Associate Director of Research for Strategic Planning.

He is a member of the American Chemical Society, the American Physical Society, the American Optical Society, and Sigma Xi.

Office of Management and Administration

Code 1005



MRS. M.C. OLIVER

Basic Responsibilities

The Office of Management and Administration provides managerial, technical, and administrative support to the Director of Research in the planning and direction of research and development programs in a variety of scientific and engineering disciplines. Specific functions include: performing special studies involving major NRL programs and resource issues; providing administrative support in the areas of personnel, budget, facilities, equipment, and security; reviewing and managing the Director of Research's correspondence; providing management information and analyses for various aspects of the research program effort; coordinating VIP and foreign visits to NRL; managing NRL facilities; providing Laboratory-wide administrative services, including mail handling and messenger service; managing the NRL Directives System; coordinating unsolicited proposals, congressional correspondence, and other external inquiries; maintaining the NRL R&D achievements file; reviewing and interpreting external Navy and DoD directives addressed to NRL; coordinating the IR&D Program; developing guidance for and monitoring the 6.1 (basic research) Program and 6.2 (exploratory development) Program; providing central word processing services to the Directorate; coordinating the NRL-NRC and ONR Postdoctoral Resident Research Associateship Programs, NRL-U.S. Naval Academy Faculty Co-op Program, Navy ASEE Program, and other special Navy programs; interacting with ONR Headquarters and the R&D Centers; and assisting in the development of NRL's five-year Plan.

Personnel: 60 full-time civilian

Key Personnel

Name	Title	Code
Mrs. M.C. Oliver	Head	1005
Mrs. L.S. Herrin	Deputy Head	1005.1
Ms. B.J. McDonald	Administrative Officer	1005.2
Mr. E. Rank	NRL Facilities Manager	1005.4
Mr. R.C. Spragg	Head, Management Information Staff	1005.5
Ms. M.E. Barton	Head, Directives Staff	1005.6
Ms. J. Hileman	Head, GLSIP Program	1005.7
Ms. L.T. Warder	Head, Administrative Services Staff	1005.8

Point of contact: Ms. B.J. McDonald, Code 1005.2 (202) 767-3634

Command Support Division

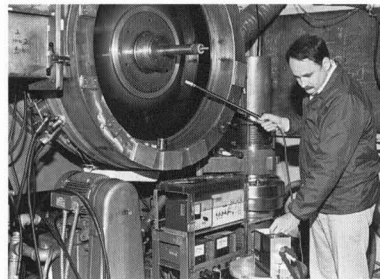
Code 1200 Staff Activity Areas

- Military Operations
- Flight Detachment
- Personnel and Physical Security
- Safety
- Public Affairs
- Communications
- Special Security

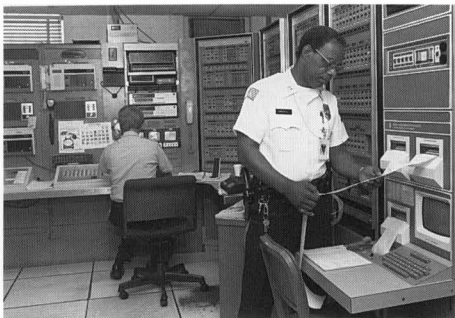
Public affairs



P-3 airborne research facility



Safety evaluation



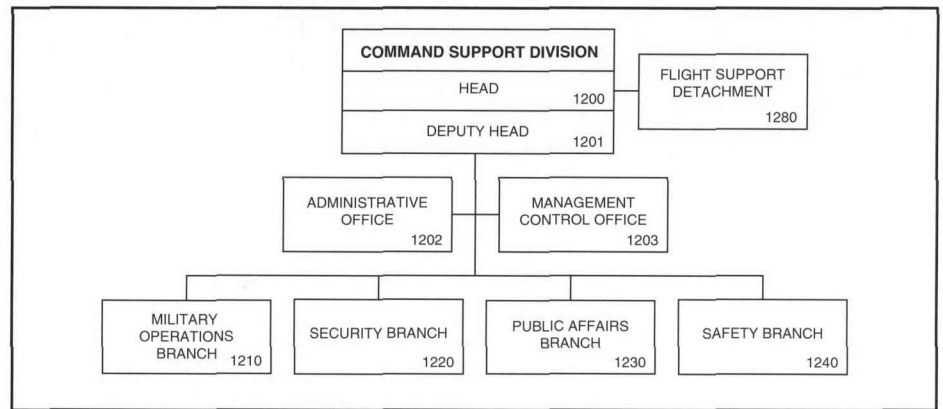
Security monitoring



Incoming visitor's reception area



CAPT J.R. LOVE, USN



Basic Responsibilities

The Command Support Division, under the direction of the Chief Staff Officer, provides military and civilian staff to the Commanding Officer and to the Director of Research for direct research support and assistance in the military aspects of the management of the Laboratory.

The military staff is the liaison with DoD, Navy commands and activities, and the operating forces of the Navy and arranges for air, surface, and subsurface services as required by research and development operations. Coordination of support to the research divisions through the Naval Reserve Units in the Technology Mobilization Program is also coordinated through Code 1200. In addition, direct research support is provided by the Flight Support Detachment, located at NAS Patuxent River, Maryland, which operates and maintains four specially configured P-3 Orion aircraft.

The Division is also responsible for the Laboratory's physical, personnel, information, industrial and ADP security programs, and its communications service, as well as fire protection, occupational health and industrial hygiene, and the public affairs program. It provides intelligence support and support for international cooperative agreements in technology. The Division also coordinates the Laboratory's Management Control Program and provides liaison and coordination for all audit and inspection teams.

Personnel: 144 full-time civilian
149 military

Key Personnel

Name	Title	Code
CAPT J.R. Love, USN	Head	1200
Mr. J.C. Payne	Deputy Head	1201
Mr. C. Drew*	Administrative Officer	1202
Ms. M.S. Rathbun	Management Control Officer	1203
CDR R.V. Young, USN	Military Operations Officer	1210
LCDR V.J. Smith, USN	Military Administration and Personnel	1213
Mr. J.R. Gallagher	Communications/Message Center	1215
Mr. J.C. Payne	Head, Security Branch	1220
Ms. S.A. Cornwell	Deputy Head, Security Branch	1220.1
Mr. C. Rogers	Head, Classification Management and Control Section	1221
Dr. J. Miller	Head, Special Security Office and NRL Scientific and Technical Intelligence Liaison Office	1225
Ms. S.A. Cornwell	Head, Personnel and Physical Security Section	1226
Mr. J.W. Gately	Head, Public Affairs Branch	1230
Mr. K.J. King	Head, Safety Branch	1240
CDR S.S. Smith, USN	Officer in Charge, Flight Support Detachment	1280

Point of contact: Mr. C. Drew, Code 1202 (202) 767-3204

*Acting

Human Resources Office

Code 1800 Staff Activity Areas

- Personnel Operations
- Employee Development
- Employee Relations
- Equal Employment Opportunity
- ONR Satellite HRO
- NRL-SSC Satellite HRO
- Management and Systems Technology



Compensation Section



Employee Relations Branch



Staffing Section



Classification Section



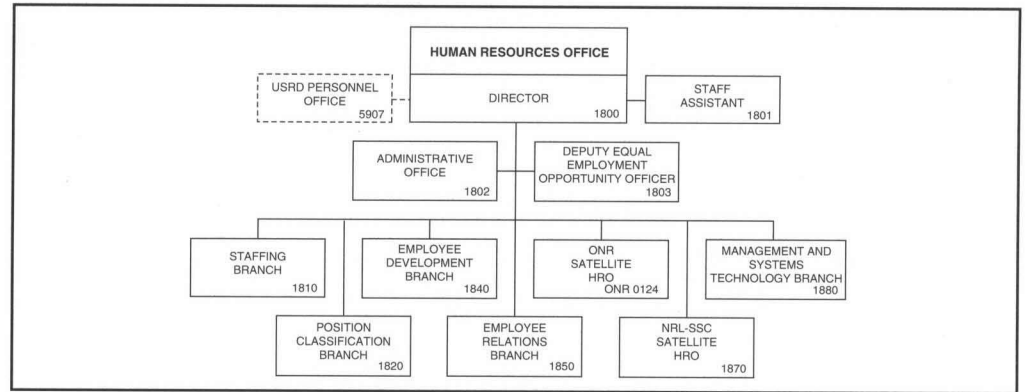
Human Resources reception area



Training Branch



Mrs. B.A. DUFFIELD



Basic Responsibilities

The Human Resources Office (HRO) provides civilian personnel and Equal Employment Opportunity (EEO) services to the Office of Naval Research (ONR), the Commander, Naval Oceanography Command (CNO), the Naval Oceanographic Office (NAVOCEANO), and the Naval Research Laboratory (NRL). The Human Resources Program includes the full range of operating civilian personnel management in the staffing and placement, position classification, employee relations, labor relations, employee development, and EEO functional areas. At NRL, the Manpower Management and Morale, Welfare, and Recreation Programs are also included.

Personnel services are furnished for a civilian complement of approximately 5,600 employees. The Hub Office at NRL-Main Site in Washington, D.C., services approximately 3,400 employees as well as provides a centralized capability to perform various managerial, service, and advisory functions in support of satellite office operations and serviced organizations' needs. These include such items as issuance of policy and procedural directives; development, design, and maintenance of automated systems; and monitoring and evaluating product effectiveness to develop and maintain efficient, cost-effective, service-oriented methods.

The Satellite HRO at Stennis Space Center (SSC), Bay St. Louis, Mississippi, services about 1,000 employees of CNO and NAVOCEANO and approximately 500 NRL-SSC/Monterey (California) employees. The Satellite HRO at Arlington, Virginia, services about 500 employees of the ONR. Approximately 30 percent of the employees serviced are professional scientists and engineers at senior grade levels up to and including Scientific Technical and Senior Executive Service (SES).

Personnel: 93 work years

Key Personnel

Name	Title	Code
Mrs. B.A. Duffield	Director	1800
Mr. Darryl Schenk	Deputy Director	1801
Mrs. P.L. Hetzler	Administrative Officer	1802
Ms. D.E. Erwin	Deputy Equal Employment Opportunity Officer	1803
Mrs. C. Downing	Head, Staffing Branch	1810
Ms. C. Grinage	Head, Position Classification Branch	1820
Mr. F.W. Robbins	Head, Employee Development Branch	1840
Mrs. J.L. Walker	Head, Employee Relations Branch	1850
Ms. C. Sherman	Site Manager, NRL-SSC Human Resources Satellite Office	1870
Mr. D.L. Schenk*	Head, Management and Systems Technology Branch	1880
Ms. M. Aylor	Site Manager, ONR Human Resources Satellite Office	ONR 01HR

Point of contact: Mrs. P.L. Hetzler, Code 1802 (202) 767-3421

*Acting

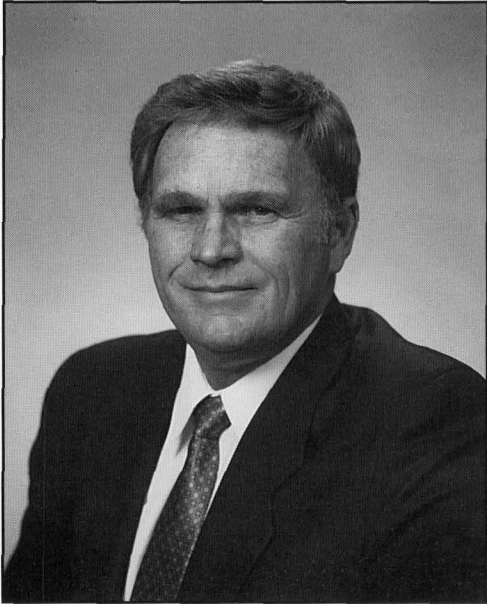
		Business Operations Directorate		

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 legal counsel, manpower management, financial management, supply management, contracting, public works, and management information support.

Associate Director of Research for Business Operations



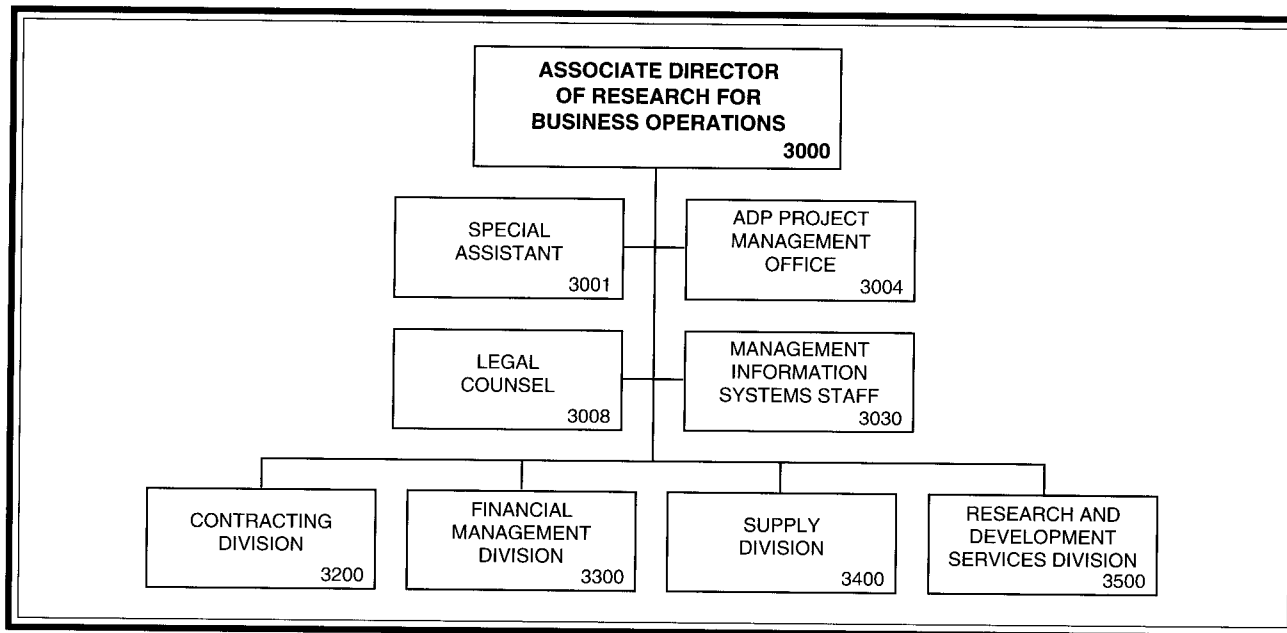
Mr. R.E. Doak v [REDACTED] He graduated from Benjamin Franklin University with a bachelor's degree in accounting in 1964 and a master's degree in business administration in 1966. Mr. Doak is a Certified Public Accountant licensed by the State of Maryland.

Mr. Doak has twenty-four years of diversified experience with the Federal Government performing in various line management positions. He has extensive experience in program management, financial management, contract policy and administration; personnel policy and administration; ADP systems development and operations; and the full spectrum of

management disciplines associated with the development, production, and operational support of major weapon systems.

From 1967 to 1980, Mr. Doak served in several positions with the Navy's Strategic Systems Projects Office. In these positions, he was responsible for the business management operations for the Navy's Fleet Ballistic Missile programs. In 1980, he entered the Senior Executive Service and served as Director of Financial Management with the Bureau of Indian Affairs. From 1981 to 1985, he served as Deputy Director, Plans and Programs, with the Strategic Systems Programs Office. From 1985 to 1989, he served as Deputy Commander with the Space and Naval Warfare Systems Command. In March 1989, Mr. Doak was appointed Associate Director of Research for Business Operations at the Naval Research Laboratory.

Mr. Doak has a consistent record of outstanding performance since entering the Senior Executive Service in 1980. In 1984, he was awarded the Navy Superior Service Award. In 1985 and 1988, he received Navy Rank Awards. In 1986, Mr. Doak received the Presidential Meritorious Executive Rank Award, and in 1988, he received the Presidential Distinguished Executive Rank Award.



Key Personnel

Name	Title	Code
Mr. R.E. Doak	Associate Director of Research for Business Operations	3000
Ms. G.L. Spisak	Special Assistant	3001
Ms. B.L. Hildreth	ADP Project Management Officer	3004
Ms. H.J. Halper	Legal Counsel	3008
Mr. R.L. Guest	Head, Management Information Systems Staff	3030
Mr. J. Ely	Head, Contracting Division	3200
Mr. D.T. Green	Comptroller	3300
Mr. W.E. Ralls, Jr.	Supply Officer, Supply Division	3400
Mr. D.K. Woodington	Director, Research and Development Services Division	3500

Point of contact: Ms. G.L. Spisak, Code 3001 (202) 404-7462

Legal Counsel

Code 3008



Ms. H.J. HALPER

Basic Responsibilities

The Office of Counsel is primarily responsible for providing legal services to NRL's management in all areas of general and administrative law, as well as intellectual property 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 personnel law, fiscal law, and environmental law.

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

Personnel: 25 full-time civilian

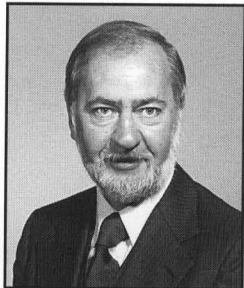
Key Personnel

Name	Title	Code
Ms. H. Halper	NRL Counsel	3008
Ms. M. Bell	Associate Counsel/General	3008.1
Mr. T. McDonnell	Associate Counsel/Patents	3008.2
Mr. A. Beede	Associate Counsel/SSC	3008.3

Point of contact: Ms. P. Schuler, Code 3008 (202) 767-2244

Management Information Systems Staff

Code 3030



MR. R.L. GUEST

Basic Responsibilities

The Management Information Systems Staff has dual responsibilities: conducting administrative data processing for the Laboratory, and designing, implementing, and controlling the Laboratory Management Information System (MIS) and its databases. The Staff Head participates directly with the Commanding Officer, the Director of Research, and the Associate Director for Business Operations in all policy matters pertaining to MIS and business data processing.

Personnel: 21 full-time civilian

Key Personnel

Name	Title	Code
Mr. R.L. Guest	Head	3030
Ms. P. Lowery	Head, Systems Development Section	3035
Mr. W.L. Gollaher	Head, Applications Systems Support	3036
Mrs. D. Martin	Head, Operations Section	3037

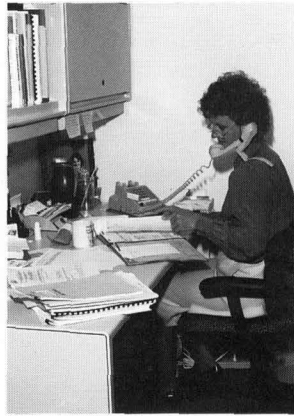
Point of contact: Ms. P. Thompson, Code 3030 (202) 767-2030

Contracting Division

Code 3200

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

Contract specialist negotiates contract award in support of the Space Program



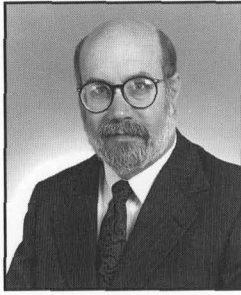
Branch Head and Deputy discuss procurement planning information



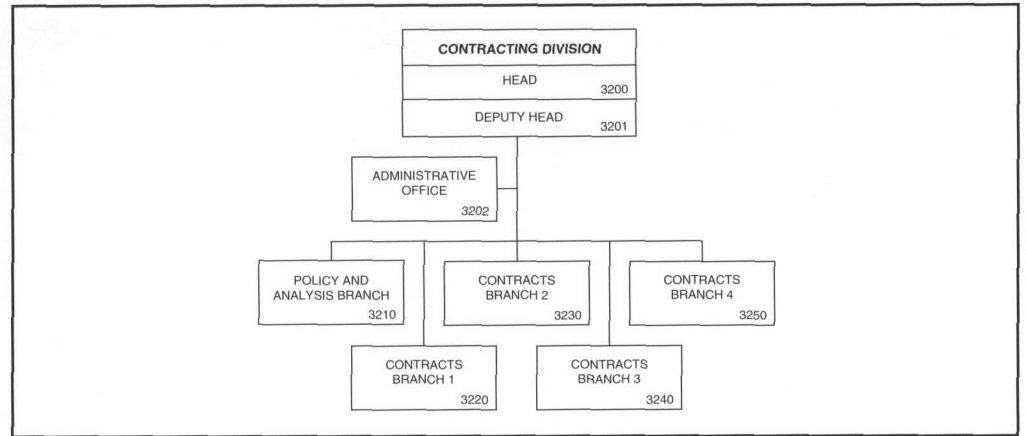
Deputy Division Head holds regular branch head meetings to discuss changing DoD regulations



Policy staff works on the local area network for production of contract awards



MR. J. ELY



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 \$25,000. 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.

Personnel: 73 full-time civilian

Key Personnel

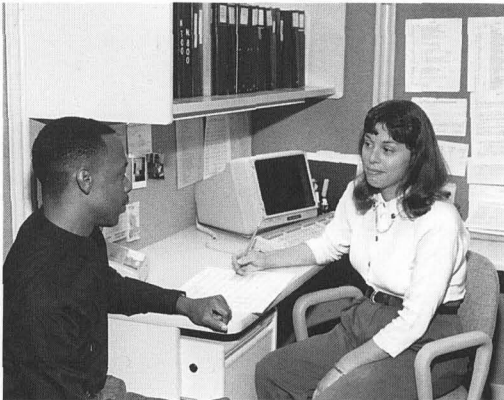
Name	Title	Code
Mr. J. Ely	Head	3200
Ms. M. Carpenter	Deputy Head	3201
Mrs. J. Price	Administrative Officer	3202
Ms. P. Schaefer	Deputy for Small Business	3204
Mr. J. Waldenfels	Policy and Analysis Branch	3210
Ms. W. Conaway	Contracts Branch 1	3220
Mr. E. Tunney	Contracts Branch 2	3230
Ms. M. Carpenter	Contracts Branch 3	3240
Mr. J. Adams	Contracts Branch 4	3250

Point of contact: Mrs. J. Price, Code 3202 (202) 767-3749

Financial Management Division

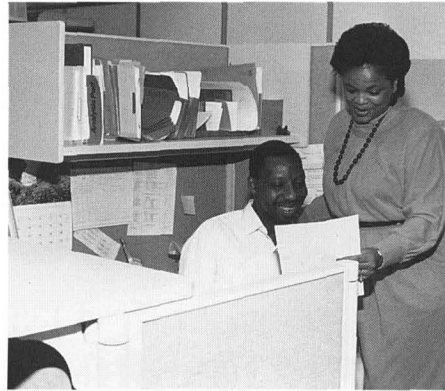
Code 3300

- Travel Administration
- Budget
- Reports and Statistics
- Accounting

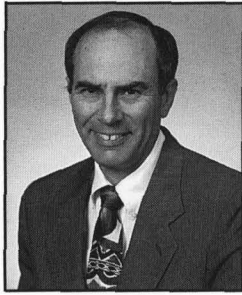


The Budget Branch provides guidance and instructions for budget preparation and funds administration. This branch also develops guidelines and criteria for statistical data at NRL and prepares progress reports and special statistical data as required.

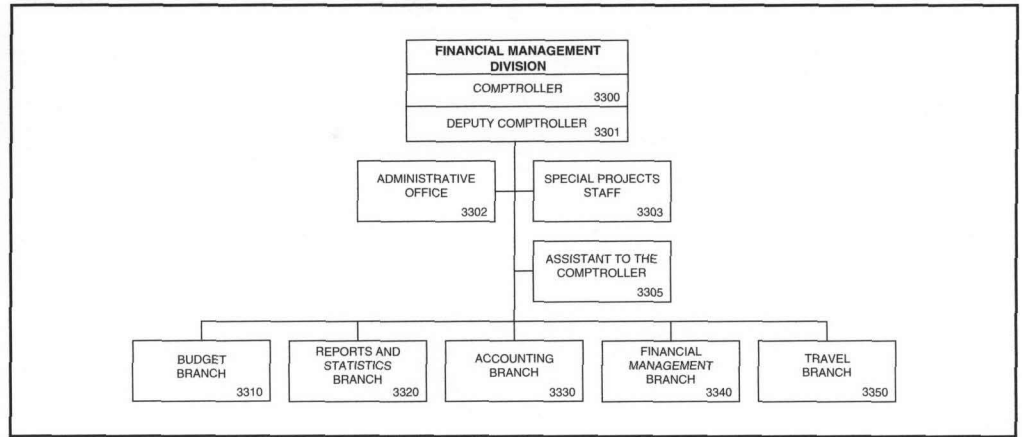
The Accounting Branch is divided into several sections that perform services essential to the Laboratory including vendor payments, cost accounting, and ledger accounting



The Travel Administration Branch role in the Laboratory's operation includes processing travel orders and examining travel claims for payment



Mr. D.T. GREEN



Basic Responsibilities

The Comptroller is the financial adviser to the Commanding Officer, the Director of Research, and other officials of the Laboratory, and he administers the financial program of the Laboratory.

The Financial Management Division provides services to the Laboratory in budget formulation, funds administration, program and budget analysis, cost accounting, travel administration and reporting. In addition, the division provides essential information and guidance concerning equipment management.

Personnel: 95 full-time civilian

Key Personnel

Name	Title	Code
Mr. D.T. Green	Comptroller	3300
Ms. D. Rippey	Deputy Comptroller	3301
Ms. A.J. Downs	Administrative Officer	3302
Mr. W.J. Rock	Special Projects Staff	3303
Vacant	Assistant to the Comptroller	3305
Ms. D. Rippey	Head, Budget Branch	3310
Mr. M. Mills	Head, Reports and Statistics Branch	3320
Mr. J. Thomas	Head, Accounting Branch	3330
Mr. D. Smith	Head, Financial Management Branch	3340
Mrs. D. Bruce	Head, Travel Branch	3350

Point of contact: Ms. A.J. Downs, Code 3302 (202) 767-2950

Supply Division

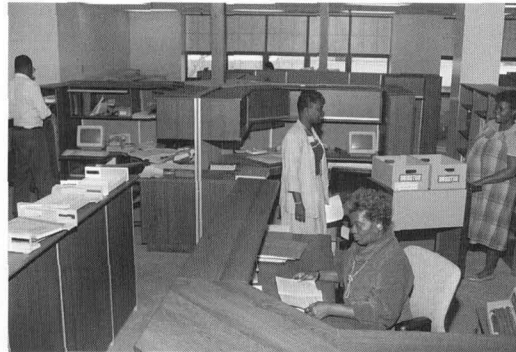
Code 3400

- Administrative Services
- Customer Liaison
- Automated Inventory Management System
- Purchasing
- Receipt Control
- Material
- Technical

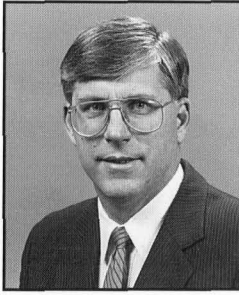


Interior of Supply store, Building A-52, featuring glass display cases and modern storage systems

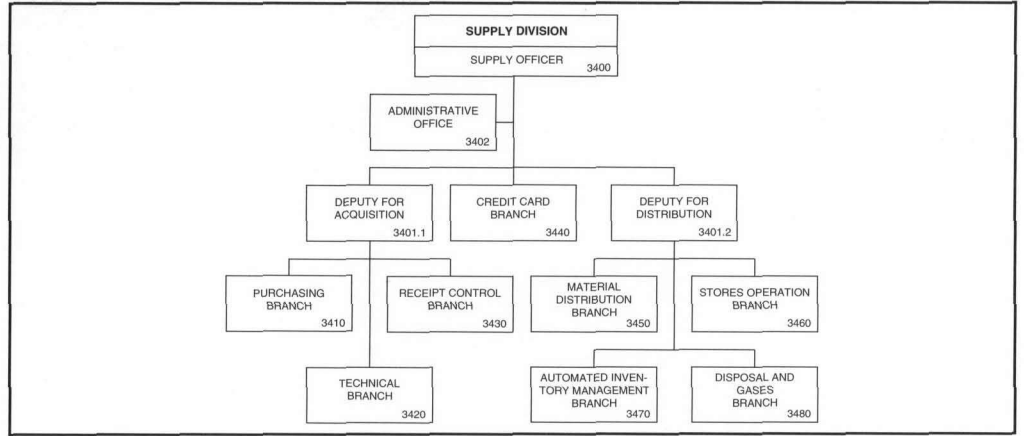
Supply technicians and inventory management specialists are gathering information for customers



An inspector verifies the contents of a package



Mr. W.E. Ralls, Jr.



Basic Responsibilities

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

Personnel: 133 full-time civilian

Key Personnel

Name	Title	Code
Mr. W.E. Ralls, Jr.	Supply Officer	3400
Ms. C. Hartman	Deputy for Acquisition	3401.1
Mr. S. Kinney	Deputy for Distribution	3401.2
Ms. P. Carter	Administrative Officer	3402
Ms. M. Smith	Head, Purchasing Branch	3410
Mr. G. Smith	Head, Technical Branch	3420
Ms. M. Mohammed	Head, Receipt Control Branch	3430
Ms. K. Hunter	Head, Credit Card Branch	3440
Mr. T. Major*	Head, Material Distribution Branch	3450
Mrs. E.I. Woodland	Head, Stores Operation Branch	3460
Mr. T. Major	Head, Disposal and Gases Branch	3480

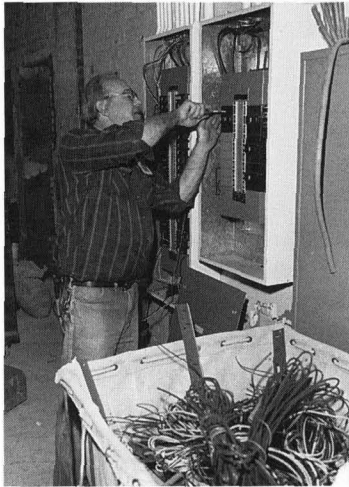
Point of contact: Ms. P. Carter, Code 3402 (202) 767-3478

*Acting

Research and Development Services Division

Code 3500

- Contracts
- Environmental
- Project Management
- Operations
- Administration
- Engineering
- Chesapeake Bay Detachment

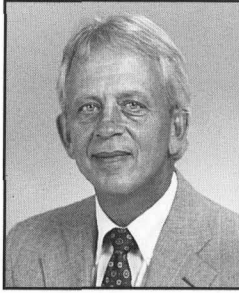


Electronics laboratory under construction

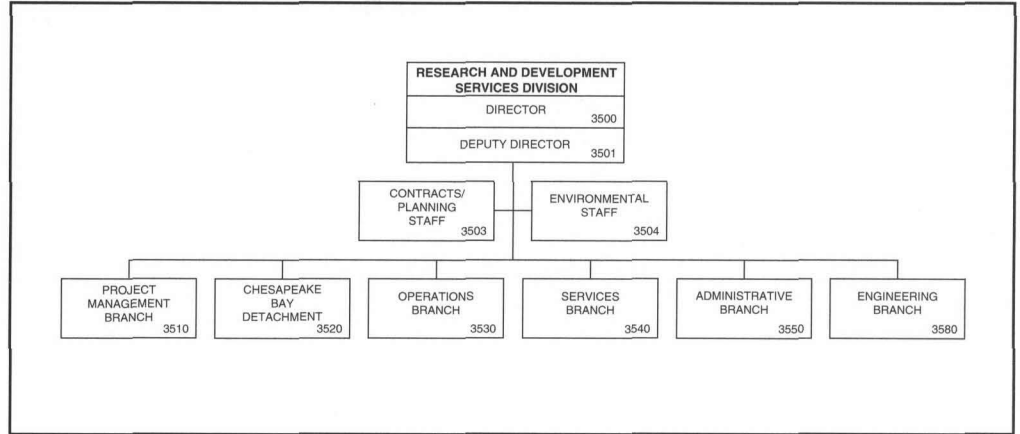
Computer room installation



Electronics laboratory under construction



MR. D.K. WOODINGTON



Basic Responsibilities

The Research and Development Services Division is responsible for the physical plant of NRL and subordinate field sites. This includes: military construction, engineering, construction, facility support services, planning, environmental, maintenance/repair/operation of all infrastructure systems, transportation, and vertical transport equipment.

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

The Division is responsible for compliance with all environmental regulations and approval authorities required by the command. The Division also supports the Office of Naval Research for all facilities operations and acquisition.

Personnel: 186 full-time civilian
2 military

Key Personnel

Name	Title	Code
Mr. D.K. Woodington	Director	3500
Mr. S. Harrison	Deputy Director	3501
LT C. Clarke	Contracts/Planning Staff	3503
Mr. E. McDaniel	Environmental Staff	3504
Mr. C. Kane	Project Management Branch	3510
LCDR B. Jones	Chesapeake Bay Detachment	3520
Mr. F. Regalia	Operations Branch	3530
Mr. J. Headley	Services Branch	3540
Ms. A. Coats	Administrative Branch	3550
Mr. B. Sweeney	Engineering Branch	3580

Point of contact: Ms. A. Coats, Code 3550 (202) 767-2168



General Science
and Technology
Directorate

GENERAL SCIENCE AND TECHNOLOGY DIRECTORATE

Code 4000

The General Science and Technology Directorate coordinates and/or manages specific NRL programs that may be multi-disciplinary in nature, may span both divisions and directorates, and may also require special security procedures. It is the Laboratory's focal point within the Navy and DoD for Low Observables Materials and Structures programs. The Directorate conducts or coordinates studies, reviews, and technical assessments in various topical areas. Areas of strong emphasis currently include all aspects of signature control and counter-signature technology, strategic and tactical missile defense, synoptic structure, and quality assurance for both corporate exploratory development programs and joint Space System Technology Programs. The NRL Signature Technology Office and the Critical Technology Assessment Office are contained within the Directorate. Program management activities related to the Navy 6.2 (exploratory development) effort and studies and analyses relating to the Strategic Defense Initiative (SDI) and other programs are carried out within the Directorate.

Associate Director of Research for General Science and Technology



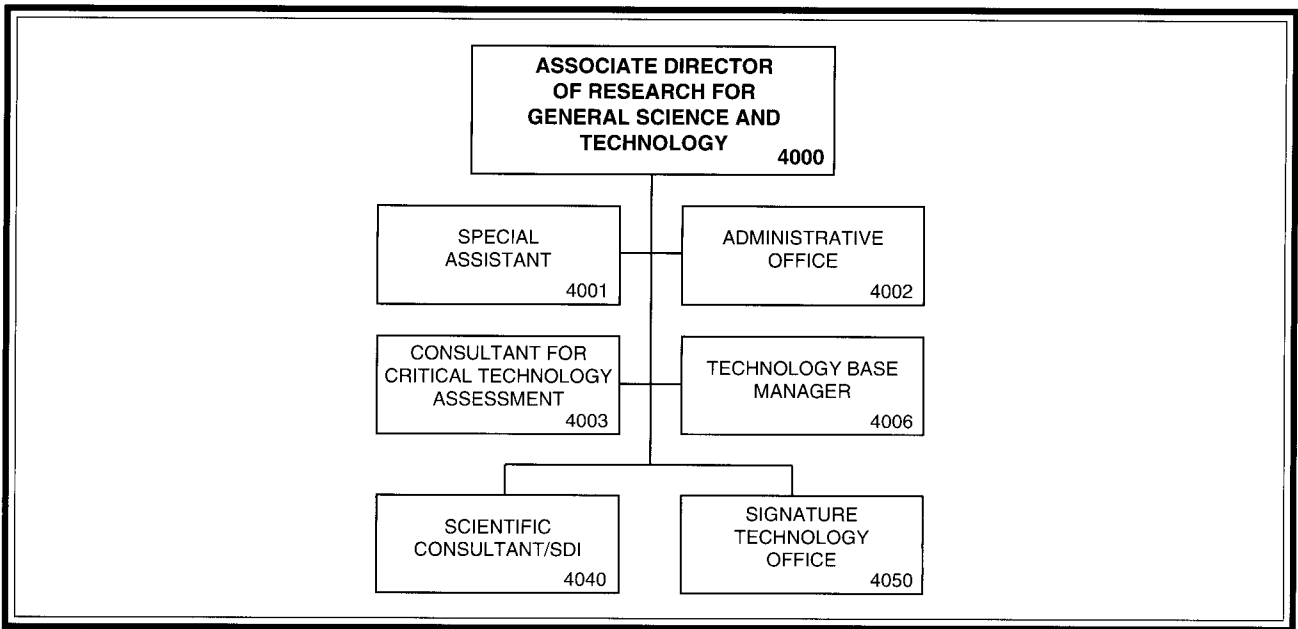
Dr. R. LeFande [REDACTED] He attended the Brooklyn Technical High School and obtained his undergraduate degree in physics from the University of Rhode Island in 1962. After a brief tour as a telephone equipment engineer with Western Electric Company in New York City, he returned to academic pursuits, earning a Master's degree in physics from the Rutgers University in 1965.

In July of 1965, Dr. LeFande joined the Naval Research Laboratory as a research physicist in the Satellite Communications Branch. He worked on a variety of projects related to the design of waveforms for Naval applications, calibration of antennas and path losses by methods borrowed from radio astronomy, and on the design and acquisition of satellite communication terminals for shipboard and submarine use. By drawing on this work for a thesis topic, he obtained his Ph.D. from the University of Maryland in 1973 in the areas of astronomy and astrophysics.

In 1976, Dr. LeFande became Head of the Special Communications Branch where he nurtured and encouraged an NRL team of scientists and engineers in the development of satellite communications terminals that are now being deployed in the Fleet, and in establishing the scientific understanding and practical design principles that contributed to the selection of waveforms for MILSTAR and other systems.

From 1979 to 1981, Dr. LeFande was Technical Director and System Engineer of the Special Communication Project of the Naval Electronic Systems Command. He oversaw several research and acquisition programs related to submarine communications, which covered the spectrum from extremely low frequencies through optics and included the maintenance and operation of a world-wide network of radio transmitter facilities. After termination of the project and a brief tour as Deputy Director, Research and Technology Group, Dr. LeFande returned to NRL as Superintendent of the Aerospace Systems Division. Here he guided a diverse program of basic applied research in Wide Area Surveillance Systems, Space Warfare, and in related areas of physical science, materials, and device technology. From 1983 to 1990, Dr. LeFande served as Associate Deputy Assistant Secretary of the Navy (C³I and Space), providing technical and philosophical advice to eight assistant and deputy assistant secretaries. In this capacity, he took a keen interest in the issues of acquisition management reform and of the appropriate roles and missions of the Laboratory and the other centers in the acquisition process. During this tour, Dr. LeFande was selected as a Legis Fellow and served on the staff of Representative Byron for six months in 1989, working on a variety of issues and legislation related to Armed Services, Science and Technology, Foreign Affairs, and other matters.

Dr. LeFande returned to the Laboratory in October 1990 where he served on the staff of the Director of Research. He was designated Acting Associate Director of Research in February 1991, Associate Director of Research in February 1992, and assigned to additional duty as Deputy for Space Systems (Code 1010) in September 1992.



Key Personnel

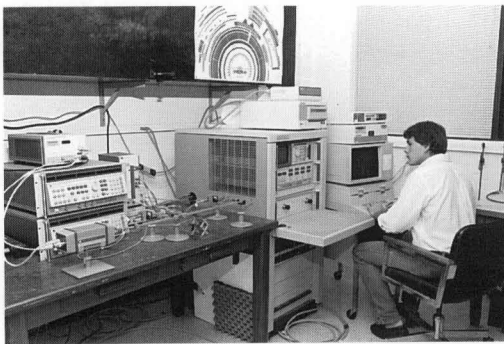
Name	Title	Code
Dr. R. LeFande	Associate Director of Research for General Science and Technology	4000
Ms. B.J. Turner	Special Assistant	4001
Ms. D. Ernst	Administrative Officer	4002
Mr. L.M. Winslow	Consultant for Critical Technology Assessment	4003
Dr. S. Sacks	Technology Base Manager	4006
Dr. P.W. Mange	Scientific Consultant/SDI	4040
Dr. D.W. Forester	Signature Technology Office	4050

Point of contact: Ms. N.H. Sell, Code 4000A (202) 767-3324

General Science and Technology Directorate

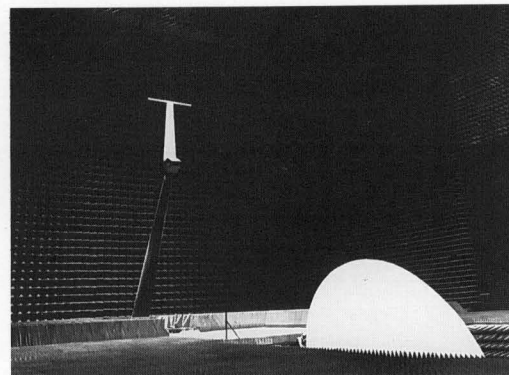
Code 4000

- Technology Assessment
- Technical Program Management
- Low Observables Programs
- Counter Low Observables
- Multidisciplinary Programs
- Modeling of Signatures
- Field Signature Trials
- Low Observables Materials



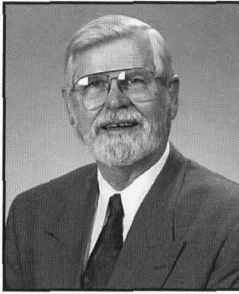
Vector network analysis of new low observables materials

Field signature trials



Infrared signatures

Consultant for Critical Technology Assessment Office Code 4003



MR. L.M. WINSLOW

The Critical Technology Assessment Office is tasked by the Assistant Secretary of the Navy (RE&S) via the Navy International Program Office to perform a broad spectrum of interrelated Navy mission-oriented efforts pertaining to international militarily critical technology transfer policy and intelligence assessment issues, involving both control and acquisition aspects. These tasks require the identification and participation of highly qualified individuals throughout the Navy scientific and technical community.

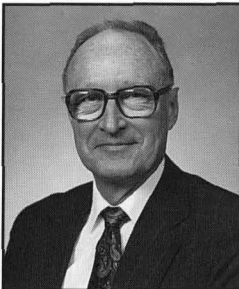
Technology Base Manager Code 4006



DR. S. SACKS

The Technology Base Manager carries out program management activities pertaining to the Navy 6.2 (exploratory development) and related efforts. Mission activities include assurance of technical quality and program relevance, orientation of the program to priority needs and transition opportunities, and overall coordination of NRL 6.2 efforts. The Technology Base Manager is the Laboratory point of contact with the Office of Naval Research for this work.

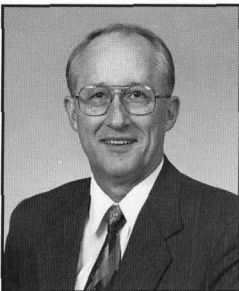
Scientific Consultant to the Associate Director of Research Code 4040



DR. P. MANGE

The Scientific Consultant conducts studies and analyses relating to the technical programs being carried out at the Laboratory on behalf of the Associate Director of Research. He represents the Laboratory on external technical boards, advisory panels, or working groups as requested by the Associate Director of Research and is the Laboratory point of contact with the Strategic Defense Initiative Organization.

Signature Technology Office Code 4050



DR. D.W. FORESTER

The NRL Signature Technology Office (STO) manages/coordinates an integrated, comprehensive research and development program at NRL addressing all aspects of signature control and countersignature control as they apply to Navy weapons systems. The STO monitors and evaluates signature control technology development efforts within government and industry and facilitates the incorporation of advanced signature control technologies into present and future Navy systems. It provides a central point of contact for outside agencies on matters concerning the STO program.



**Warfare Systems
and Sensors Research
Directorate**

WARFARE SYSTEMS AND SENSORS RESEARCH DIRECTORATE

Code 5000

The Warfare Systems and Sensors Research Directorate performs basic research and development for major generic Navy systems. The emphasis is on radar, electronic warfare, optical sensors and materials, and the integration of these primary sensors by communications and battle management systems. The Directorate conducts an extensive experimental program in the field to support the above activities. Programs in systems simulation, Human Computer Interfaces, artificial intelligence, acoustic transducers, and calibration and standards for underwater acoustic devices are pursued in support of research and development for Navy systems. In addition, the Directorate has responsibility for providing specialized computing and computer networking on a Laboratory-wide basis, and the provision of administrative and technical services to support the Laboratory's mission through the operation of the Technical Information Division.

Associate Director of Research for Warfare Systems and Sensors Research



Mr. R.R. Rojas [REDACTED] He attended City College of New York, where in 1952 he received a B.E.E. degree. In 1961, he received an M.E.E. degree from Drexel Institute of Technology, Philadelphia. Further graduate studies in mathematics and engineering were pursued at the University of Pennsylvania, Philadelphia.

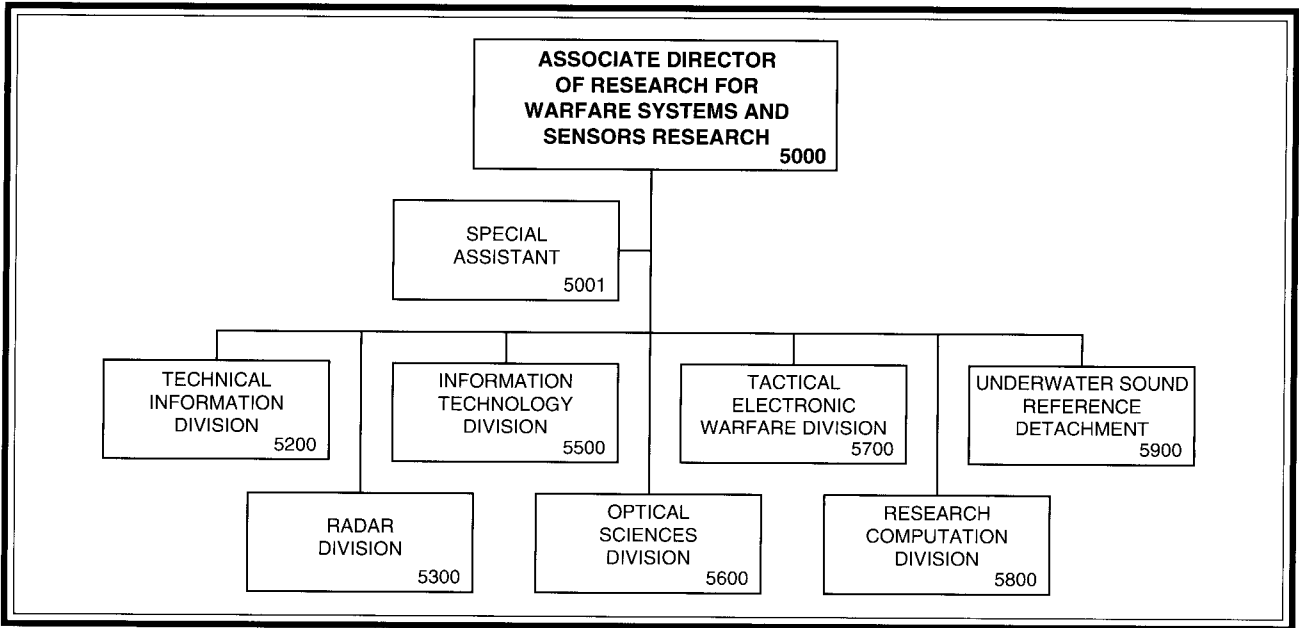
From 1952 to 1960, Mr. Rojas was a project engineer in the Missile Department at Philco Corporation where he participated in the Talos, Terrier, and Tartar missile fuze programs and the Terrier missile guidance project. While at Philco, he received a company achievement award for his work on the design of specialized missile test equipment. From 1960 to 1969, he was

manager of the Hydroacoustics Department at the Magnavox General Atronics Corporation. At General Atronics, he was active in the area of signal processing techniques as applied to sonar, communication systems, and seismic detection systems.

In 1969, he joined the Naval Research Laboratory as Head of the Advanced Undersea Surveillance Program. In this capacity, he was responsible for directing an experimental and theoretical program whose purpose was to evaluate and develop advanced surveillance systems for the Navy. Mr. Rojas served as Associate Director of Research and Director of Oceanology from 1977 until 1980, Associate Director of Systems Research and Technology Directorate from 1980 to 1986, and is currently Associate Director of the Warfare Systems and Sensors Research Directorate. Mr. Rojas also was on the graduate teaching staff at the Pennsylvania State University.

Mr. Rojas' research interests are centered on signal processing and the physics of underwater acoustic propagation, ambient noise, and reverberation.

Mr. Rojas is a member and Fellow of the Acoustical Society of America, Sigma Xi, the Institute of Electrical and Electronics Engineers, and the Association of Old Crows; he is also a charter member of the Marine Technology Society.



Key Personnel

Name	Title	Code
Mr. R.R. Rojas	Associate Director of Research for Warfare Systems and Sensors Research	5000
Mrs. B.L. Fleming	Special Assistant	5001
Mr. P. Imhof	Head, Technical Information Division	5200
Dr. M.I. Skolnik	Superintendent, Radar Division	5300
Dr. R.P. Shumaker	Superintendent, Information Technology Division	5500
Dr. T.G. Giallorenzi	Superintendent, Optical Sciences Division	5600
Dr. J.A. Montgomery	Superintendent, Tactical Electronic Warfare Division	5700
Mr. R.F. Saenger	Head, Research Computation Division	5800
Dr. J.E. Blue	Superintendent, Underwater Sound Reference Detachment	5900

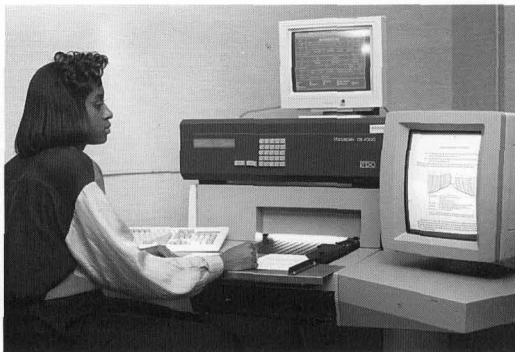
Point of contact: Mr. R.R. Rojas, Code 5000 (202) 767-3294

Technical Information Division

Code 5200

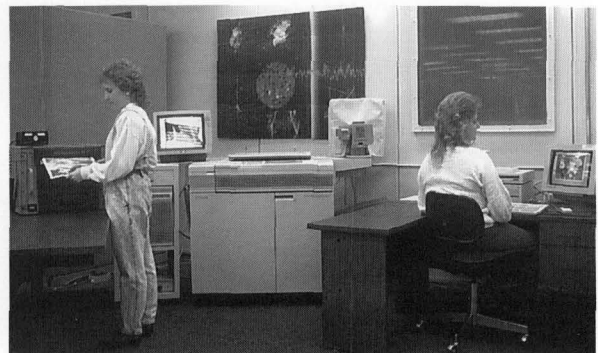
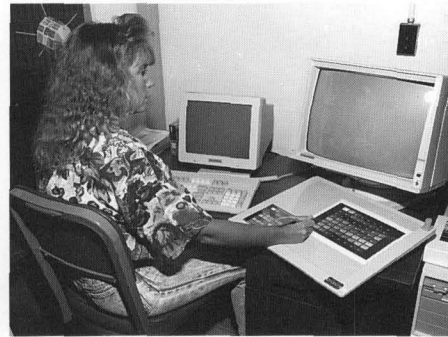
- Research Library and Technical Information Center
- Microcomputer Software Support Center
- Publications
- Photographic Services
- Graphics Design Services

Editors work directly with authors to provide clear, readable documentation

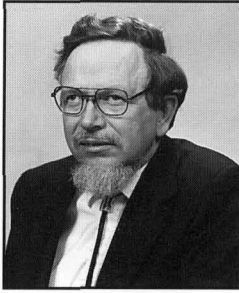


A computer technician scans reports into the Library's Optical Disk System

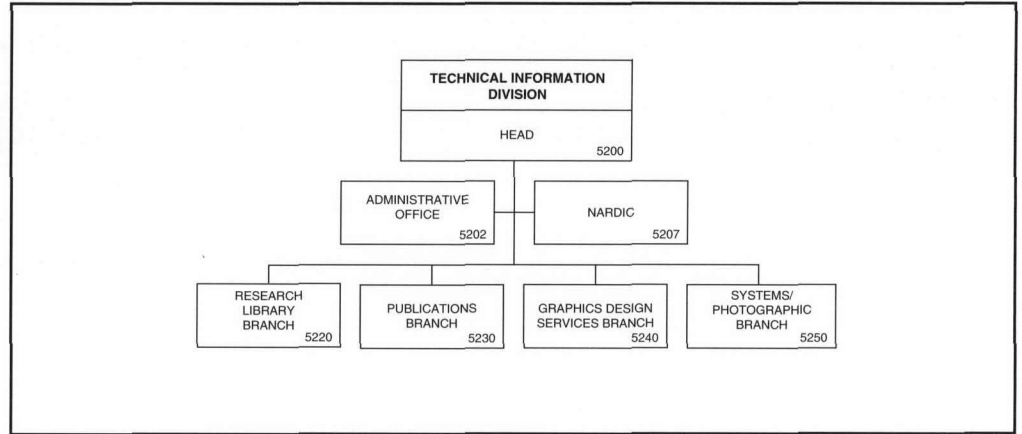
The Imaginator SI workstation provides a high front-end facility for scanning in and manipulating color photographs for conversion to digital format



Operators in the Electronic Imaging Center print images from the computer network



MR. P. IMHOF



Basic Responsibilities

The Technical Information Division (TID) provides centralized support to the Laboratory, and sometimes the Office of Naval Research, by collecting, retaining, processing, publishing, presenting, and distributing information in various forms to many audiences.

The Technical Information Division supports the Laboratory by editing and publishing reports and publications; by providing a full range of Library services, including the Microcomputer Software Support Center; by performing specialized scientific and general photographic services, illustration and visual aid services, imaging support, scientific composition, special projects graphics and publishing; and by providing video data-gathering services.

Personnel: 75 full-time civilian

Key Personnel

Name	Title	Code
Mr. P. Imhof	Head	5200
Mrs. C. Uffelman	Administrative Officer	5202
Ms. L. Stackpole	Head, Research Library Branch	5220
Mr. T. Calderwood	Head, Publications Branch	5230
Ms. L. Jackson	Head, Graphics Design Services Branch	5240
Mr. J. Lucas	Head, Systems/Photographic Branch	5250

Point of contact: Mrs. C. Uffelman, Code 5202 (202) 767-3370

Radar Division

Code 5300

Staff Activity Areas

Systems research
Electromagnetic propagation
Electromechanical design

Research Activity Areas

Radar Analysis

Radar systems
Target signature prediction
Electromagnetics and antennas

Advanced Radar Systems

High-frequency over-the-horizon radar
Signal analysis
Signal processing and equipment

Search Radar

Shipboard surveillance radar
Precision tracking techniques
Air traffic control

Target Characteristics

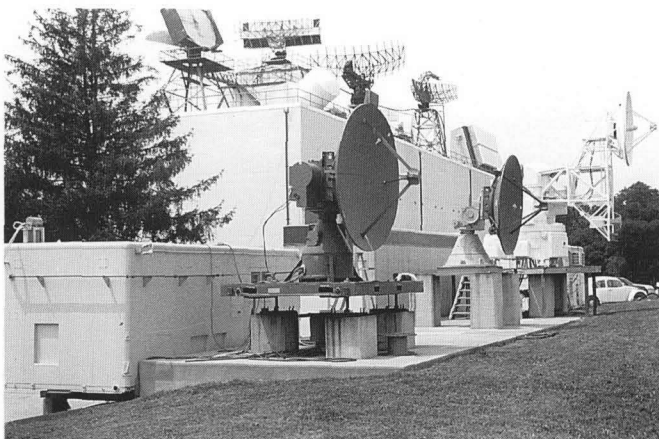
Electronic counter-countermeasures
New radar concepts
Target signature recognition

Identification Systems

Mark XII IFF improvements
NATO identification system
Future identification technology

Airborne Radar

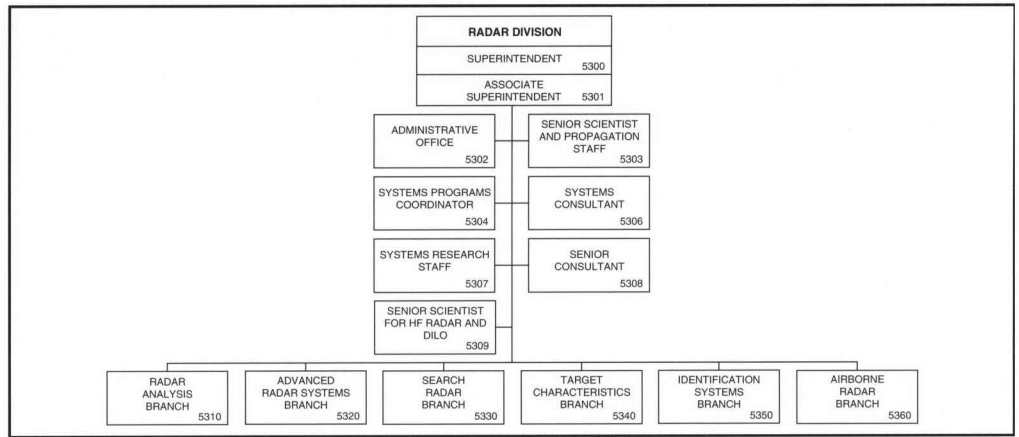
Airborne early-warning radar (AEW)
Inverse synthetic aperture radar (ISAR)
Space-time adaptivity



Radar test site at Building 75, Chesapeake Bay Detachment (Chesapeake Beach, MD) showing radar antennas used in experimental development by the Radar Division. On the roof, from left to right: experimental back-to-back 2D/3D air surveillance radar test bed antennas; a directed mirror antenna (DMAR), a dual-frequency mirror-scan antenna with mechanically agile beam steering; antenna for Senrad, an experimental L-band system; and antennas for the SPS-49, SPS-10, IFF, SPS-40 and the fixed array surveillance radar (FASR) phased array. In the foreground from left to right: a high-resolution X-band clutter radar (antenna and mount from the Marine Corps TPQ-27) with associated electronics van; the antenna and van for the Point Defense Demonstration Radar system; and the antenna for the high range resolution monopulse (HRRM) system.



DR. M.I. SKOLNIK



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.

Personnel: 150 full-time civilian

Key Personnel

Name	Title	Code
Dr. M.I. Skolnik	Superintendent	5300
Mr. I.D. Olin	Associate Superintendent	5301
Mrs. C. Hill	Administrative Officer	5302
Dr. L.B. Wetzel	Senior Scientist and Head, Propagation Staff	5303
Mr. D.F. Hemenway	Systems Programs Coordinator	5304
Mr. J. Pavco	Systems Consultant	5306
Mr. C.E. Jedrey	Head, Systems Research Staff	5307
Dr. G.A. Andrews	Senior Consultant	5308
Mr. J.M. Headrick	Senior Scientist for HF Radar and DILO	5309
Dr. G.V. Trunk	Head, Radar Analysis Branch	5310
Mr. J.P. Letellier	Head, Advanced Radar Systems Branch	5320
Dr. C.L. Temes	Head, Search Radar Branch	5330
Dr. B.H. Cantrell	Head, Target Characteristics Branch	5340
Mr. C.M. Veronda	Head, Identification Systems Branch	5350
Mr. T.L. apRhys	Head, Airborne Radar Branch	5360

Point of contact: Mr. I.D. Olin, Code 5301 (202) 767-2089

Information Technology Division

Code 5500 Research Activity Areas

Navy Center for Applied Research in Artificial Intelligence

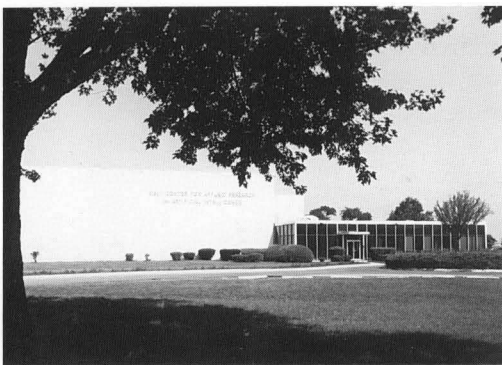
- Case-based reasoning
- Natural language interfaces
- Intelligent tutoring
- Machine learning
- Robotics software and computer vision
- Neural networks

Communication Systems

- Network design
- Secure communication systems
- Modulation, coding, and waveform design
- Satellite communication system technology
- Distributed simulation and prototyping

Human-Computer Interaction (HCI) Laboratory

- Novel interaction techniques
- Devices/techniques for HCI
- Voice processing (synthesis, recognition, transmission, etc.)
- Man-in-loop interface evaluation



The Navy Center for Applied Research in Artificial Intelligence is engaged in research and development designed to address the application of artificial intelligence technology and techniques to critical Navy and national problems

Center for High Assurance Computer Systems

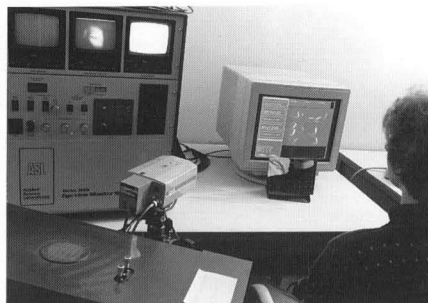
- Security architecture
- Formal specification/verification of system security
- COMSEC application technology
- Secure networks
- Secure databases
- Software engineering for secure systems
- Key management and distribution
- Certification and Infosec Engineering
- Formal methods for requirements specification and verification
- Tools for real-time software development

Transmission Technology

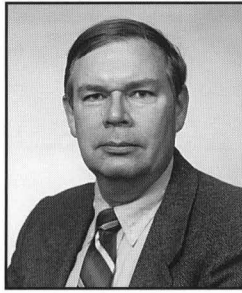
- Arctic communication
- Submarine communication technology
- Communication system architecture
- Communication antenna/propagation technology
- Signal processing for high-frequency intercept system

Advanced Information Technology

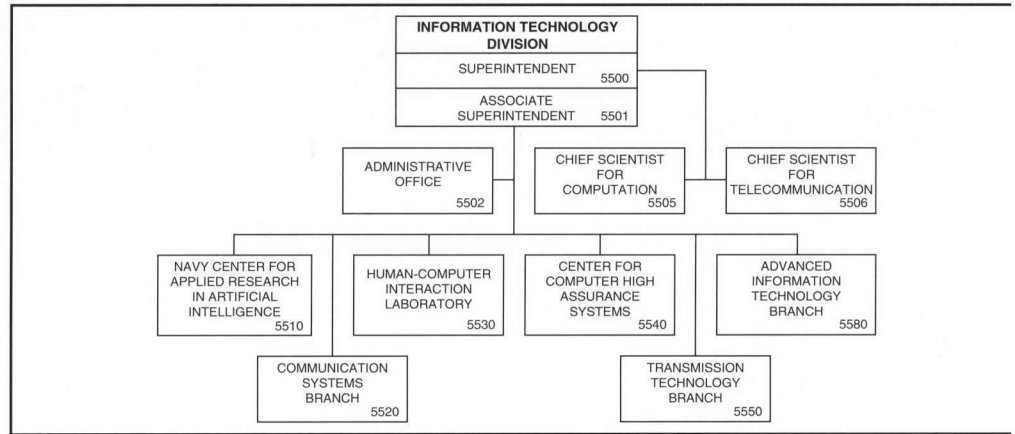
- Command decision support
- Parallel computing
- Battle management/C³
- Data fusion technology
- Database management technology
- Real-time parallel processing
- Distributed simulation
- Scalable high performance computing
- Processing graph method
- Signal processing applications
- Advanced ATM/SONET networking
- Image processing



NRL researchers have developed a prototype user-computer interface that responds to a user's eye gaze. In a crisis or other situation requiring rapid response, eye gaze has the potential to provide faster and more natural user-computer input.



Dr. R.P. SHUMAKER



Basic Responsibilities

The Information Technology Division conducts research and development programs in the collection, transmission, and processing of information to provide a basis for improving the conduct of military operations. The organization of the Division is directed toward addressing the technologies and subsystems necessary to develop architectures and system designs for the next-generation battleforce warfare systems.

Personnel: 195 full-time civilian

Key Personnel

Name	Title	Code
Dr. R.P. Shumaker	Superintendent	5500
Mr. W.D. Long	Associate Superintendent	5501
Ms. J. Saunders	Administrative Officer	5502
Vacant	Chief Scientist for Computation	5505
Vacant	Chief Scientist for Telecommunication	5506
Dr. A.L. Meyrowitz	Director, Navy Center for Applied Research in Artificial Intelligence	5510
Mr. E.L. Althouse	Head, Communication Systems Branch	5520
Dr. H.M. Gigley	Head, Human-Computer Interaction Laboratory	5530
Mr. H.O. Lubbes*	Director, Center for Computer High Assurance Systems	5540
Mr. E.J. Kennedy	Head, Transmission Technology Branch	5550
Dr. S.K. Numrich	Head, Advanced Information Technology Branch	5580

Point of contact: Mr. W.D. Long, Code 5501 (202) 767-2954

*Acting

Optical Sciences Division

Code 5600 Staff Activity Areas

Program analysis and development
Special systems analysis
Technical study groups

Technical contract monitoring
Theoretical studies

Research Activity Areas

Optical Materials

Advanced infrared glasses and fibers
Radiation effects
Fiber-optic materials and fabrication
Sensors for smart structures
Fiber lasers and amplifiers
Laser window materials

Advanced Concepts

IR low observables
IR space surveillance systems
EO/IR systems analysis
Airborne IR search and track technology
Atmospheric IR measurements
Ship IR signatures
High-speed optical networks

Applied Optics

Optical and IR countermeasures
Optical technology
Ultraviolet component development
and UV countermeasures
Atmospheric optics
Propagation studies
Laser radar

Laser Physics

Molecular and chemical laser physics
Interferometry
Laser chemical kinetics
Diode laser pumped solid-state lasers
Electrically driven lasers
Laser-induced reactions
Laser materials diagnostics
Nonlinear frequency conversion
Beam cleanup technology
Optical instrumentation and probes

Electro-Optical Technology

Detection signal processing studies
Optical seeker studies
Solid-state laser development
Optical imager development
Optical interactions in semiconductor
superlattices and organic solids

Optical Techniques

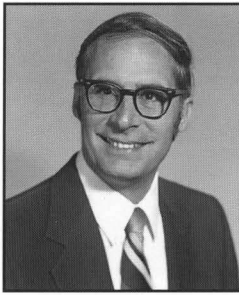
Diode laser applications
Fiber lasers/sources
Optical control of solid-state electronic devices
Integrated optics
Fiber-optic sensors (acoustic, magnetic, electric
fields, etc.)
Tunable and short (<100 femto-seconds) optical
pulses for high-speed probing of semiconductor
materials, superconductors, and other materials
High-power laser diode amplifier



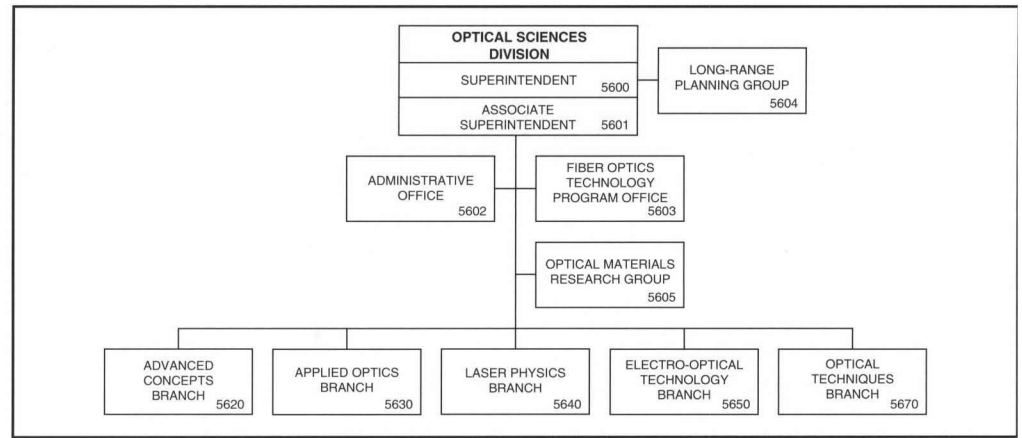
The Focal Plane Array Evaluation Facility consists of the optical sources and electronics required to evaluate monolithic or hybrid infrared focal plane arrays that use charge-coupled device, charge-injection device, direct readout, or charge-imaging matrix technologies

The Missile Seeker Evaluation Facility is a computerized facility that is used to evaluate optical countermeasures to infrared missile seekers and infrared imaging sensors





Dr. T.G. GIALLORENZI



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, optical technology, holography, optical warfare, optical data processing, fiber-optic sensor systems, optical systems, optical materials, radiation damage studies, IR surveillance and missile seeker technologies, IR signature measurements, optical recording materials, and optical diagnostic techniques. A significant portion of the effort is devoted to developing, analyzing, and using special optical materials. Various field measurement programs on optical problems of specific interest are also conducted.

Personnel: 137 full-time civilian

Key Personnel

Name	Title	Code
Dr. T.G. Giallorenzi	Superintendent	5600
Mr. J.M. McMahon*	Associate Superintendent	5601
Ms. V. Short-Williams	Administrative Officer	5602
Mr. G. Cogdell	Head, Fiber Optics Technology Program Office	5603
Dr. L. Esterowitz	Long-Range Planning Group	5604
Dr. E.J. Friebele	Long-Range Planning Group	5604
Dr. J.C. Kershenstein	Long-Range Planning Group	5604
Mr. J.M. McMahon	Long-Range Planning Group	5604
Dr. R.A. Patten	Long-Range Planning Group	5604
Dr. E.J. Friebele	Head, Optical Materials Research Group	5605
Dr. J.C. Kershenstein	Head, Advanced Concepts Branch	5620
Dr. R.A. Patten	Head, Applied Optics Branch	5630
Dr. B. Feldman	Head, Laser Physics Branch	5640
Dr. L. Esterowitz	Head, Electro-Optical Technology Branch	5650
Dr. J. Weller	Head, Optical Techniques Branch	5670

Point of contact: Ms. V. Short-Williams, Code 5602 (202) 767-2855

*Acting

Tactical Electronic Warfare Division

Code 5700 Staff Activity Areas

Long-range EW strategic planning
Lead laboratory coordinating
Communications CM Group

Effectiveness of Naval EW Systems (ENEWS)
Facility Operations Unit

Research Activity Areas

Offboard Countermeasures

Expendable technology and devices
Unmanned air vehicles
Offboard payloads
Decoys

Airborne Electronic Warfare Systems

Air systems development
Penetration aids
Power source development
Jamming and deception
Millimeter-wave technology

Ships Electronic Warfare Systems

Ships systems development
Jamming technology
Deception techniques
EW antennas

Electronic Warfare Support Measures

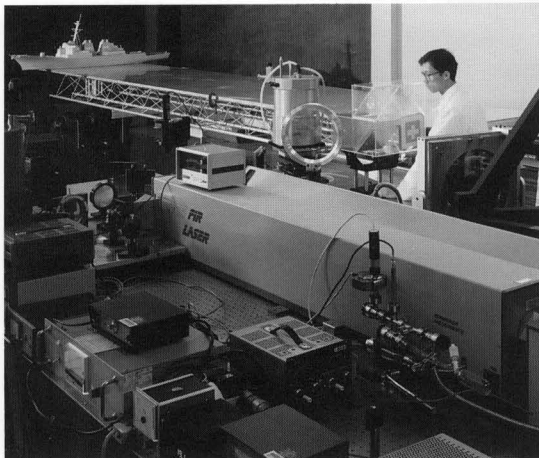
Intercept systems and direction finders
RF signal simulators
Systems integration
Command and control interfaces
Signal processing

Advanced Techniques

Analysis and modeling simulation
New EW techniques
Experimental systems
EW concepts
Infrared technology

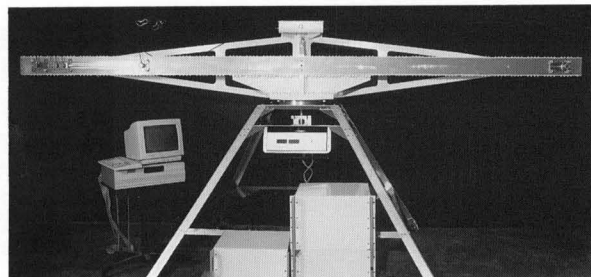
Integrated EW Simulation

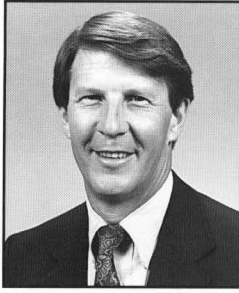
Hardware-in-the-loop simulation
Data management technology
Flyable ASM seeker simulators
Foreign military equipment exploitation



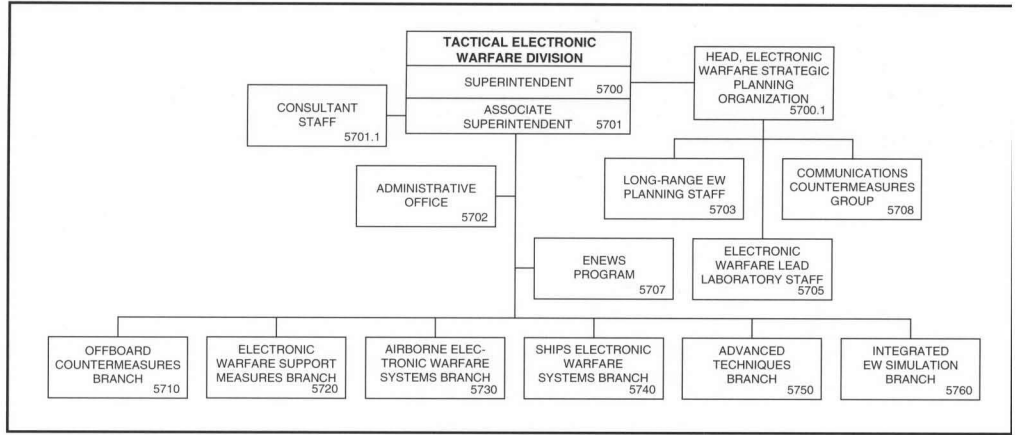
The precision direction finding system measures the direction-of-arrival of received RF signals with extreme accuracy, extending the technology in direction finding by more than two orders of magnitude from typically 1 to 5 spatial degrees to 0.01 spatial degrees

The Scale Model Analysis Facility is a compact range established at NRL as a low cost method of measuring and analyzing the radar cross section of target platforms using submillimeter waves and accurate scale models of the target platforms and the environment





DR. J.A. MONTGOMERY



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.

Personnel: 272 full-time civilian

Key Personnel

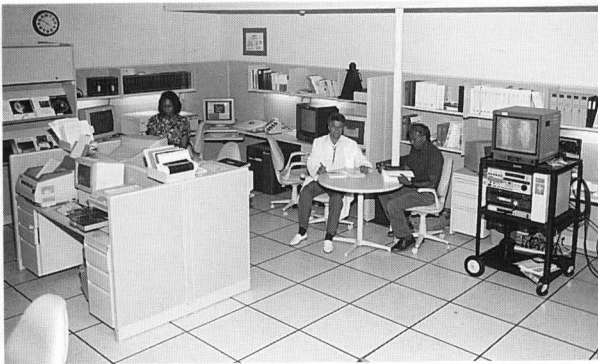
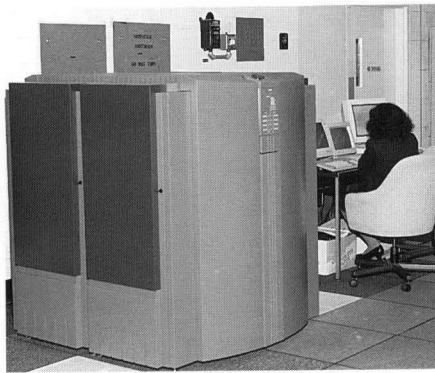
Name	Title	Code
Dr. J.A. Montgomery	Superintendent	5700
Mr. H.W. Zwack	Associate Superintendent/Head	5701
Dr. C.H. Heider	Head, Electronic Warfare Strategic Planning Organization	5700.1
Mr. D.M. Swann	Administrative Officer	5702
Dr. C.H. Heider	Head, Long-Range EW Planning Staff	5703
Mr. T.J. Jesswein	Head, Electronic Warfare Lead Laboratory Staff	5705
Mr. D.F. Grady	Manager, ENEWS Program	5707
Mr. W.W. Everett	Head, Communications Countermeasures Group	5708
Dr. F.J. Klemm	Head, Offboard Countermeasures Branch	5710
Mr. T. Jones	Head, Electronic Warfare Support Measures Branch	5720
Dr. J.C. Constantine	Head, Airborne Electronic Warfare Systems Branch	5730
Dr. J.P. Lawrence	Head, Ships Electronic Warfare Systems Branch	5740
Dr. G.E. Friedman	Head, Advanced Techniques Branch	5750
Mr. A.A. DiMattesa	Head, Integrated EW Simulation Branch	5760

Point of contact: Mr. H.W. Zwack, Code 5701 (202) 767-3622

Research Computation Division

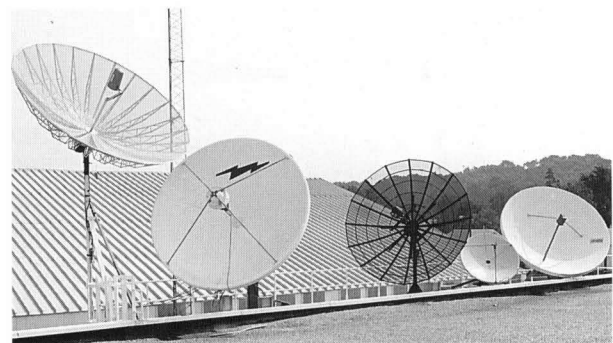
Code 5800

The Cray Y-MP EL/2-512 is a two-processor system with 512 megabytes of memory. The dual CPUs run on a clock cycle of 30 nanoseconds generating a peak performance of 266 MFLOPS. The EL is configured with three VME-based I/O subsystems featuring a total bandwidth of 120 megabytes/second. Storage for the EL system is provided by eight DD-4 disk drives, totalling over 21 gigabytes of disk storage.

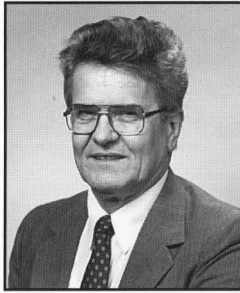


The RCD Visualization Laboratory offers a wide variety of visualization platforms ranging from powerful graphics engines to computationally intensive workstations. These platforms permit users to view and interpret the large datasets that are routinely generated by state-of-the-art calculations on today's high-performance gigaflop computers. The Visualization Laboratory staff is available to help users on an individual basis in the development of visual and animation paradigms, as well as presentation slides and videos.

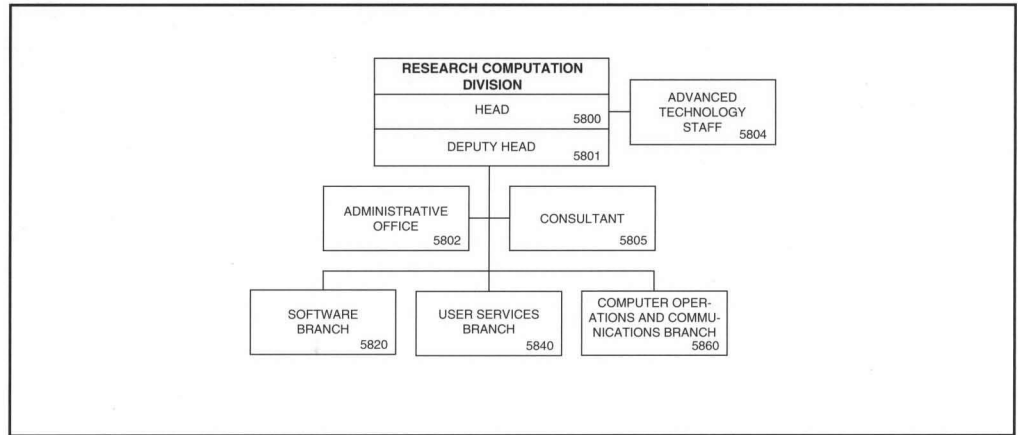
This StorageTek "silo" houses the automated tape cartridge system which features advanced robotics and supplies 1.5 terabytes of nearline storage. It is part of NRL's File Server/ Archiver installation which is accessible via NICEnet.



Satellite dishes provide video reception for NICEnet; including news, weather, seminars, and training programs.



MR. R.F. SAENGER



Basic Responsibilities

The Research Computation Division (RCD) provides a variety of computing and networking services in support of computational research efforts to more than 1700 scientists, analysts, and engineers at NRL/ONR throughout the United States and at remote locations from London to Tokyo. The Division manages and operates NRL's Central Computing Facility (CCF) and the NRL Integrated Communications Environment Network (NICEnet). The RCD also provides laboratory ADP logistic support by identifying ADP requirements and securing and administering contractual support for lab-wide or multiple buys of ADP systems, software, and services.

Computer systems located in the Central Computing Facility include a Cray Y-MP EL/2-512 multi-processor computer system and a variety of UNIX workstations. The CCF NRL File Server/ Archiver system provides over 1.5 terabytes of storage capacity, and functions as both a file server and archival system for the laboratory's mainframe, minicomputers, workstations, and microcomputers. Graphics workstations, color printers, and video recording equipment, located in the CCF's Scientific Visualization Laboratory, are also available for use by NRL researchers. Full user support services are provided for all of the CCF systems, including a help desk, training classes, documentation, program conversion and optimization, and assistance with computer graphics and animation.

NICEnet, the laboratory's local area network, supports both data and video services, and provides external connections to network and computer systems world-wide, including Internet, DDN/MILNET, SURAnet/NSFnet and NSI.

Personnel: 50 full-time civilian

Key Personnel

Name	Title	Code
Mr. R.F. Saenger	Head	5800
Ms. D.E. Gossett	Deputy Head	5801
Ms. B.M. Thomas	Administrative Officer	5802
Mr. R.F. Saenger*	Head, Advanced Technology Staff	5804
Mr. H.K. Brock	Head, Consultant Staff	5805
Mr. G.E. Perez	Head, Software Branch	5820
Ms. H.K. Howell	Head, User Services Branch	5840
Mr. J.N. Lockard	Head, Computer Operations and Communications Branch	5860

Point of contact: Mr. R.F. Saenger, Code 5800 (202) 767-2751

*Acting

Underwater Sound Reference Detachment

Code 5900 Research Activity Areas

Measurements

- Calibration theory and accuracy
- Measurement methods
- Standard calibration services
- Sonar transducer test and evaluation
- Transduction and radiation theory
- Wavenumber calibration
- Explosive shock testing
- Panel measurements of acoustic materials

Acoustical Systems

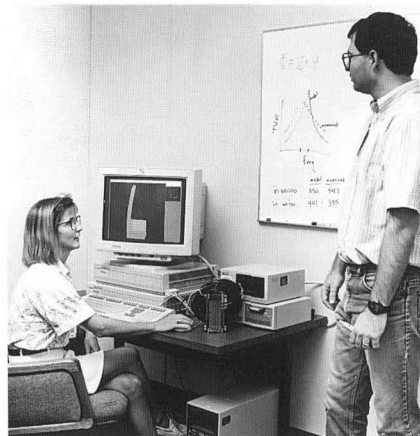
- Computation services
- Digital systems
- Analog systems
- Signal analysis
- Low-noise preamplifiers
- Measurement systems

Acoustic Materials

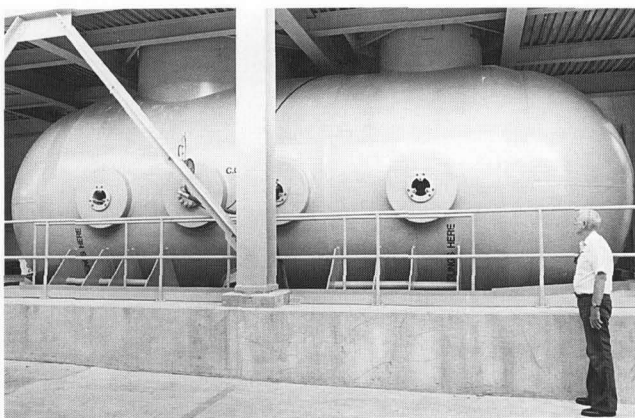
- Polymers
- Transduction materials
- Adhesives
- Measurements
- Quality control
- Chemical analysis

Transducers

- Electroacoustic standards
- Acoustic sources
- Specialized electroacoustic transducers
- Transducer loan services
- Transducer reliability
- Sonar transducers
- Accelerated life testing
- Transducer modeling



The Modeling and Concepts Section utilizes numerical and analytical techniques as well as experimental modal analysis in support of Navy transducer design and development



New acoustic measurement tank capable of testing transducers or materials to 3000 psi at temperatures from 2° to 40° C



Technician loading sonar material sample for evaluation in Shock-Tube Facility



Materials Science
and Component
Technology Directorate

MATERIALS SCIENCE AND COMPONENT TECHNOLOGY DIRECTORATE

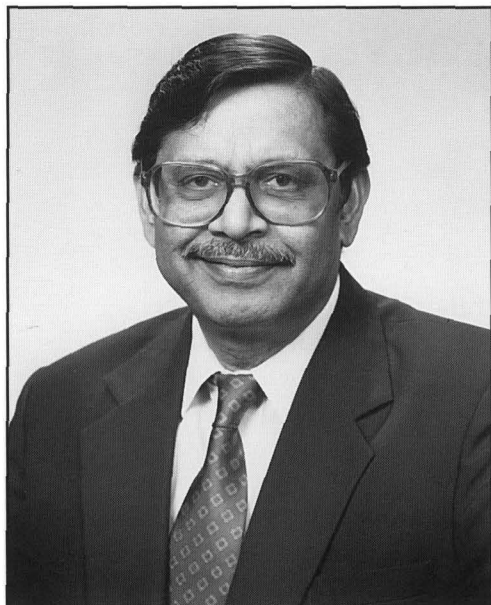
Code 6000

The Materials Science and Component Technology Directorate carries out a multidisciplinary research program whose objectives are the discovery 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, and artificially structured bio/molecular materials and composites, 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 materials in natural or radiation environments, components under deleterious conditions such as those associated with the marine environment, neutron or directed energy beam irradiation, or extreme temperatures and pressures, are established.

Additionally, major thrusts are directed in advanced space sensing, reactive flow physics, computational physics, and plasma sciences. Areas of particular emphasis include fluid mechanics and hydrodynamics, nuclear weapons effect simulations, high-energy density 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. B.B. Rath He received a B.S. degree in physics and mathematics from Utkal University, an M.S. in metallurgical engineering from Michigan Technological University, and a Ph.D. from the Illinois Institute of Technology.

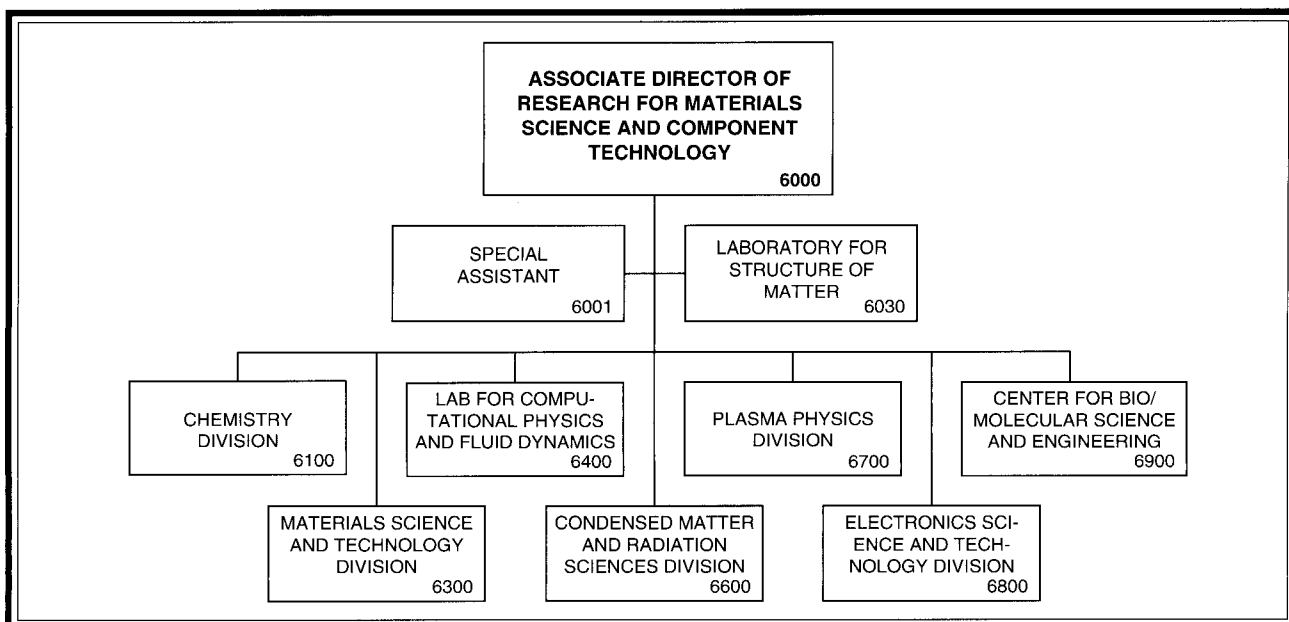
Dr. Rath was Assistant Professor of Metallurgy and Materials Science at Washington State University from 1961 to 1965. From 1965 to 1972, he was with the staff of the Edgar C. Bain Laboratory for fundamental research of the U.S. Steel Corporation. From 1972 to 1976, he headed the Metal Physics Research Section of the McDonnell Douglas Research Laboratories in St.

Louis, Missouri, until he came to NRL as Head of the Physical Metallurgy Branch. During this period, he was adjunct Professor at the Carnegie-Mellon University, the University of Maryland, and the Colorado School of Mines. Dr. Rath served as Superintendent of the Materials Science and Technology Division from 1982 to 1986, when he was appointed to his present position.

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

Dr. Rath serves on several planning, review, and advisory boards for both the Navy and the Department of Defense, as well as for the National Materials Advisory Board of the National Academy of Sciences, National Science Foundation, Carnegie-Mellon University, University of Virginia, Colorado School of Mines, University of Pittsburgh, and Florida Atlantic University. He serves as the Navy representative to the panel of The Technical Cooperation Program (TTCP) countries and the Indo-U.S. Joint Commission on Science and Technology.

Dr. Rath is a fellow of the Minerals, Metals and Materials Society (TMS), American Society for Materials-International (ASM), and Washington Academy of Sciences. He has received the 1991 George Kimball Burgess Memorial Award and the Charles S. Barrett Medal for his contributions to Materials Research. He serves as a member of the Board of Directors of TMS, editorial board of three international materials research journals, and as chairman of several committees of TMS and ASM.



Key Personnel

Name	Title	Code
Dr. B.B. Rath	Associate Director of Research for Materials Science and Component Technology	6000
Mr. R.A. Gray	Special Assistant	6001
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter	6030
Dr. J.S. Murday	Superintendent, Chemistry Division	6100
Dr. D.U. Gubser	Superintendent, Materials Science and Technology Division	6300
Dr. J.P. Boris	Chief Scientist and Director, Laboratory for Computational Physics and Fluid Dynamics	6400
Dr. D.J. Nagel	Superintendent, Condensed Matter and Radiation Sciences Division	6600
Dr. S. Ossakow	Superintendent, Plasma Physics Division	6700
Dr. G.M. Borsuk	Superintendent, Electronics Science and Technology Division	6800
Dr. J. Schnur	Director, Center for Bio/Molecular Science and Engineering	6900

Point of contact: Mrs. J. Smithwick, Code 6000A (202) 767-3566



DR. J. KARLE

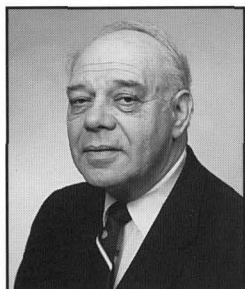
Recipient of
1985 Nobel Prize in Chemistry

Dr. Jerome Karle's research has been concerned with diffraction theory and its application to the determination of atomic arrangements in various states of aggregation, gases, liquids, amorphous solids, fibers, and macromolecules. This research has resulted in new techniques for structure determination and a broad variety of applications. His work in crystal structure analysis was recognized by the 1985 Nobel Prize in Chemistry.

Dr. Karle is a Fellow of the American Physical Society, a member of the National Academy of Sciences and the American Philosophical Society. He has served as president of the International Union of Crystallography, and is a member of a number of other professional societies. He has been chairman of the Chemistry Section of the National Academy of Sciences. Some time ago, he was a Professorial Lecturer in the University College of the University of Maryland and a Visiting Professor at the University of Kiel in Germany. He has also lectured at many international schools and symposia and has served on a number of international scientific organizations.

Laboratory for Structure of Matter

Code 6030



DR. J. KARLE

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, glassy, and crystalline structures of materials. The methods of X-ray, electron, and neutron diffraction are used in a broad program of structural studies that can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines. Structural investigations relate structure to function, facilitate industrial syntheses and the creation of new materials with improved properties, and provide foundation information for numerous associated disciplines and studies. Applications are made, for example, to propellants, explosives, dense energetic materials, absorptive carbons, metallic glasses, device materials, ion carriers, antibiotics, analgesics, reversible oxygen carriers, and synthetic reaction intermediates and final products.

Personnel: 12 full-time civilian

Key Personnel

Name	Title	Code
Dr. J. Karle	Chief Scientist	6030

Point of contact: Mrs. M. Williams, Code 6030 (202) 767-3496

Chemistry Division

Code 6100

Staff Activity Areas

Fire Protection and Damage Control Program Office

Research Activity Areas

Chemical Diagnostics

- Optical diagnostics of chemical reactions
- Kinetics of gas phase reactions
- Trace analysis
- Atmosphere analysis and control
- Ion/molecule processes
- Environmental chemistry

Materials Chemistry

- Synthesis and evaluation of innovative polymers
- Functional organic coatings
- Polymer characterization
- Quality control methodology
- Degradation and stabilization mechanisms
- High-temperature resins
- OMCVD materials

Surface/Interface Chemistry

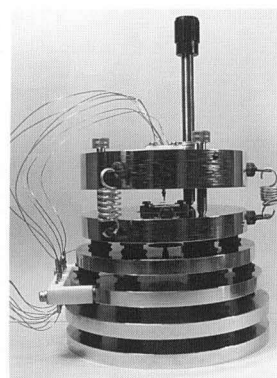
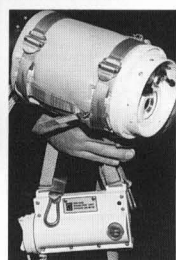
- Tribology
- Surface properties of materials
- Surface/interface analysis
- Chemical microdetectors
- Surface reaction dynamics
- High-temperature chemistry
- Diamond films
- Beam-enhanced chemistry
- Electrochemistry

Combustion and Fuels

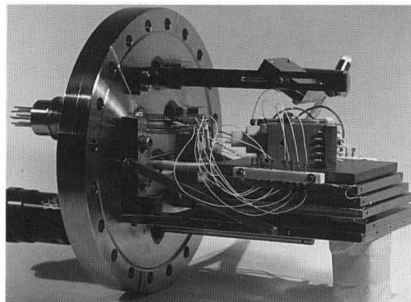
- Distillate fuels research
- Combustion dynamics
- Fire protection and suppression
- Personnel protection
- Modeling and scaling of combustion systems
- Chemical and biological defense
- Safety and survivability
- Corrosion prevention
- Solution chemistry



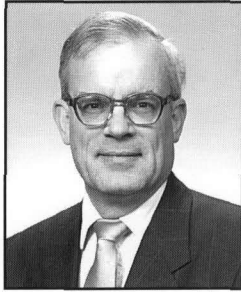
Navy combatant ships are now receiving Naval Firefighters Thermal Imagers (NFTIs) as a result of a 4-year evaluation and testing program conducted by NRL scientists. NFTI, which has already been used in one fire aboard an aircraft carrier, allows firefighters to immediately locate and extinguish a fire.



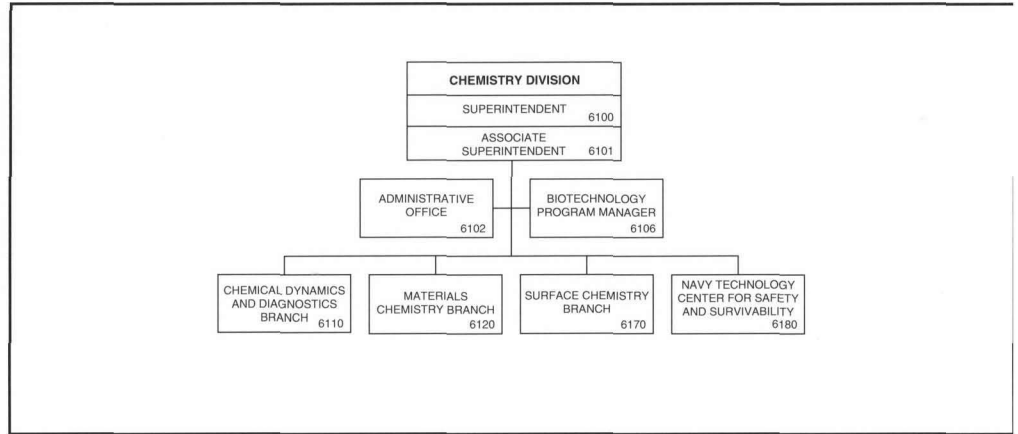
A scanning tunneling microscope designed and built in the Chemistry Division for the study of the atomic structure of surfaces in air



A scanning tunneling microscope designed and built in the Chemistry Division for the study of the atomic structure of surfaces in ultra-high vacuum



Dr. J.S. MURDAY

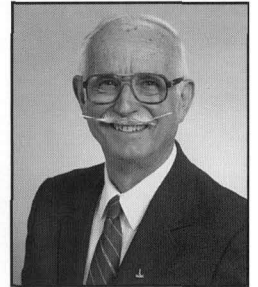


Basic Responsibilities

The Chemistry Division conducts basic and applied research and development studies in the broad fields of chemical diagnostics, reaction rate control materials chemistry, surface and electrochemistry, combustion, and fuels chemistry. Specialized programs within these fields include organic polymeric materials, coatings, dynamics, laser chemistry, tribology, physical and chemical characterization of surfaces and theory of surfaces, chemistry of electronic materials, submarine atmosphere analysis and control, nanometer scale phenomena, sensors, and solution chemistry.

Navy Technology Center for Safety and Survivability

To enhance protection of Navy personnel and platforms from damage and injury in peace and wartime, the Center 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.



Dr. H.W. CARHART

Personnel: 120 full-time civilian
2 full-time military

Key Personnel

Name	Title	Code
Dr. J.S. Murday	Superintendent	6100
Dr. W.B. Fox	Associate Superintendent	6101
Ms. B.L. Russell	Administrative Officer	6102
CAPT W.W. Schultz, USN	Biotechnology Program Manager	6106
CAPT S. Snyder, USN	Biotechnology Program	6106A
Dr. J. McDonald	Head, Chemical Dynamics and Diagnostics Branch	6110
Dr. D. Sheehan	Head, Materials Chemistry Branch	6120
Dr. D.L. Venezky	Head, Surface Chemistry Branch	6170
Dr. H.W. Carhart	Head, Navy Technology Center for Safety and Survivability	6180

Point of contact: Ms. B. Russell, Code 6102 (202) 767-2460

Materials Science and Technology Division

Code 6300 Research Activity Areas

Materials Physics

- Superconductivity
- Magnetism
- Electronic properties
- Metallic film growth and characterization

Physical Metallurgy

- Phase transformations and defect states
- Microstructure-property relationships
- Elasticity, plasticity, mechanical phenomena
- Surface processing
- Alloy development
- Elevated temperature behavior of materials
- Rapid solidification processing of materials

Mechanics and Structural Properties

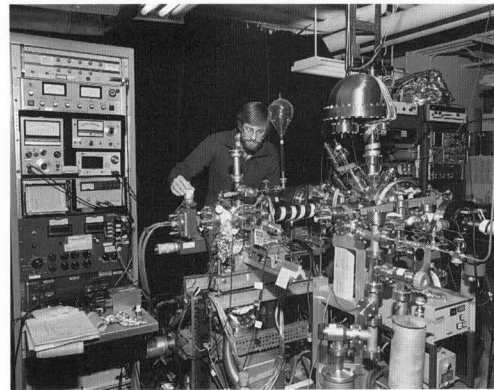
- Micromechanisms of crack growth
- Subcritical crack growth and fracture
- Failure mechanisms and criteria
- Computational, fracture, and structural mechanics
- Constitutive theories
- Reliability analysis and failure modes of components and systems
- Nondestructive evaluation
- Performance and survivability
- Elevated temperature materials

Composites and Ceramics

- Processing, fabrication, and microstructural characterization
- Thermostructural applications
- Ceramics for electronic, piezoelectric, optical, and other nonmechanical applications
- Physical, mechanical, and failure characterization and analysis

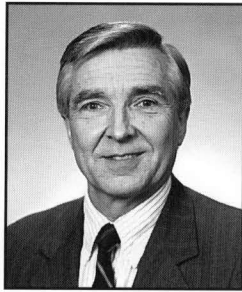
Environmental Effects

- Microstructural characterization
- Influence of environment on high-temperature materials
- Corrosion science and mechanisms
- Stress corrosion cracking
- Surface protection and inhibitors
- Marine corrosion

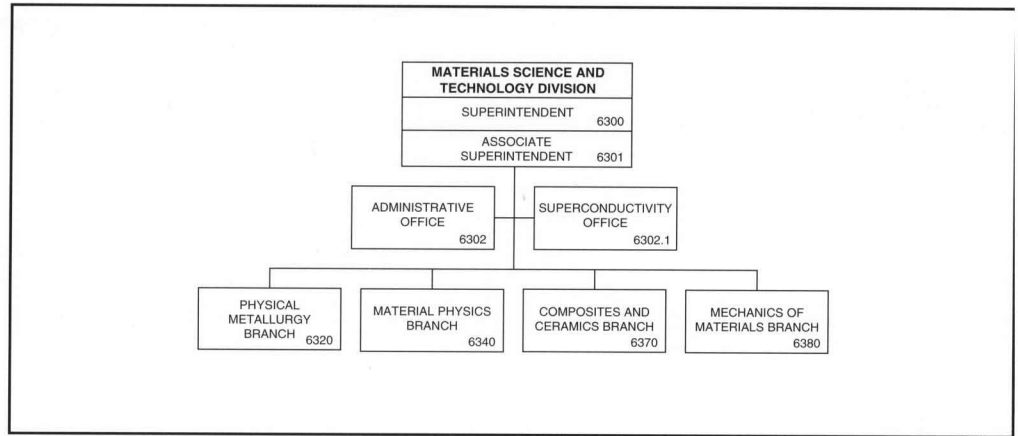


The growth of single crystal magnetic films on semiconductor substrates for electronic applications is observed

Ultrasonic imaging and analysis system for nondestructive inspection of irregular objects and simple bodies of revolution. The computer-interactive automated system provides acoustic images of bodies fabricated from metals or composites in real time, with visual indicators of defects that may be present.



DR. D.U. GUBSER



Basic Responsibilities

The Materials Science and Technology Division conducts basic and applied research and engages in exploratory and advanced development of materials having substantive value to the Navy. R&D programs encompass the intrinsic behavior of metals, alloys, ceramics, glasses, and composites and their performance and reliability in naval structures and devices. Program objectives include achieving fundamental understanding of the mechanical, physical, electrical, magnetic, superconducting, and electrochemical properties of materials; identifying composition, processing, and microstructural parameters to produce improved materials; and developing guidelines for the selection, design, and certification of materials for life-cycle management of naval structures and systems. This diversity of programs is carried out by interdisciplinary teams of material scientists, metallurgists, ceramists, physicists, chemists, and engineers, using the most advanced testing facilities and diagnostic techniques.

Personnel: 130 full-time civilian

Key Personnel

Name	Title	Code
Dr. D.U. Gubser	Superintendent	6300
Dr. D.J. Michel	Associate Superintendent	6301
Mrs. S.A. McIntire	Administrative Officer	6302
Dr. D.U. Gubser	Program Administrator, Superconductivity Office	6302.1
Dr. C.R. Crowe	Head, Physical Metallurgy Branch	6320
Dr. S.A. Wolf	Head, Material Physics Branch	6340
Dr. S.C. Sanday	Head, Composites and Ceramics Branch	6370
Dr. R. Badaliane	Head, Mechanics of Materials Branch	6380

Point of contact: Mrs. B. Wood, Code 6300A (202) 767-2926

Laboratory for Computational Physics and Fluid Dynamics

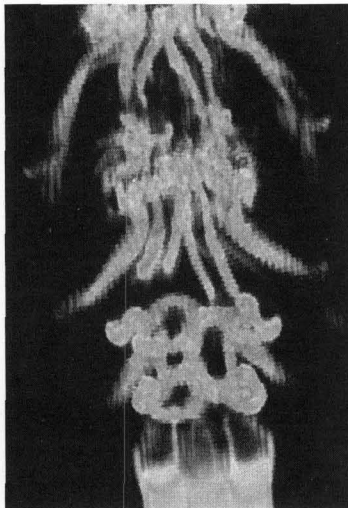
Code 6400 Research Activity Areas

Reactive Flows

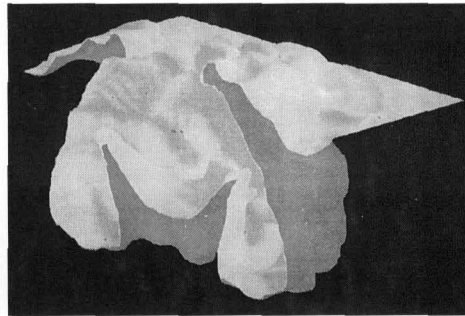
- Fluid dynamics in combustion
- Turbulence in compressible flows
- Multiphase flows
- Molecular dynamics of energetic materials
- Theoretical quantum chemistry
- Turbulent jets and wakes
- Turbulence modeling
- Computational hydrodynamics

Computational Physics Developments

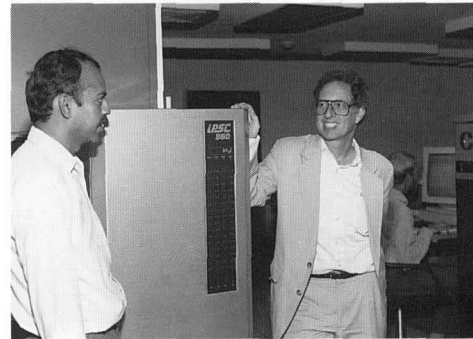
- Laser plasma interactions
- Inertial confinement fusion
- Solar physics modeling
- Dynamical gridding algorithms
- Advanced graphical and parallel processing systems
- Electromagnetic and acoustic scattering
- Battle management and data fusion
- Bubble dynamics



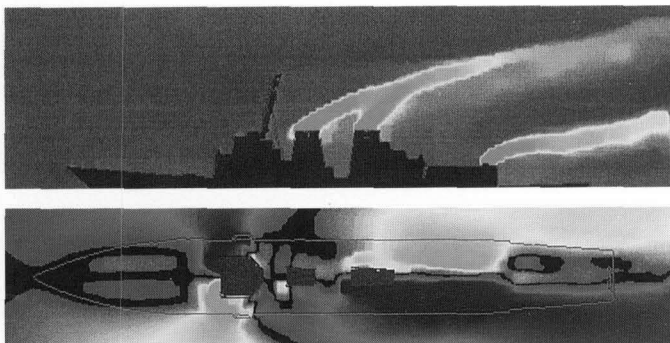
Volume rendering of the vorticity magnitude for a subsonic square jet. The figure depicts the outstanding topological features of the flow.



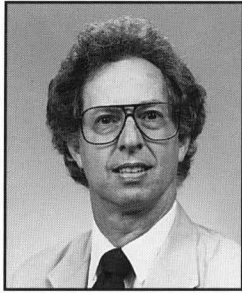
The configuration of a 3-D underwater explosion bubble breaching the free surface at elapsed time of 1.2 s. The light gray area is the air water interface seen through air. The dark gray area is the same interface seen from the water side. The bubble has been sliced through to expose the inside. Visualization done with AVS system and RCD.



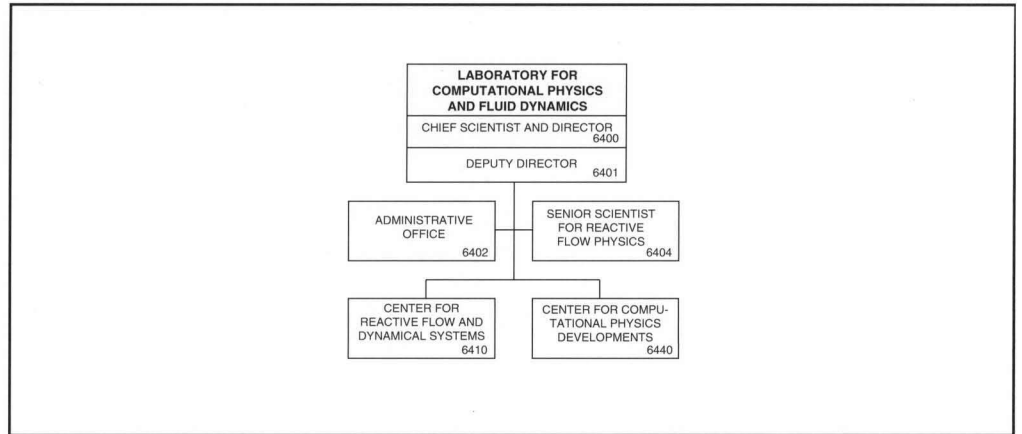
Working at the LCP&FD Intel Touchstone



Contours of temperature (top figure) and transverse velocity (bottom figure) over the DDG-51 destroyer in a headwind. The high-temperature regions are due to exhaust gases from the engine stacks. The unsteady flow solution with recirculation regions was computed on an Intel iPSC/860 parallel computer.



DR. J.P. BORIS



Basic Responsibilities

The Laboratory for Computational Physics and Fluid Dynamics is responsible for the research leading to and the application of advanced analytical and numerical capabilities that are relevant to Navy, DoD, and other programs of national interest. This research is pursued in the fields of compressible and incompressible fluid dynamics, reactive flows, fluid/structure interaction including submarine and aerospace applications, atmospheric and solar geophysics, magnetoplasma dynamics for laboratory and space applications, application of parallel processing to large-scale problems such as unstructured grid generation for complex flows and target tracking and correlation for battle management, and in other disciplines of continuum and quantum computational physics as required to further the overall mission of the Naval Research Laboratory. The specific objectives of the Laboratory for Computational Physics and Fluid Dynamics 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.

Personnel: 26 full-time civilian

Key Personnel

Name	Title	Code
Dr. J.P. Boris	Chief Scientist and Director	6400
Dr. W.C. Sandberg	Deputy Director	6401
Mrs. C. Adams	Administrative Officer	6402
Dr. E.S. Oran	Senior Scientist for Reactive Flow Physics	6404
Dr. K. Kailasanath	Head, Center for Reactive Flow and Dynamical Systems	6410
Mr. J.H. Gardner, Jr.	Head, Center for Computational Physics Developments	6440

Point of contact: Mrs. C. Adams, Code 6402 (202) 767-6581

Condensed Matter and Radiation Sciences Division

Code 6600 Research Activity Areas

Radiation Effects

- Satellite survivability
- Single-event upsets
- Device and material damage and hardening
- Ultrafast charge collection
- Nuclear radiation detection
- Space experiments
- High-Temperature Superconductivity Space Experiment
- Microelectronics and Photonics Test Bed
- Solar cells
- Environmental nuclear radiation
- 60-MeV LINAC

Directed Energy Effects

- Atomic and molecular interactions with surfaces and interfaces
- Interaction of laser and microwave radiation with materials and systems
- Solid-state spectroscopy
- Environmental effects on aircraft wiring
- Laser-hardened materials and systems
- High-power microwave test facility

Surface Modification

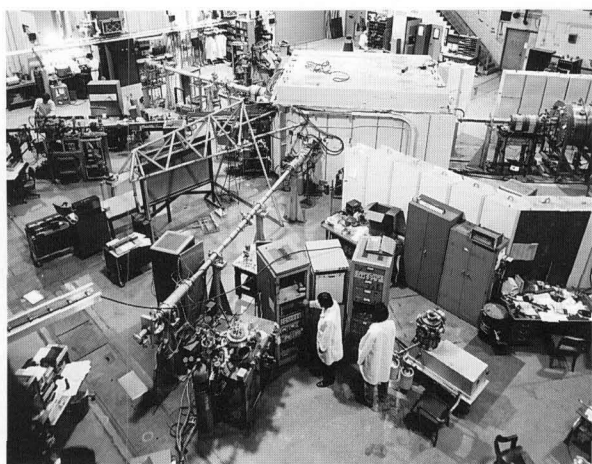
- Modification of surfaces by ion implantation
- Deposition of thin films by ion beam-assisted deposition and pulsed laser deposition
- Radiation effects from high energy charged particle beams
- Surface analyses by accelerator-based techniques
- ECR microwave plasma etching
- 200-keV ion implantation systems
- 3-MeV tandem ion accelerator

Dynamics of Solids

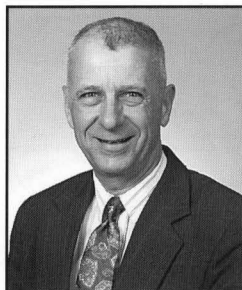
- X-ray sources, optics, and detectors
- X-ray analysis of materials – composition and structure
- Plasma spectroscopy
- Synchrotron radiation applications
- Semiconductor surface science
- Phase transformations
- Shock physics
- Hypervelocity impact
- Radiation effects in microelectronics
- Synchronized laser facility

Complex System Theory

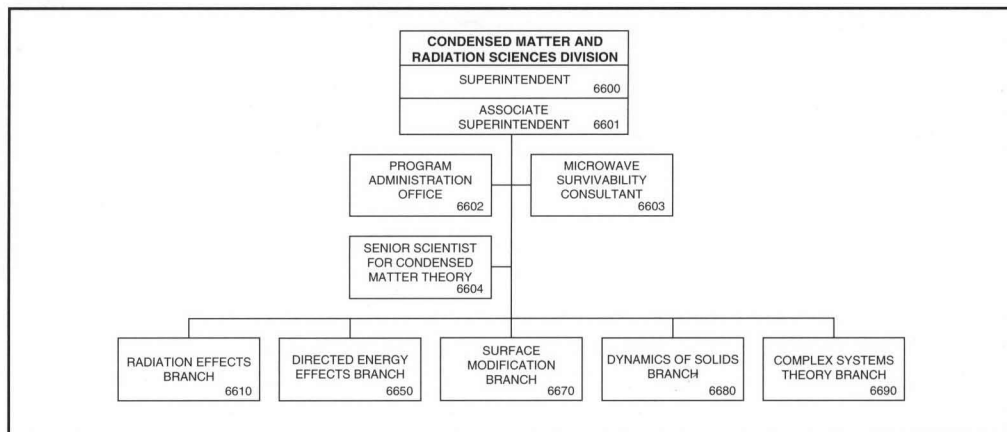
- Computational condensed matter physics
- Applications of electronic structure theory to solids and clusters
- Molecular dynamics
- Quantum many-body theory
- Theory of alloys
- Superconductivity theory
- Theoretical studies of phase transitions
- Atomic physics theory



An elevated view showing the NRL 3 MeV Tandem Van de Graaff Accelerator and associated beam lines



DR. D.J. NAGEL



Basic Responsibilities

The Condensed Matter and Radiation Sciences Division conducts broad programs of basic and applied research on the fundamental properties of materials and on the interactions of various types of radiation with matter. Physical properties of condensed matter are investigated theoretically and experimentally. Radiation damage produced in materials, components, subsystems, and systems by radiation, ranging from microwave and laser beams through charged and neutral particle beams in the megavolt region, is studied. Techniques in the use of radiation for beneficial modification and characterization of materials are also developed. Radiations of military significance are studied and simulated in the laboratory by various radiation facilities maintained and operated by the Division primarily for DoD users.

Personnel: 96 full-time civilian

Key Personnel

Name	Title	Code
Dr. D.J. Nagel	Superintendent	6600
Dr. R.W. Holst	Associate Superintendent	6601
Ms. B. Murphy	Head, Program Administration Office	6602
Dr. J.W. Butler	Microwave Survivability Consultant	6603
Dr. W.E. Pickett	Senior Scientist for Condensed Matter Theory	6604
Mr. J.C. Ritter	Head, Radiation Effects Branch	6610
Dr. T.J. Wieting	Head, Directed Energy Effects Branch	6650
Dr. F.A. Smidt	Head, Surface Modification Branch	6670
Dr. M.I. Bell	Head, Dynamics of Solids Branch	6680
Dr. D.A. Papaconstantousoulos	Head, Complex Systems Theory Branch	6690

Point of contact: Ms. B. Murphy, Code 6602 (202) 767-3407

Plasma Physics Division

Code 6700

Research Activity Areas

Radiation Hydrodynamics

- Pulsed-power radiation source and power-flow development
- X-ray laser modeling
- Dense plasma atomic structure, processes, and equations of state
- Radiation hydrodynamics of dense Z-pinch and laser-produced plasmas
- Plasma-radiation diagnostics
- Numerical simulation of high-density plasma

Laser Plasma

- Laser-plasma interaction
- Laser fusion, inertial confinement
- Laser-plasma diagnostics
- Laser-driven X-ray lasers
- KrF laser development
- Strongly coupled plasmas

Charged Particle Physics

- Charged particle beam generation
- Propagation of high-energy charged particle beams
- Radiation source development
- Plasma channels in air
- Experimental study of plasma chemistry
- Railgun physics
- Applications of modulated electron beams

Pulsed Power Physics

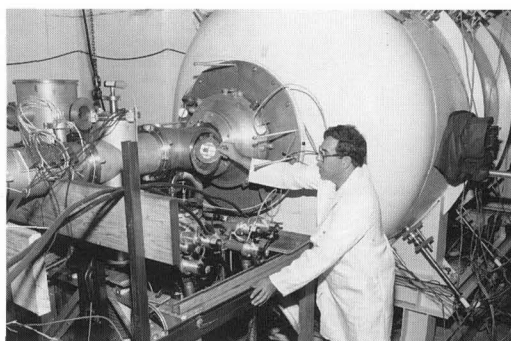
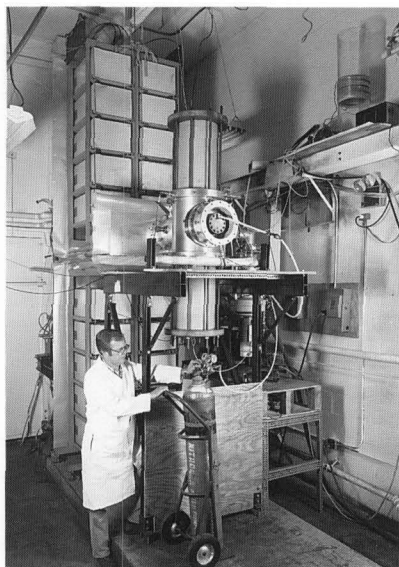
- Production of intense relativistic electron beams
- Electron beam propagation and focusing
- Pulse-power-driven X-ray lasers
- Generation of intense ion beams
- Inductive and capacitive energy storage
- Dense Z-pinch

Space Plasma Physics

- Theoretical and numerical simulation of ionospheric and magnetospheric phenomena
- High-altitude, nuclear weapons effects on the ionosphere/magnetosphere
- Ionospheric-magnetospheric coupling
- Rocket, satellite, and shuttle-borne natural and active experiments
- Laboratory simulation of space plasma processes

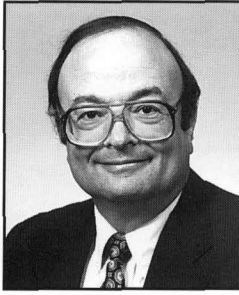
Beam Physics

- High-quality electron beams
- Wake field accelerators
- Application of high-current relativistic electron beams to microwave and millimeter wave generation, e.g., gyrotrons, short-pulse FEL, and CARM
- Plasma microwave electronics
- Solar-plasma processes

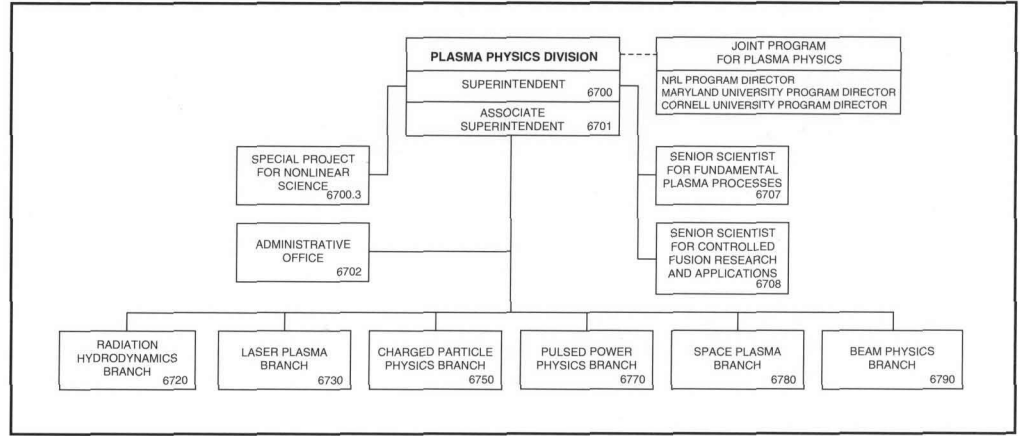


The Super IBEX CPB generator injects high current electron beams into this propagation chamber. Diagnostics at the input and along the chamber are used to measure beam quality and propagation stability.

PAWN is a compact, high-power pulse generator. A mega-joule of energy is initially stored in the low-voltage, air-insulated capacitor bank. Discharge of this bank into the even more compact, cylindrical, vacuum inductor produces the reservoir of magnetic energy to be used by the generator. Power amplification is achieved by opening switches in steps. At each successive step, the switch opens faster resulting in a pulse with higher voltage and shorter pulse duration. The PAWN generator is expected to produce the same pulse output as the Gamble II generator that is nearly 50 times larger. The physicist is pressurizing the opening switch cartridges with gas to provide megavolt insulation.



DR. S.L. OSSAKOW



Basic Responsibilities

The Plasma Physics Division conducts a broad theoretical and experimental program of basic and applied research in plasma physics, laboratory and space plasmas, intense electron and ion beams, atomic physics, pulsed power sources, and laser physics. 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; the effects of high-altitude nuclear weapons on the atmosphere; thermonuclear plasma confinement; atomic physics; and relativistic electron beam propagation. Areas of experimental interest include: relativistic electron beams, laser-matter interaction, thermonuclear fusion, electromagnetic wave generation, the generation of intense ion beams, electric mass launchers, advanced accelerator development, inductive energy storage, the interaction of charged particle beams with the atmosphere, and in-situ space plasma measurements.

Personnel: 115 full-time civilian

Key Personnel

Name	Title	Code
Dr. S.L. Ossakow	Superintendent	6700
Dr. V.L. Patel	Associate Superintendent	6701
Dr. P. Palmadesso	Head, Special Project for Nonlinear Science	6700.3
Ms. T. Mason	Administrative Officer	6702
Dr. W. Manheimer	Senior Scientist, Fundamental Plasma Processes	6707
Dr. A.E. Robson	Senior Scientist, Controlled Fusion Research and Applications	6708
Dr. J. Davis	Head, Radiation Hydrodynamics Branch	6720
Dr. S. Bodner	Head, Laser Plasma Branch	6730
Dr. R. Meger	Head, Charged Particle Physics Branch	6750
Dr. G. Cooperstein	Head, Pulsed Power Physics Branch	6770
Dr. B. Ripin	Head, Space Plasma Branch	6780
Dr. P. Sprangle	Head, Beam Physics Branch	6790

Point of contact: Dr. V.L. Patel, Code 6701 (202) 767-2997

Electronics Science and Technology Division

Code 6800

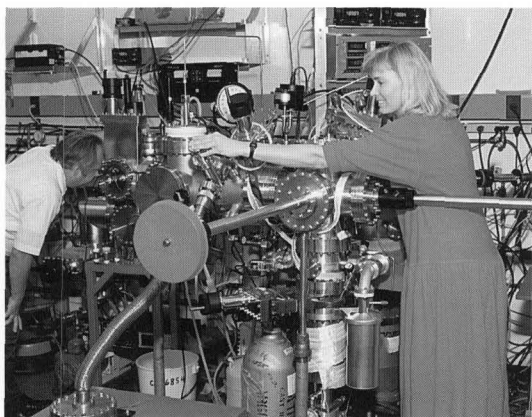
Research Activity Areas

Electronic Materials

Preparation and development of magnetic, dielectric, optical, and semiconductor materials
Electrical, optical, and magneto-optical studies of semiconductor microstructures, surfaces, and interfaces
Impurity and defect studies
Structural and electronic properties of amorphous semiconductors
Condensed matter theory
High magnetic field phenomena

Surface and Interface Sciences

Metal organic chemical vapor deposition
Surface and interface physics
Vacuum surface research
Processing research for nanometric electronics
Growth and characterization of surfaces and interfaces
High-temperature superconductors



Working with high-temperature superconducting film growth system

Microwave Technology

Microwave, millimeter-wave, and submillimeter-wave component and circuit research
Microwave and millimeter-wave integrated circuits
Surface acoustic wave devices
High-frequency-device design, simulation, and fabrication
Ion implantation technology
Reliability and failure physics of electronic devices and circuits

Solid State Devices

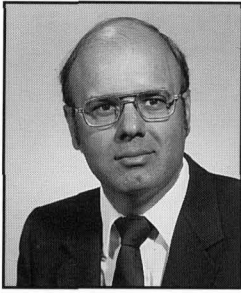
Solid-state optical sensors
Radiation effects/hardening of electronic devices, circuits, and optoelectronic sensors
Microelectronics device research and fabrication
Solid state circuits research
Signal processing research

Vacuum Electronics

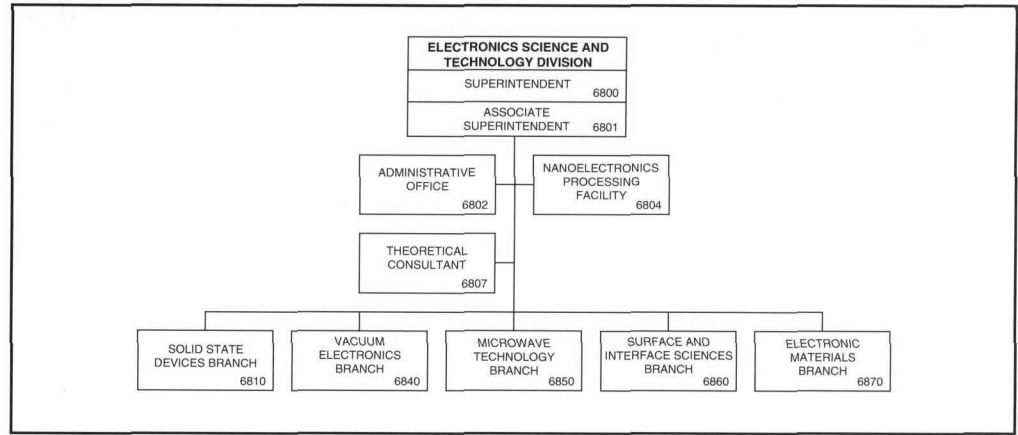
Microwave and millimeter power amplifier research and development
Cathode research and development
Thermionic energy conversion
Field emission arrays
Vacuum electronic devices
Tube fabrication and support technology



Working with the JEOL Nanowriter



DR. G.M. BORSUK



Basic Responsibilities

The Electronics Science and Technology Division conducts programs of basic science and applied research and development in materials growth and properties, surface physics, microstructure electronics, microwave techniques, microelectronic device research and fabrication, vacuum electronics, high-power microwave generation, and cryoelectronics, including superconductors. The activities of the Division couple device research both to basic materials investigations and to systems research and development needs.

Personnel: 140 full-time civilian

Key Personnel

Name	Title	Code
Dr. G.M. Borsuk	Superintendent	6800
Dr. K. Sleger	Associate Superintendent	6801
Mrs. M. Bozzi	Administrative Officer	6802
Dr. D. McCarthy*	Head, Nanoelectronics Processing Facility	6804
Dr. K.L. Ngai	Theoretical Consultant	6807
Dr. J.M. Killiany	Head, Solid State Devices Branch	6810
Dr. R.K. Parker	Head, Vacuum Electronics Branch	6840
Dr. D. Webb	Head, Microwave Technology Branch	6850
Dr. M. Peckerar	Head, Surface and Interface Sciences Branch	6860
Dr. N.D. Wilsey	Head, Electronic Materials Branch	6870

Point of contact: Dr. K. Sleger, Code 6801 (202) 767-3894

*Acting

Center for Bio/Molecular Science and Engineering

Code 6900 Research Activity Areas

Biologically Derived Microstructures

Self-assembly, molecular machining
Synthetic membranes, molecular printing
Nanocomposites
Tubulin
Rhapsosomes
Resilin

Biosensors

Binding polypeptides
Cell-based biosensor
DNA biosensor
Fiber optic biosensor
Flow immunosensor

Combat Casualty Care

Wound repair, angiogenic implants
Liposome encapsulated hemoglobin
Red cell lyophilization

Environmental Quality

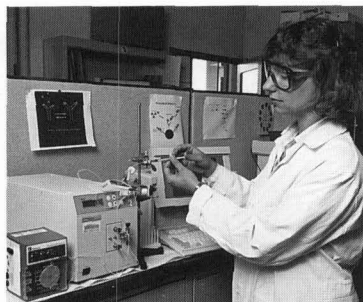
Antifouling paint, controlled release
Polyurethanase degradation
Antisense DNA

Polymers and Liquid Crystals

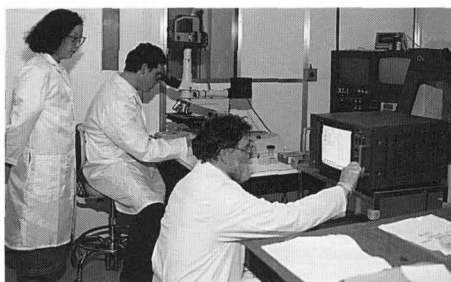
Ferromagnetic liquid crystals
Advanced materials/information processing

Surfaces and Interfaces

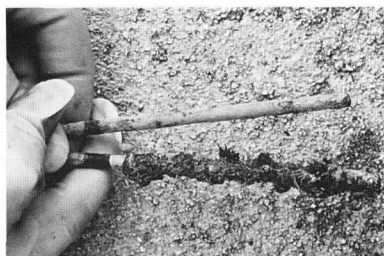
Submicron resists and microlithography
Specifically activated thin films
Neuronal patterning



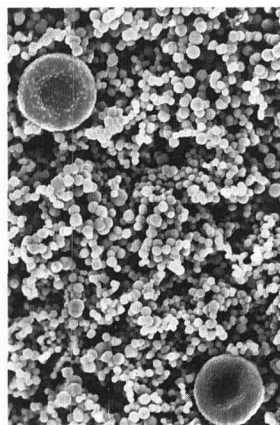
Biosensor for the detection
of drugs and explosives



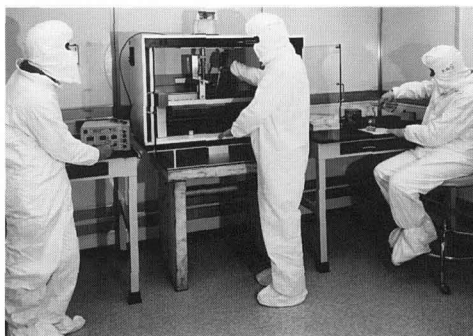
Center scientists looking at
high resolution patterns



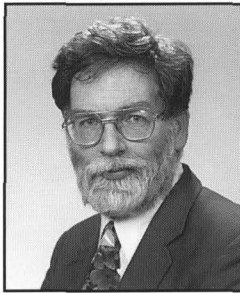
Self-assembled microstructures
and novel controlled release
techniques are being incorporated
into antifouling paints for
improved environmental quality



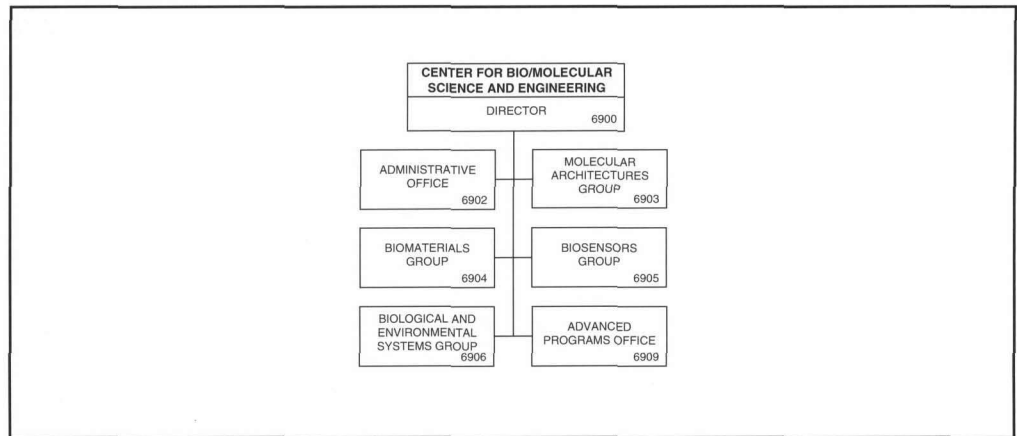
Liposomes containing
hemoglobin (LEH) are
small in comparison to
human red cells. LEH is
now manufactured in
large scale and has been
proven to carry oxygen
effectively.



Center scientists
working on
advanced thin
film technology
in clean room



Dr. J.M. SCHNUR



Basic Responsibilities

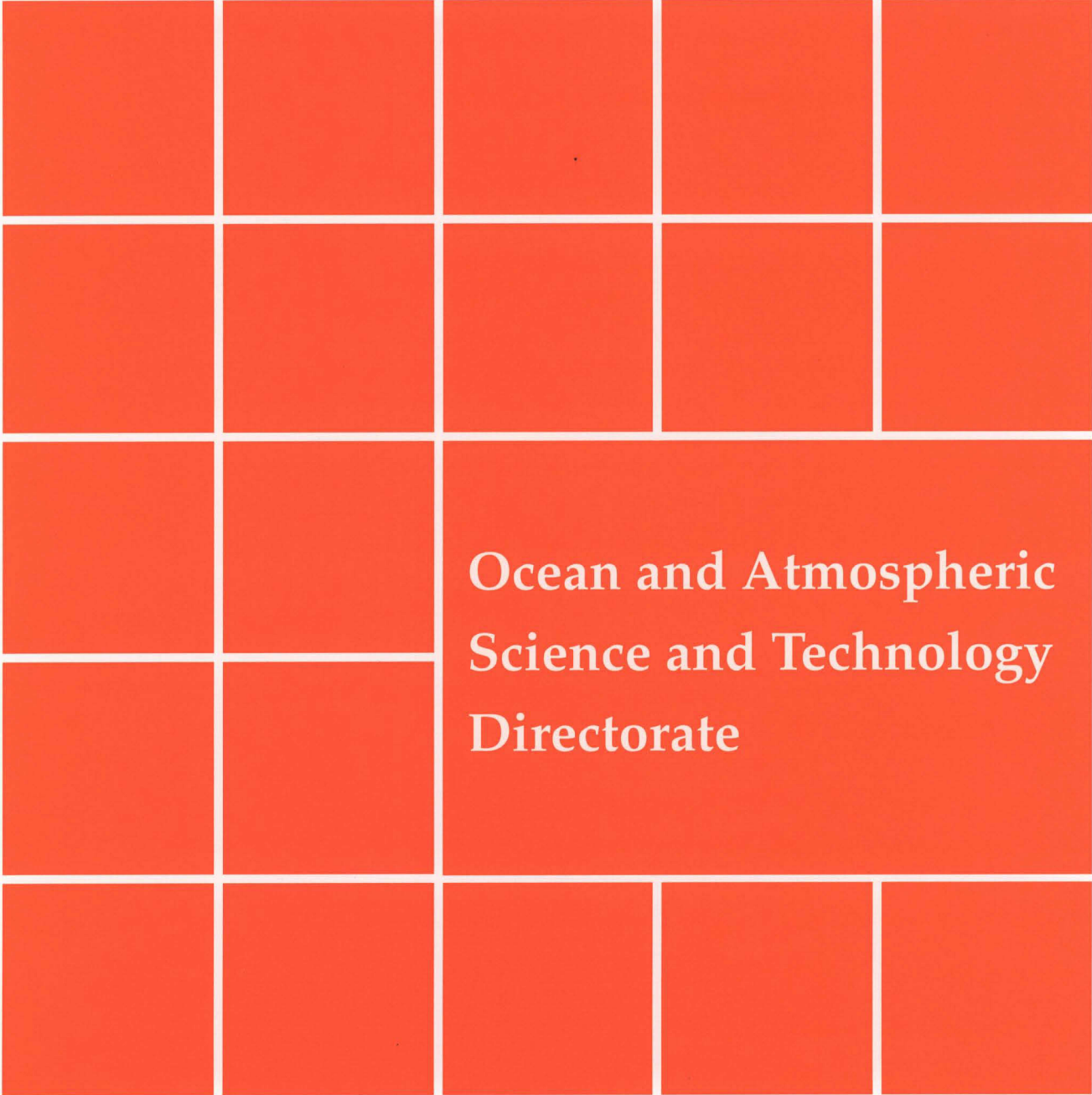
The Center for Bio/Molecular Science and Engineering is using the tools of modern biology, physics, chemistry, and engineering to develop advanced materials and sensors. The long-term research goal is to gain a fundamental understanding of the relationship between molecular architecture and the function of materials. 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, self-assembly, controlled release and encapsulation, and surface patterning and modification. Much of the research deals with the self-assembly of lipids, proteins, and liquid crystals 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 in order to pursue these research and development programs. The Center provides a stimulating environment for cross disciplinary programs in the areas of immunology, biochemistry, electrochemistry, inorganic and polymer chemistry, microbiology, microlithography, photochemistry, biophysics, spectroscopy, advanced diagnostics, organic synthesis, and electrooptical engineering.

Personnel: 33 permanent civilian
3 full-time military

Key Personnel

Name	Title	Code
Dr. J.M. Schnur	Director	6900
Dr. B.P. Gaber	Biologically Derived Microstructures Program Manager	6909
Dr. F.S. Ligler	Biosensor Program Manager	6909
Dr. A.S. Rudolph	Combat Casualty Care Program Manager	6909
Dr. Shashidhar	Polymers and Liquid Crystals Program Manager	6909
Dr. J.M. Calvert	Surfaces and Interfaces Program Manager	6909

Point of contact: Mrs. S.W. Menton, Code 6902 (202) 404-8435



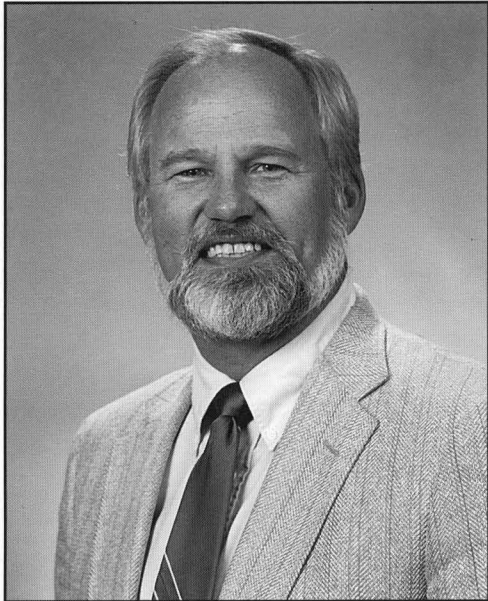
**Ocean and Atmospheric
Science and Technology
Directorate**

OCEAN AND ATMOSPHERIC SCIENCE AND TECHNOLOGY DIRECTORATE

Code 7000

The Ocean and Atmospheric Science and Technology Directorate performs research 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, environmental acoustics, 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, imaging systems and research, and remote sensing applications. Areas of emphasis in oceanography include ocean dynamics and prediction, ocean sciences, small scale phenomenology, and ocean technology. Areas of emphasis in marine geosciences include marine physics, seafloor sciences, and mapping, charting, and geodesy. Areas of emphasis in marine meteorology include prediction systems and forecast support. Areas of emphasis in space science include ultraviolet measurements, x-ray astronomy, upper atmospheric physics, gamma and cosmic rays, solar physics, and solar terrestrial relationships. The directorate is responsible for administrative and technical support to major activities in Washington, D.C., Stennis Space Center, Mississippi, and Monterey, California.

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



Dr. E.O. Hartwig [REDACTED] He obtained his B.S. degree in biological sciences from the University of Texas at El Paso in 1968, and his Ph.D. from Scripps Institution of Oceanography in 1974. After completing his graduate studies, Dr. Hartwig accepted a position as a researcher at the Scottish Marine Biological Association (SMBA) in Oban, Scotland, where he established a sea-going experimental marine microbiological effort.

In 1975, Dr. Hartwig returned to the U.S., accepting a position at the Chesapeake Bay Institute of Johns Hopkins University. His shallow water research concentrated on the Chesapeake Bay and its outflow region, in active collaboration

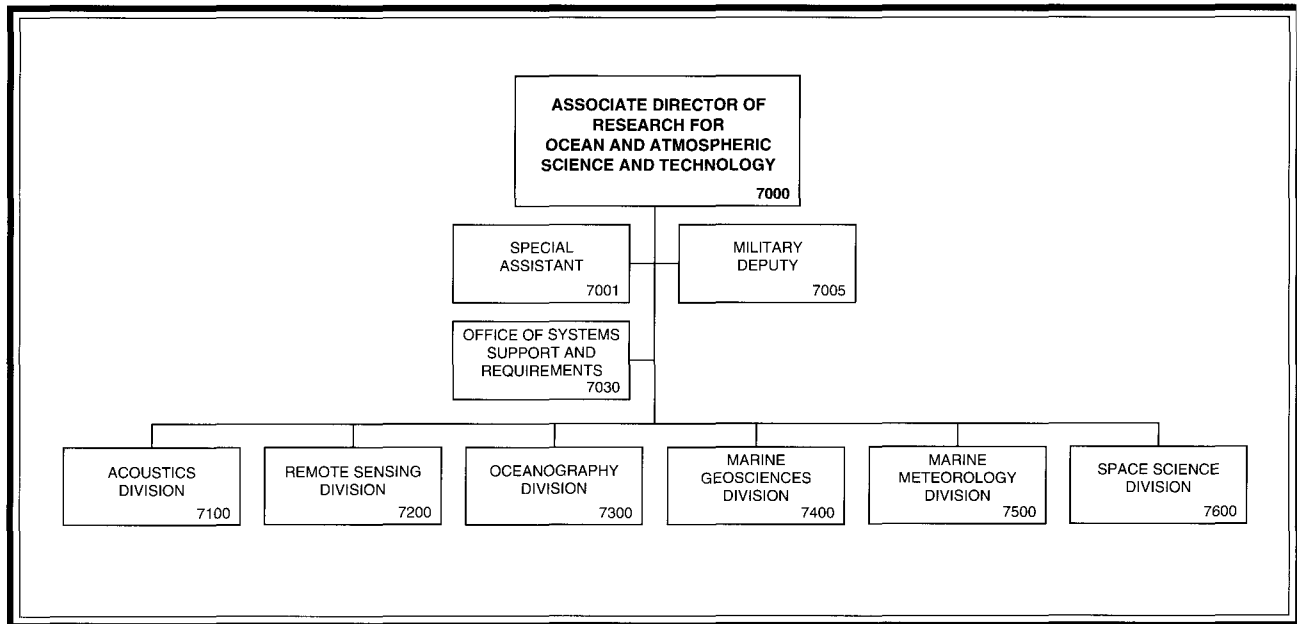
with many institutions and scientists. The efforts sought to understand the biological dynamics associated with the Bay's flow regimes, and studied the underlying water column and benthic biological processes resulting in the onset of the seasonal summer anoxia of the Bay.

In 1978, Dr. Hartwig accepted a position at Marine Ecological Consultants (MEC), where his research centered on understanding the "before operations" environment at a nuclear generating station. In 1980, Dr. Hartwig accepted a position at the Lawrence Berkeley Laboratory (LBL) at the University of California at Berkeley to head up the biological component of a research team studying the concept of a proposed Ocean Thermal Energy Conversion (OTEC) plant. His work involved extensive interactions with engineers on the operating characteristics of the plant and physical oceanographers modeling flow regimes around the plant and to be generated by the plant.

Following his research at LBL, Dr. Hartwig joined the Office of Naval Research in 1982 as a scientific officer in the Oceanic Chemistry/Biology Program. When the program was split into an Oceanic Chemistry and Oceanic Biology Program, Dr. Hartwig became Program Manager of the Oceanic Biology Program. Here Dr. Hartwig developed several major interdisciplinary research initiatives for the Navy.

In 1987, Dr. Hartwig was selected as Director of Ocean Sciences at ONR. He enhanced both university interactions with Ocean Sciences and the stature of ONR Ocean Science scientific officers and program managers in the Federal Government.

Dr. Hartwig joined NRL in October 1992 as Associate Director of Research for Ocean and Atmospheric Science and Technology.



Key Personnel

Name	Title	Code
Dr. E.O. Hartwig	Associate Director of Research for Ocean and Atmospheric Science and Technology	7000
Mrs. C.C. Thorowgood	Special Assistant	7001
CDR P. Ranelli	Military Deputy	7005
Dr. R.M. Root	Director/Head, Office of Systems Support and Requirements	7030
Dr. D.L. Bradley	Superintendent, Acoustics Division	7100
Dr. K. Johnston	Superintendent, Remote Sensing Division	7200
Dr. W.B. Moseley	Superintendent, Oceanography Division	7300
Dr. H.C. Eppert, Jr.	Superintendent, Marine Geosciences Division	7400
Dr. J.B. Hovermale	Superintendent, Marine Meteorology Division	7500
Dr. H. Gursky	Superintendent, Space Science Division	7600

Point of contact: Mrs. Velma Stiverson, Code 7000A (202) 404-8174

Office of Systems Support and Requirements

Code 7030 Staff Activity Areas

Security

- Physical security
- Classification
- SCIF management
- Security investigations

Safety

- Industrial/laboratory safety
- Specialized safety training
- Hazard abatement
- Preventive safety

Special Programs

- Patents
- NSAP
- CRADA
- IR&D
- Technology Transfer
- STILO

Support Services

- Classified document control
- Mailroom
- Correspondence/records management
- Facilities planning
- Facilities maintenance and management
- Facilities alterations
- Technical and classified library
- Technical editing, illustration, reproduction, printing
- Visual information, photographic services

Public Affairs

- Community relations
- Exhibits
- News releases
- Information

Information Systems

- Data communications
- Data networking
- Computer maintenance
- Consulting and planning
- Supercomputing interface management

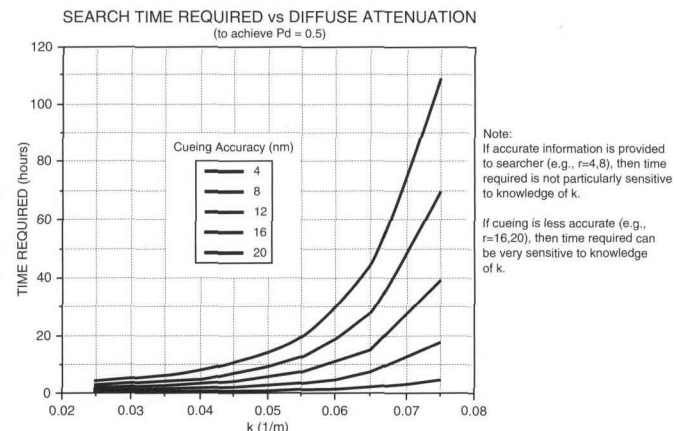
Operations/Systems Research

- Operations research
- Tactical analysis/decision aids
- System effectiveness studies
- At-sea exercise validation



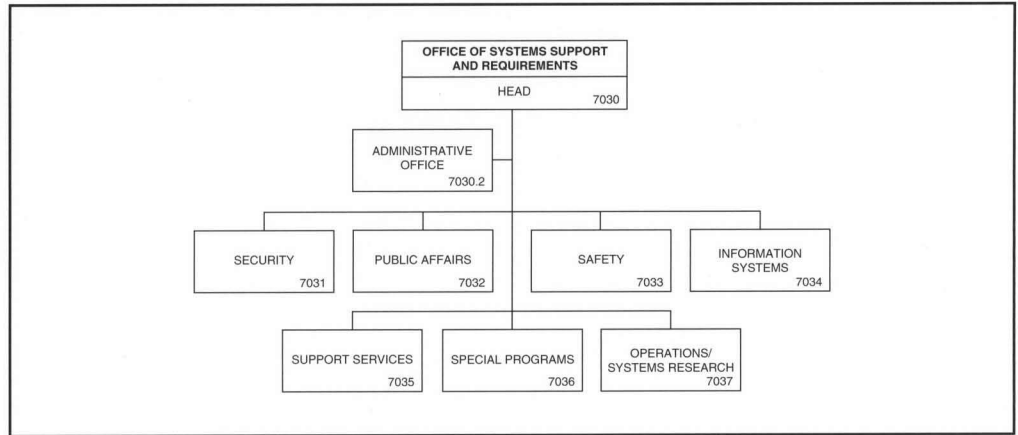
Safety first—proper protection

This graph shows the relationship between water clarity (as measured by diffuse attenuation), cueing accuracy (as measured by radius of area of uncertainty), and time to search out an area using an optical sensor. This analysis is a tactical decision aid that can be used by naval operators to plan searches with knowledge of the ocean environment.





DR. R.M. ROOT



Basic Responsibilities

The Office of Systems Support and Requirements is responsible for the operational and management support necessary for the day-to-day operations at NRL-Stennis Space Center, Mississippi (NRL-SSC). The Director of NRL-SSC acts for the Commanding Officer in dealing with local Naval, Federal, and civil activities and personnel on matters relating to NRL-SSC support activities and facilities, community, and multi-command issues, and safety and disaster control measures. The Office also conducts a technical program of operations/systems analysis to support applications of environmental knowledge to Navy systems and operations.

Support functions include security, public affairs, safety, information systems, and support services to include management and administration, facilities, technical information, and special programs (NSAP, STILO, Technology Transfer, etc.).

Personnel: 63 full-time civilian
1 military

Key Personnel

Name	Title	Code
Dr. R.M. Root	Head	7030
LCDR D.L. Roybal	Military Deputy	7030.MD
Ms. P.L. Fayard	Staff Assistant	7030.2
Mr. J.L. Carbonaro	Security Officer	7031
Ms. M.P. Rotundo	Head, Public Affairs	7032
Mr. J.D. Meredith	Safety Manager	7033
Mr. R.W. Burke	Head, Information Systems	7034
Mr. C.W. Mueller	Head, Support Services	7035
Mr. G.W. Foozer	Head, Management and Administrative Services	7035.1
Mr. M.S. Bellis	Head, Facilities Services	7035.2
Ms. S.A. Liddell	Head, Technical Information	7035.3
Mr. G.E. Stanford	Head, Special Programs	7036
Dr. R.A. Goggins	Head, Operations/Systems Research	7037

Point of contact: Dr. R.M. Root, Code 7030 (601) 688-4010

Acoustics Division

Code 7100

Staff Activity Areas

Special programs management
System concepts and studies

USN Journal of Underwater Acoustics

Research Activity Areas

Center for Advanced Acoustic Concepts and Computation

Geophysical inversion
Ocean tomography
Array design
Noise cancellation

Acoustic Signal Processing

Matched field processing
Transient acoustics
Airborne sensor systems
Bottom-limited acoustic properties
Arctic acoustic systems
Propagation
Ambient noise decomposition and modeling
Parallel processing
Pattern recognition

Physical Acoustics

Structural acoustics
Reflection, diffraction, scattering by bodies
Target strength modeling
Fiber-optic acoustic sensors
Acoustics of coatings
Hydrodynamic/acoustic interaction with elastic bodies

Acoustic Systems

Propagation, coherence, and wave-front behavior
Large-scale spatial and temporal integration
Low-frequency monostatic and multistatic reverberation
Shallow-water acoustic surveillance methods
Mode analysis
Models of signal and noise fields
Sensor fusion

Ocean Acoustics

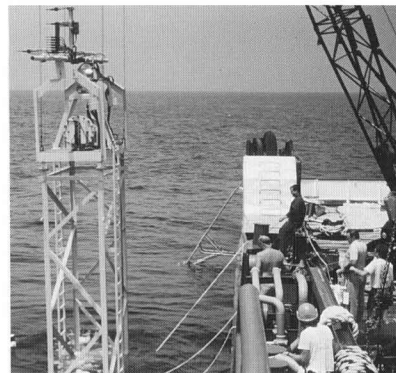
Arctic environmental acoustics
Shallow-water acoustics
Environmental impact on acoustic transients
High-frequency acoustics
Biologic volume reverberation
Seafloor scattering
Ambient noise measurements and simulation

Acoustic Simulation and Tactics

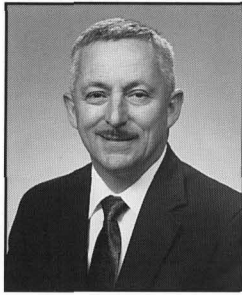
Seismo-acoustic wave propagation
Stochastic propagation and noise models
Simulations
Environmental assessments
Very-low frequency acoustics
Tactical decision aids
Ambient noise measurements and models



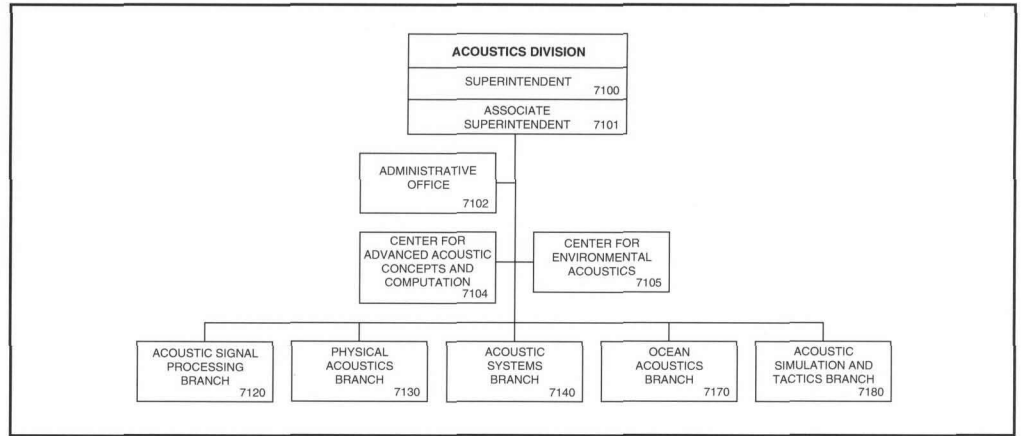
Structural acoustics studies in the instrumented NRL pool facility



Forward scatter tower being deployed



DR. D.L. BRADLEY



Basic Responsibilities

The Acoustics Division conducts basic and applied research in undersea physics. The basic research areas are signal processing; ocean acoustics and the associated description of the ocean environment as it impacts advanced systems; and physical acoustics. The applied spectrum includes developing and proving system concepts; signal processing for active and passive detection, tracking and classification of underwater targets; echo strength; structural acoustics; large area assessment techniques; and development of processing systems and techniques. Also included are basic and applied research in simulations and tactics as influenced by the environment. The Division program is interactive with the ONR Contract Research Program and other research laboratories, both U.S. and foreign.

Personnel: 197 full-time civilian

Key Personnel

Name	Title	Code
Dr. D.L. Bradley	Superintendent	7100
Vacant	Associate Superintendent	7101
Mrs. N.J. Beauchamp	Administrative Officer	7102
Dr. W.A. Kuperman	Head, Center for Advanced Acoustic Concepts and Computations	7104
Dr. E.R. Franchi	Head, Center for Environmental Acoustics	7105
Dr. M.H. Orr	Head, Acoustic Signal Processing Branch	7120
Dr. J.A. Bucaro	Head, Physical Acoustics Branch	7130
Mr. L.B. Palmer	Head, Acoustic Systems Branch	7140
Dr. D.J. Ramsdale	Head, Ocean Acoustics Branch	7170
Mr. J.E. Matthews	Head, Acoustic Simulation and Tactics Branch	7180

Point of contact: Dr. D.L. Bradley, Code 7100 (202) 767-3482

Remote Sensing Division

Code 7200 Research Activity Areas

Remote Sensing

Sensors

Radio

Microwave

SAR RAR, passive microwave

IR

CCD arrays, spectrometers

Optical interferometers

Areas

Marine ocean boundary layer

Polar ice

Middle atmosphere

Ionosphere

Space environment

Ocean phenomenology



The German Forschungs Platform NORDSEE is used for oceanic and atmospheric surface truth measurements in joint (US/GE/NATO) radar/radiometry/acoustics experiments providing data over a wide range of dynamic conditions

Astrometry

Radio interferometry

Optical interferometry

Reference frames

Radio Science

Astronomy

Astrophysics

Interferometry

Physics of Atmospheric/Ocean Interaction

Mesoscale, fine-structure, microstructure

Aerosol and cloud physics

Mixed layer and thermocline applications

Sea-truth towed instrumentation techniques

Turbulent jets and wakes

Nonlinear and breaking ocean waves

Stratified flows

Turbulence modeling

Boundary layer hydrodynamics

Marine hydrodynamics

Computational hydrodynamics

Imaging Research/System

Remotely sensed signatures analysis/simulation

Real-time signal and image processing

algorithm/systems

Image data compression methodology

Image fusion

Automatic target recognition

Scene/Sensor noise characterization

Image enhancement/noise reduction

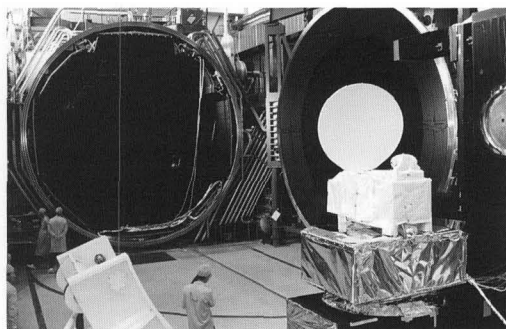
Scene classification techniques

Radar and laser imaging systems studies

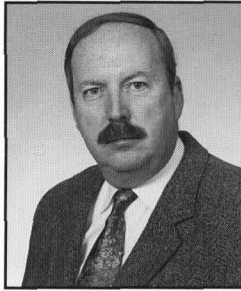
Coherent/Incoherent imaging sensor exploitation

Numerical simulation

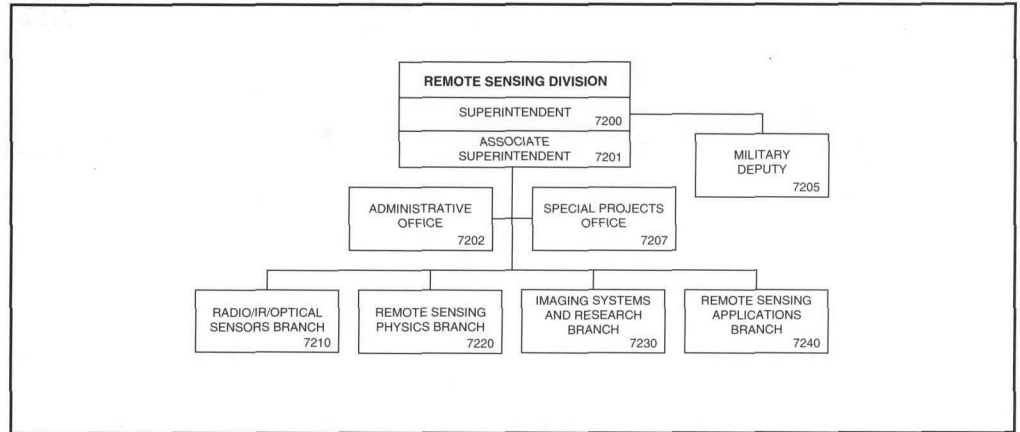
Environmental imagery analysis



The Millimeter-wave Atmospheric Sounder (MAS), designed and fabricated by Code 7200, is a shuttle-based radiometer designed to measure important constituents of the middle atmosphere (15-100 km) by limb-scanning millimeter-wave spectroscopy. MAS is an international effort involving components in Germany and Switzerland as well as the U.S. MAS is part of NASA's ATLAS series of spacelab shuttle flights. ATLAS 1 was successfully launched in March 1992, with successive launches at roughly yearly intervals scheduled.



DR. K.J. JOHNSTON



Basic Responsibilities

The Remote Sensing Division conducts 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 and in the near-Earth environment, as well as in deep space. The research, both theoretical and experimental, deals with discovering and understanding the basic physical principles and mechanisms that give rise to the background environmental emission and targets of interest and to absorption and emission mechanisms of the intervening medium. The accomplishment of this research requires the development of sensor systems technology. The 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 due to the Earth's atmosphere and oceans, as well as man-made or induced phenomena such as ship/submarine hydrodynamic effects. The research includes theory, laboratory, and field experiments leading to ground based, airborne or space systems for use in such areas as remote sensing, astrometry, astrophysics, surveillance, nonacoustic ASW, and improved meteorological support systems for the operational Navy. Special emphasis is given to developing space-based platforms and exploiting existing space systems.

Personnel: 106 full-time civilian

Key Personnel

Name	Title	Code
Dr. K.J. Johnston	Superintendent	7200
Mr. G.W. Hoskins	Associate Superintendent	7201
Mrs. M.K. Smith	Administrative Officer	7202
Dr. V.E. Noble	Chief Scientist	7203
Dr. D.T. Chen	Special Projects Office	7207
Dr. R.S. Simon	Head, Radio/Infrared/Optical Sensors Branch	7210
Dr. P.R. Schwartz	Head, Remote Sensing Physics Branch	7220
Dr. S.A. Mango	Head, Imaging Systems and Research Branch	7230
Mr. A. Pressman	Head, Remote Sensing Applications Branch	7240

Point of contact: Dr. K.J. Johnston, Code 7200 (202) 767-2351

Oceanography Division

Code 7300 Staff Activity Areas

Block program management
Special studies

Scientific Committee of National Representatives

Research Activity Areas

Ocean Dynamics and Prediction

Ocean prediction
Large scale
Arctic
Shipboard
Data assimilation
Coastal and semi-enclosed sea
Ocean observing system simulation

Ocean Sciences

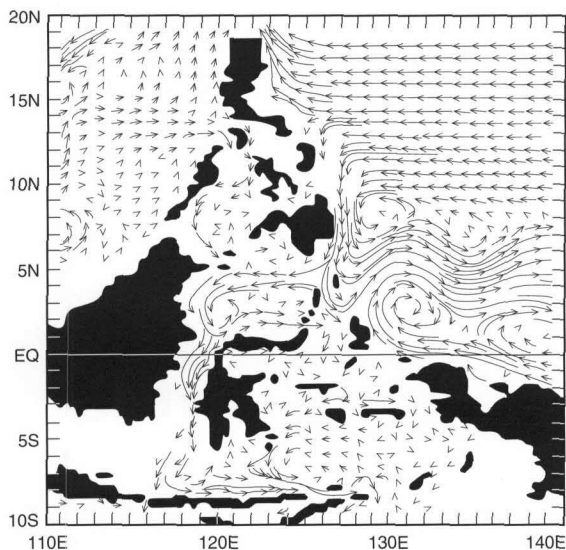
Mesoscale dynamics
Coupled systems
Air sea interaction
Biodynamics
Bio-optical models
Small scale dynamics
Small scale turbulence
Bubbles/waves

Upper Ocean Dynamics

High-resolution remote sensing
Hydrodynamic process modeling
Observations-hydrodynamic, CM scale surface
Wave action spectral density modeling
SAR/RAR image modeling
Surface feature analysis/modeling
Wakes
Evaluation of competing noise

Ocean Technology

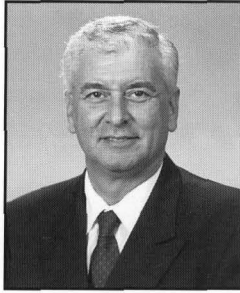
Ocean measurements
AOSS (Advanced Optical Surveillance System)
OBT (On-Board Trainer)/network
Instrumentation-shipboard/aircraft



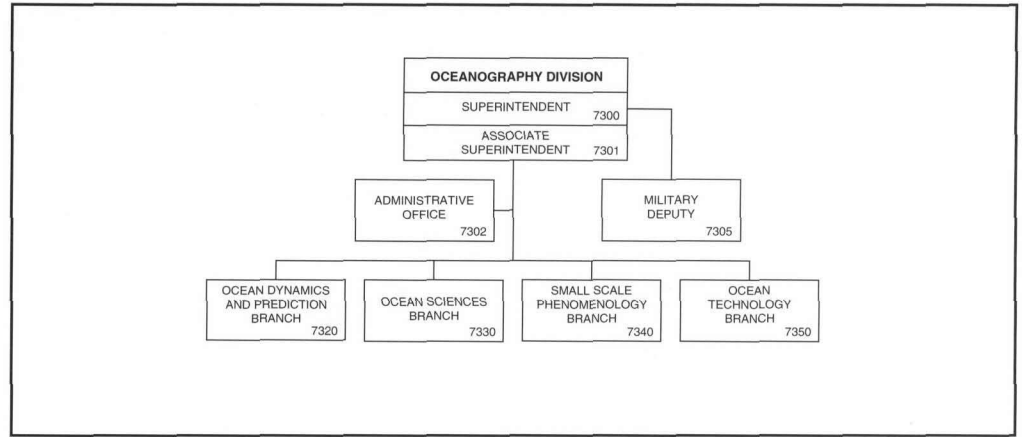
Computer modeling of ocean currents around Indonesia



Versatile Experimental Data Acquisition Buoy System (VEDABS) being readied for sea



DR. W.B. MOSELEY



Basic Responsibilities

The Oceanography Division conducts basic and applied research in biological, chemical, dynamical, and physical processes of the ocean and marine boundary layer, and ocean engineering efforts in deployable environmental data acquisition and processing systems. The oceanographic research is both theoretical and experimental in nature and is focused on understanding ocean hydro/thermodynamics, ocean circulation, ice dynamics, air-sea exchanges, ocean optics, small- and micro-scale turbulence, bioluminescence, ship/submarine induced effects, and microbially induced corrosion. The Division programs are designed to be responsive to, and to anticipate, naval needs. Key to this is extensive interaction with the Warfare Centers, CNO, and the Fleet and substantial participation in Navy R&D planning groups. Transition of Division products to system developers and the operational Navy is a primary goal. The Division program is coordinated and interactive with other NRL programs and activities, ONR's Research Program Department, and other government agencies involved in oceanographic activities. The Division collaborates and cooperates with scientists from the academic community and other U.S. and foreign laboratories.

Personnel: 134 full-time civilian
1 full-time military

Key Personnel

Name	Title	Code
Dr. W.B. Moseley	Superintendent	7300
Dr. E.M. Stanley	Associate Superintendent	7301
Mrs. Iris DeSpain	Administrative Officer	7302
CDR J.E. Johnson	Military Deputy	7305
Dr. J.W. McCaffery	Head, Ocean Dynamics and Prediction Branch	7320
Dr. A.W. Green	Head, Ocean Sciences Branch	7330
Mr. E.E. Rudd	Head, Small Scale Phenomenology Branch	7340
Mr. C.W. Orr	Head, Ocean Technology Branch	7350

Point of contact: Mrs. Iris DeSpain, Code 7302 (601) 688-4114

Marine Geosciences Division

Code 7400 Research Activity Areas

Marine Geology

- Sedimentary processes
- Pore fluid flow
- Diapirism, volcanism, faulting, mass movement
- Sediment geochemistry

Marine Geophysics

- Seismic wave propagation
- Earthquake seismology
- Physics of low-frequency acoustic propagation
- Acoustic energy interaction with topography and inhomogeneities
- Detection, localization, and characterization of events
- Geomagnetic modeling

Marine Geotechnique

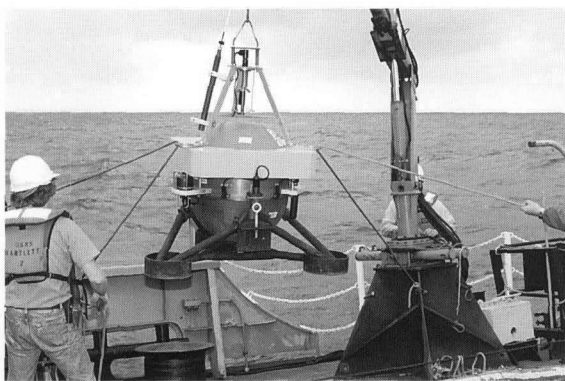
- Sediment classification
- Sediment microfabric
- Geoacoustic modeling
- Geotechnical properties of sediments

Mapping and Charting

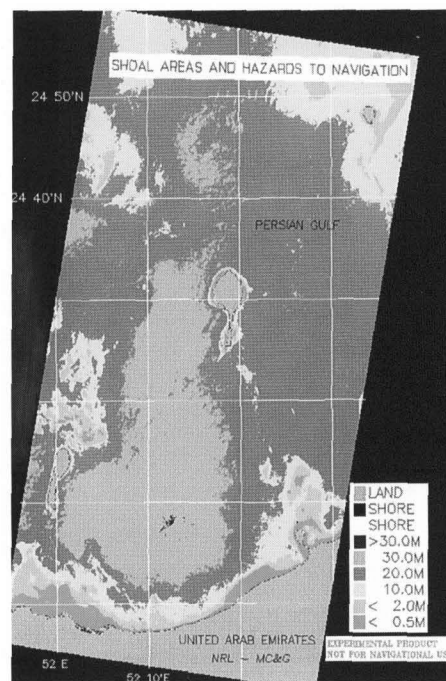
- Digital database design
- Digital product analysis and standardization
- Data compression techniques and exploitation
- Hydrographic survey techniques
- Bathymetry extraction techniques from remote and acoustic imagery
- Utility software development for digital mapping databases

In-Situ and Laboratory Sensors

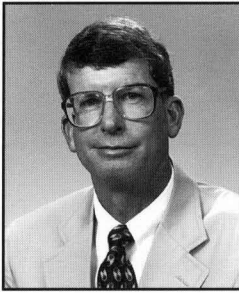
- High-resolution subseafloor 2-D and 3-D seismic imaging
- Swath acoustic backscatter imaging
- Sediment pore water pressure
- Compressional and shear wave velocity
- Airborne electromagnetics
- Seafloor magnetic fluctuation
- Sediment microfabric change with pore fluid change



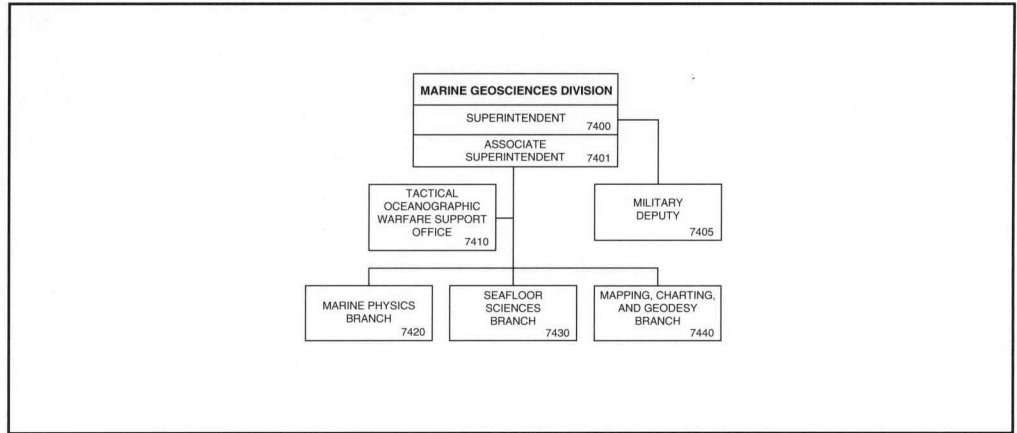
Ocean bottom seismometer being deployed



Remotely sensed shoal detection and remote bathymetry



DR. H.C. EPERT, JR.



Basic Responsibilities

The Marine Geosciences Division has responsibility for planning and executing a broad spectrum research, development, technology and engineering program in marine geology, geophysics, geoacoustics, geotechniques, and mapping, charting and geodesy (MC&G). The program is designed to provide necessary digital databases, geoacoustic and geophysical models, and simulations to support training, system design, performance prediction, and operations needs of the Navy.

The applied portion of the program is directed toward (1) quantitatively predicting the effects of the seafloor and associated geophysical, geomorphological, and geoacoustic variability on performance of present and emerging naval systems, operations and plans, and (2) developing technology and techniques to rapidly acquire, process, and analyze MC&G (gravity, magnetics and bathymetry) and other types of geological, geophysical, and geoacoustic information to meet existing digital database requirements of the Chief of Naval Operations (CNO), Defense Mapping Agency (DMA), and system commands.

The Division serves as the focal point in the Navy and Marine Corps for assessing and identifying MC&G requirements, including prototype digital MC&G products and product coordination. The program is keyed to and responsive to priorities identified by NRL, Office of Naval Research, CNO, the system commands, and DMA. Close coordination and interaction with the Warfare Centers is essential to the success of this program with transition of Division products to system developers and the operational Navy a primary goal. The Division program is coordinated and interactive with other NRL programs and activities, ONR's Research Program Department, 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.

Personnel: 99 full-time civilian
4 full-time military

Key Personnel

Name	Title	Code
Dr. H.C. Eppert, Jr.	Superintendent	7400
Dr. P.J. Valent	Associate Superintendent	7401
Mr. F.H. Conner	Administrative Officer	7402
LCDR C.D. Johnson	Military Deputy	7405
Mr. K.M. Ferer	Head, Tactical Oceanographic Warfare Support Office	7410
Mr. H.S. Fleming	Head, Marine Physics Branch	7420
Mr. S.G. Tooma	Head, Seafloor Sciences Branch	7430
Mr. M.M. Harris	Head, Mapping, Charting, and Geodesy Branch	7440

Point of contact: Mr. F.H. Conner, Code 7402 (601) 688-4660

Marine Meteorology Division

Code 7500 Staff Activity Areas

Project Reliance
Program management

Research Activity Areas

Numerical Weather Prediction

Global
Regional
Large Eddy Simulation
Boundary layer
Coastal
Massively parallel computing
Coupled ocean/atmosphere
Arctic leads
Tropical cyclones

Data Assimilation

Optimum interpolation
Objective analysis
Quality control
Synthetic soundings
Remotely sensed data

Shipboard Support

Port studies
Typhoon havens
Forecaster handbooks
Expert systems
CD-ROMs

Satellite Data/Imagery

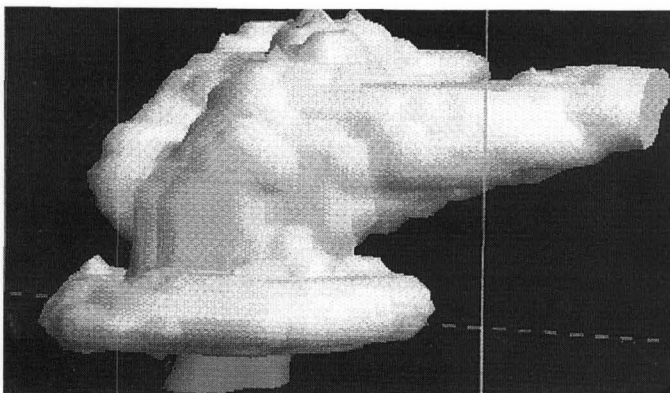
Cloud classification
Visual interpretation
Case study development
Automated interpretation
Aerosols

Tactical Systems

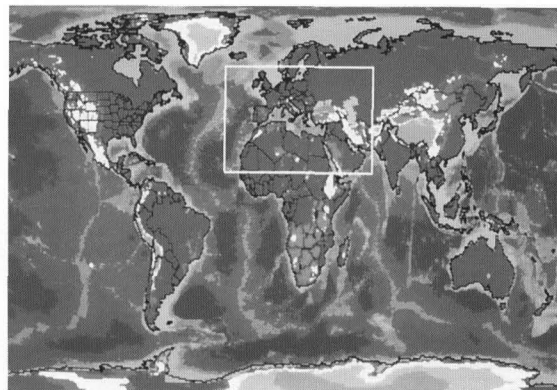
Tactical Environmental Support System
Data fusion
Visualization

Decision Aids

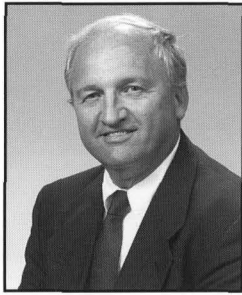
Refractivity
Strike warfare
Ship routing
Fog/Turbulence/Icing
Electro-optical



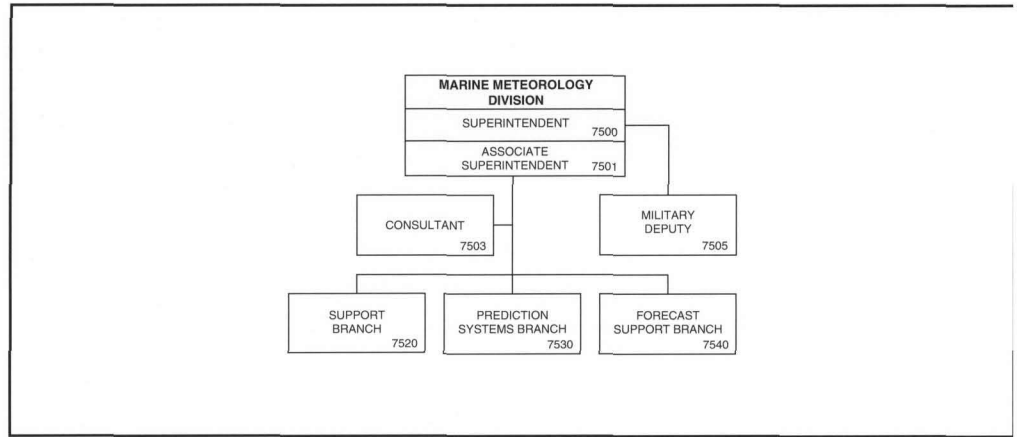
Computer simulation of a thunderstorm



Graphical user interface eases access to climate summaries on CD-ROM



Dr. J.B. HOVERMALE



Basic Responsibilities

The Marine Meteorology Division conducts basic and applied research in meteorology. Basic research includes work in air-sea interaction process studies, ocean-atmosphere teleconnections, and arctic studies. Applied research spans the gamut from development of both central-site and shipboard forecast models and aids, to the development of tactical aids for operations or weapons systems. NRL-Monterey (NRL-MRY) is co-located with the Fleet Numerical Oceanography Center (FNOC) and has developed and transitioned to FNOC the global and regional forecast models that form the backbone of the Navy's world-wide weather forecasting capability. In addition, NRL-MRY is lead laboratory for the third phase of the Tactical Environmental Support System, a shipboard-based environmental diagnosis/forecast system. Specialties of the Division include numerical weather prediction, data assimilation and quality control, environmental decision aids, data base management, and satellite imagery interpretation.

Personnel: 63 full-time civilian
1 full-time military

Key Personnel

Name	Title	Code
Dr. J.B. Hovermale	Superintendent	7500
Dr. P.M. Tag	Associate Superintendent	7501
Ms. L.E. O'Toole	Administrative Officer	7502
CDR R.G. Handlers	Military Deputy	7505
Ms. L.E. O'Toole	Support Branch	7520
Mr. S.W. Payne	Head, Prediction Systems Branch	7530
Dr. T.L. Tsui	Head, Forecast Support Branch	7540

Point of contact: Dr. J.B. Hovermale, Code 7500 (408) 656-4721; DSN 878-4721

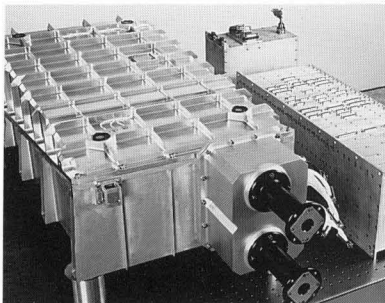
Space Science Division

Code 7600 Research Activity Areas

Space Weather and Atmospheric Physics

- Remote sensing of the ionosphere
- Middle atmospheric investigations
- Global modeling
- Upper atmospheric physics
- Space astronomy
- X-ray observation, analysis and theory of space astronomical sources
- Ultraviolet astronomy
- Gamma-ray astrophysics, solar-flare gamma-rays, space cosmic ray partial environment

The Solar Ultraviolet Spectral Irradiance Monitor on-board the Upper Atmospheric Research Satellite (launched September 1991) measures the total solar irradiance in the wavelength region of 200 to 400 nm



Radiation detectors based on superconductivity, which promise energy resolution 10 to 100 times better than existing detectors, are being investigated in this specially-instrumented cryostat

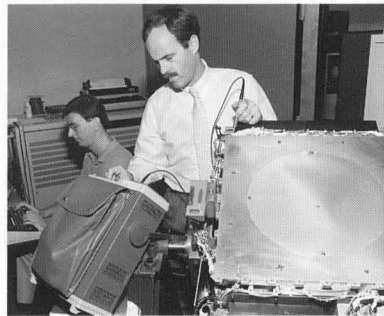
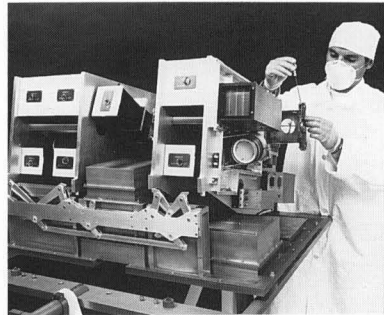
Solar Physics

Solar ultraviolet and visible light spectroscopy and photometry from rockets, satellites, and the Space Shuttle

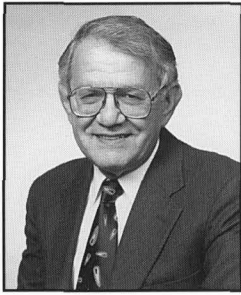
Solar-Terrestrial Relationships

Solar X-ray/EUV plasma diagnostics; coronal effects on Earth

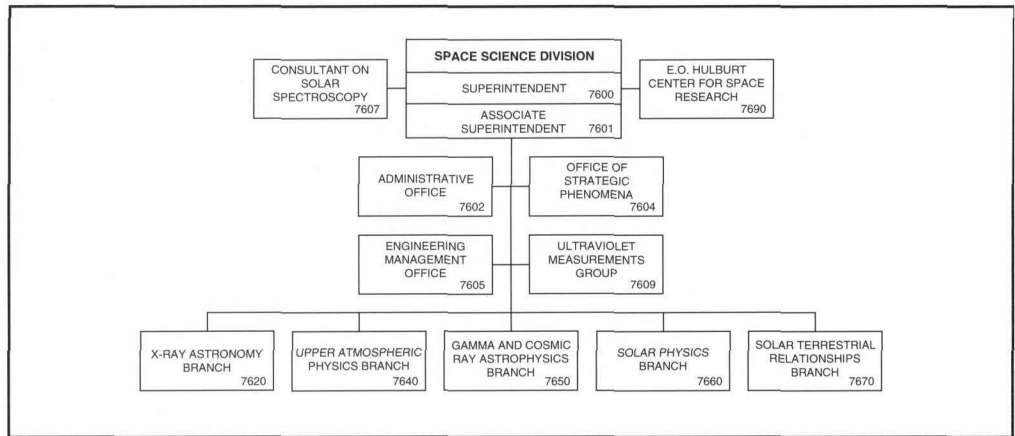
The Remote Atmospheric and Ionospheric Detection System, an array of eight optical instruments, will fly aboard a NOAA Tiros satellite to measure air-glow from the upper atmosphere and ionosphere



Scientists test a detector assembly for NRL's Oriented Scintillation Spectrometer Experiment launched on NASA's Gamma Ray Observatory mission in April 1991. Its 5-10 year mission: to investigate 50 keV to 10 MeV nuclear radiation from solar flares, neutron stars, supernovae, and black holes.



DR. H. GURSKY



Basic Responsibilities

The Space Science Division conducts research in the fields of astronomy and astrophysics, solar-terrestrial physics, and atmospheric science. Satellites, rockets, and ground-based facilities are used to obtain information on radiation from the Sun and celestial sources, and to study the behavior of the ionosphere and high atmosphere. Research results are of importance to radio communications, to use of the space environment, to weather prediction, and to the fundamental understanding of natural radiation and geophysical phenomena. The Superintendent also acts as Chief Scientist of the E.O. Hulburt Center for Space Research, created to provide research opportunities in space science to appointees from universities.

Personnel: 111 full-time civilian

Key Personnel

Name	Title	Code
Dr. H. Gursky	Superintendent	7600
Dr. R.G. Groshans	Associate Superintendent	7601
Mrs. B.M. Shea	Administrative Officer	7602
Dr. H.M. Heckathorn	Director, Office of Strategic Phenomena	7604
Mr. J. Vrancik	Engineering Management Officer	7605
Dr. R. Tousey	Consultant (Emeritus), Solar Spectroscopy	7607
Dr. G. Carruthers	Head, Ultraviolet Measurements Group	7609
Mr. G.G. Fritz	Head, X-Ray Astronomy Branch	7620
Dr. R.R. Meier	Head, Upper Atmospheric Physics Branch	7640
Dr. J.D. Kurfess	Head, Gamma and Cosmic Ray Astrophysics Branch	7650
Dr. G.E. Brueckner	Head, Solar Physics Branch	7660
Dr. G.A. Doschek	Head, Solar Terrestrial Relationships Branch	7670
Dr. H. Gursky [†]	Chief Scientist, E.O. Hulburt Center for Space Research	7690
Dr. H. Friedman	Chief Scientist (Emeritus), E.O. Hulburt Center for Space Research	7690

Point of contact: Mrs. B.M. Shea, Code 7602 (202) 767-3631

[†]Additional duty



**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 activities extend from basic and applied research through advanced development in all areas of interest to the Navy space program. These activities include developing 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;

system engineering to allocate design requirements to subsystems; and 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 of Naval Center for Space Technology

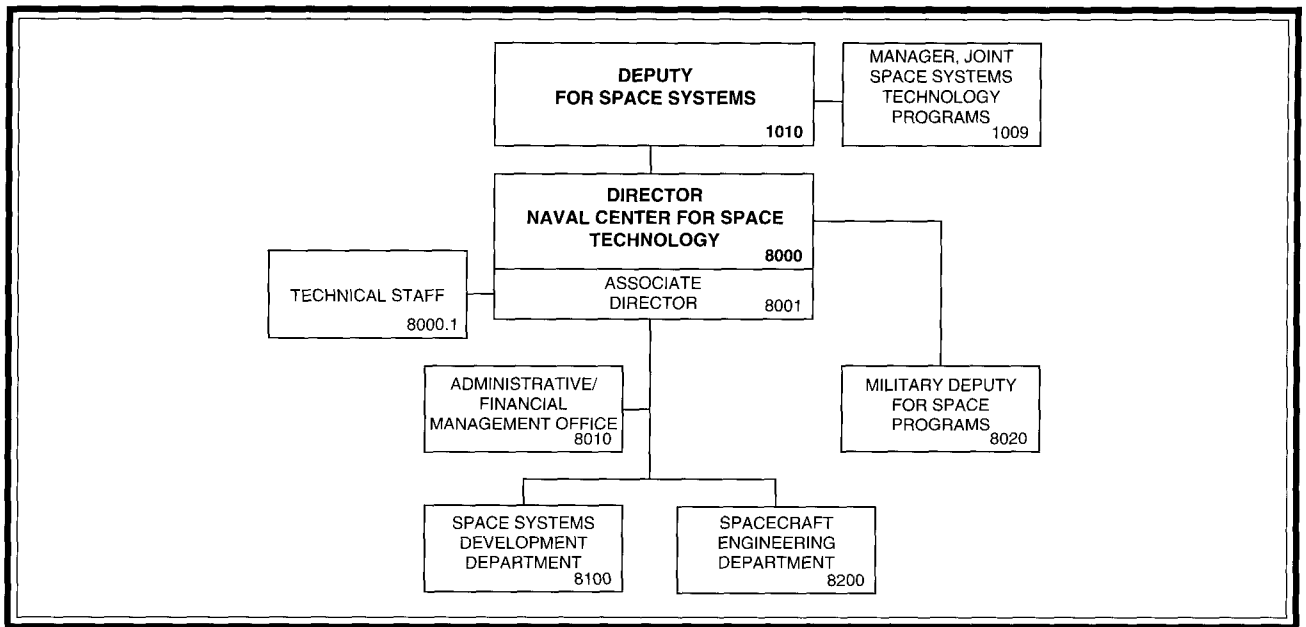


Mr. P.G. Wilhelm [REDACTED]. He attended Purdue University, where he received a B.S.E.E. degree in 1957. By 1961, he had completed all the course work for an M.S.E. degree from George Washington University.

From 1957 to 1959, Mr. Wilhelm served as an electrical engineer with Stewart Warner Electronics where he was assigned to a project to redesign the UPM-70, a Navy radar test set. In March 1959, he joined the Naval Research Laboratory as an electrical scientist in the Electronics Division. In December 1959, he joined the Naval Research Laboratory as an electrical scientist in the Electronics Division. In December 1959, he joined

the Satellite Techniques Branch. In 1961, he became Head of the Satellite Instrument Section; in 1965, he became Head of the Satellite Techniques Branch; and in 1974, Head of the Spacecraft Technology Center. In these positions, he performed satellite system design, equipment development, environmental testing, launch operations, and orbital data handling. In 1981, he was named the Superintendent of the Space Systems and Technology Division, the Navy's principal organization, or "lead Laboratory," for space. He is credited with contributions in the design, development, and operation of 78 scientific and Fleet-support satellites. He has been awarded five patents. In October 1986, he was appointed Director of the newly established Naval Center for Space Technology. 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."

Mr. Wilhelm has been recognized with numerous awards including the Navy's Meritorious Civilian Service Award, the Distinguished Civilian Service Award, the Presidential Meritorious Executive Award, NRL's Space Systems Program Achievement Award, the Institute of Electrical and Electronics Engineers Aerospace and Electronic Systems Group Man of the Year Award in 1981, the NRL E.O. Hulburt Annual Science and Engineering Award for 1982, and the Dexter Conrad Award. He also has been elected a Fellow of the Washington Academy of Sciences and a Fellow of the American Institute of Aeronautics and Astronautics.



Key Personnel

Name	Title	Code
Mr. P.G. Wilhelm	Director, Naval Center for Space Technology	8000
Mr. F.V. Hellrich	Associate Director	8001
Mrs. L.T. McDonald	Head, Administrative/Financial Management Office	8010
CDR M. Abrams, USN	Military Deputy for Space Programs	8020
Mr. R.E. Eisenhauer	Superintendent, Space Systems Development Department	8100
Mr. R.T. Beal	Superintendent, Spacecraft Engineering Department	8200

Point of contact: Mr. F.V. Hellrich, Code 8001, (202) 767-6549

Space Systems Development Department

Code 8100

Research Activity Areas

Advanced Space Systems Technologies

- Space systems architectures and requirements
- Advanced payloads and optical systems
- Controllers, processors, and signal processing
- Data management systems and equipment
- Embedded algorithms and software

Astrodynamics

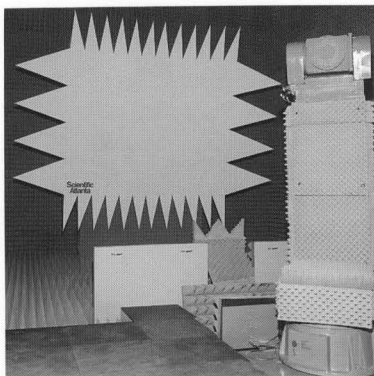
- Mathematic modeling and algorithms
- Astrodynamics and attitude dynamics

Command, Control, Communications, Computers, and Intelligence

- Communications theory and systems
- Tracking, telemetry, and control systems
- Spacecraft test systems and satellite simulators
- Antenna systems
- High-speed ground data collection, processing, and dissemination systems

Space Electronic Systems Development

- Detailed electrical/electronic design
- Space systems fabrication, test, and integration
- Launch and on orbit support
- Test equipment and ground support equipment



This new compact range for far field radio frequency measurements of antennas, and the radar cross section measurement of objects is shared by Codes 5300 and 8100. The new facility has a frequency test limit above 100 GHz, extending the test capability facilities well above our other anechoic chamber's 18 GHz limit.

Space Electronic Warfare

- Design criteria for counter-surveillance and counter-targeting
- Data search, analysis, and synthesis of information related to special sensor performance

Space Mission Development

- Mission development and requirements definition
- Systems engineering and analysis
- Concepts of operations and mission simulations
- Mission evaluation and performance assessments

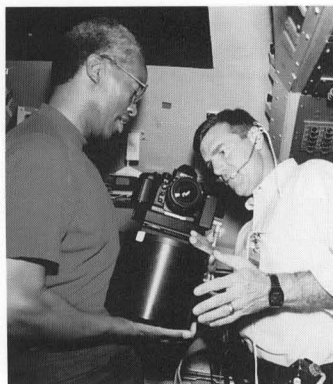
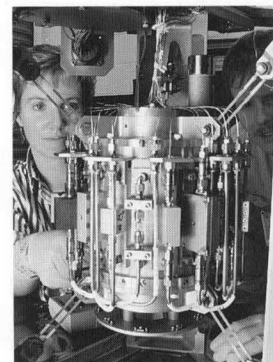
Space Surveillance, Navigation and Time

- Advanced navigation satellite technology
- Precise Time and Time Interval (PTTI) technology
- Atomic time/frequency standards/instrumentation
- Passive and active ranging techniques
- Detection and precision tracking of orbiting objects from space and ground

Strategic Defense Initiative

- Flight experiments and satellites for space-based defense initiatives

The High Temperature Superconductivity Space Experiment (HTSSE) space flight experiment hardware assembly being installed in the host vehicle.



The Hand-held, Earth-oriented, Real-time, Cooperative, User-friendly, Location-targeting, and Environmental System (HERCULES) incorporates a camera, ring laser gyroscope, charge coupled device (CCD), digital imaging system, and computer. It allows an astronaut in space to point the camera at an object of interest on the Earth's surface, record the image and allow real time observation, while geolocating the boresight of the Earth image to within two nautical miles.

Spacecraft Engineering Department

Code 8200

Research Activity Areas

Design, Test, and Processing

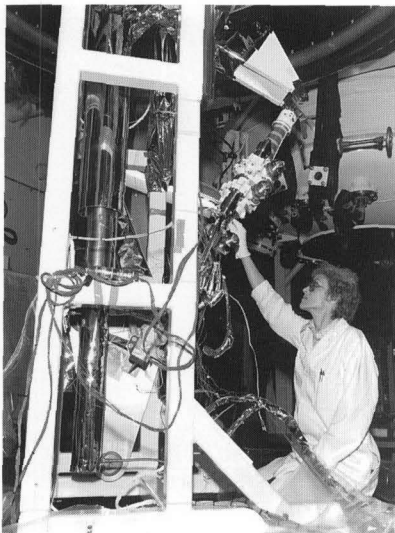
- Launch vehicle integration
- Spacecraft manufacturing
- Spacecraft design
- Spacecraft test and production planning
- Spacecraft assembly and processing
- Spacecraft environmental testing
- Spacecraft mechanical functional testing

Systems Analysis

- Spacecraft structural design
- Spacecraft environmental testing
- Structural and thermal analysis
- Materials research
- Flexible space structures research

Control Systems

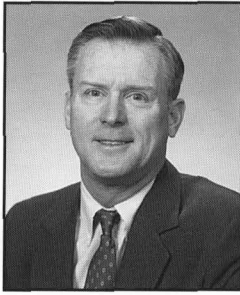
- Attitude control systems
- Reaction control systems
- Propulsion systems
- Flight operations support
- Orbit dynamics
- Expert systems
- Spaceborne applications of robotics



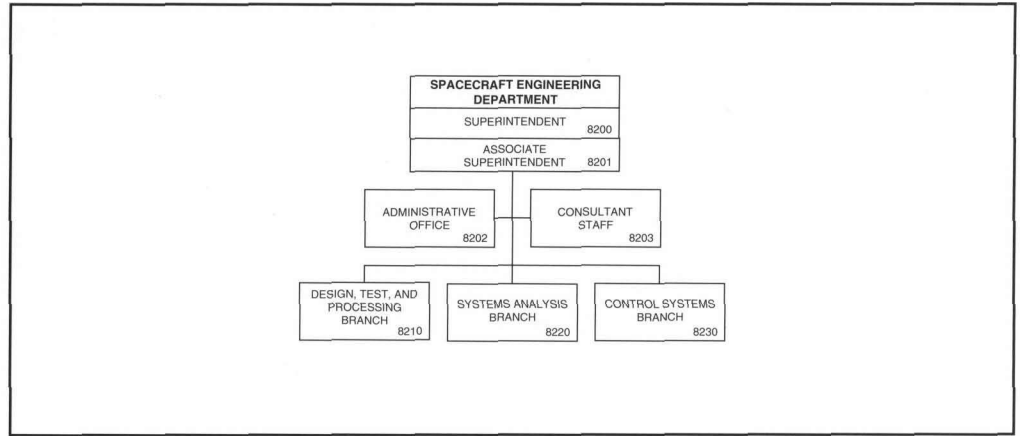
Ball-screw actuator being readied for vacuum-chamber test



A specially designed and constructed facility for the safe handling and testing of propellants used in Naval Center for Space Technology spacecraft



MR. R.T. BEAL



Basic Responsibilities

The Spacecraft Engineering Department (SED) is the focal point for the Navy's "in-house" spacecraft bus capability. Activities of the SED range from concept and feasibility planning, through the on-orbit IOC for the Navy Space Systems. Design, assembly and test activities are performed in teamwork with the Space Systems Development Department. The SED provides analysis, design and hardware expertise in structures and mechanisms, attitude control systems, propulsion and reaction control systems, thermal control systems, satellite design integration, launch vehicle integration and satellite-to-boost-stage integration.

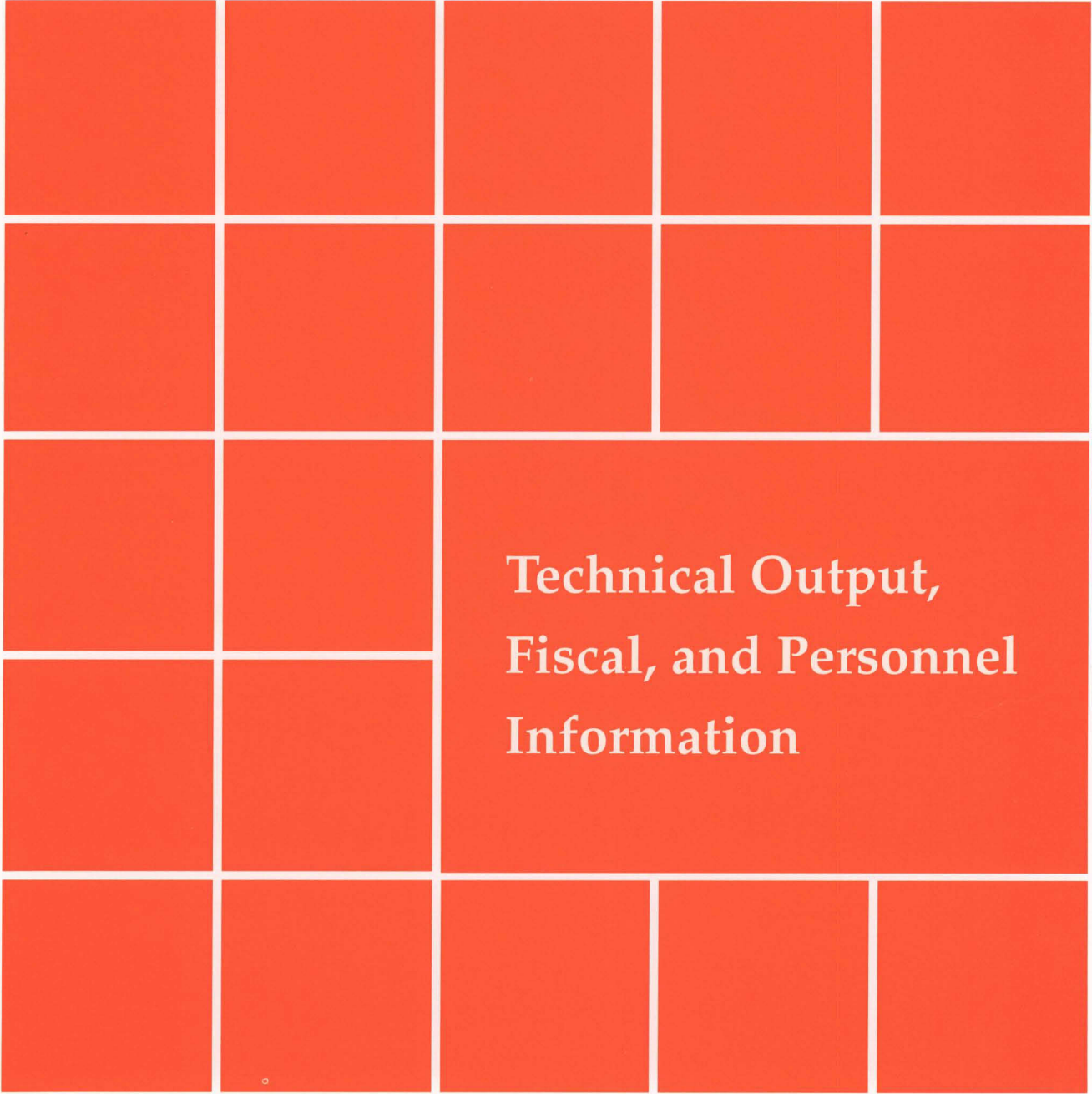
The SED functions as "Program Manager" for Navy Programs. In this role, system engineering and technical directions are provided to Navy Space Programs while maintaining an active in-house satellite development capability. The SED performs as a prototype laboratory in this role and pursues the program to ensure that designs are transferable to industry for additional satellite hardware builds. Following an NRL build, the SED supports the Navy Program Office by providing experienced expert technical consultation.

Personnel: 84 full-time civilian

Key Personnel

Name	Title	Code
Mr. R.T. Beal	Superintendent	8200
Mr. E. Senasack	Associate Superintendent	8201
Mrs. C. Warner	Administrative Officer	8202
Mr. L. Sentiger	Consultant Staff	8203
Mr. A.D. Watts	Head, Design, Test, and Processing Branch	8210
Mr. M. Brown	Head, Systems Analysis Branch	8220
Mr. S. Hollander	Head, Control Systems Branch	8230

Point of contact: Mr. R.T. Beal, Code 8200, (202) 767-6407



**Technical Output,
Fiscal, and Personnel
Information**

Technical Output

Publications

Scientists and engineers at the Naval Research Laboratory have published more than 33,452 articles, reports, and books since the Laboratory was established in 1923. During fiscal year 1992, NRL researchers published 1 book, 499 journal articles, and 169 NRL memorandum and formal reports. In addition, their works were described in 293 conference proceedings; approximately 1860 presentations were made to scientific, military, and Government audiences.

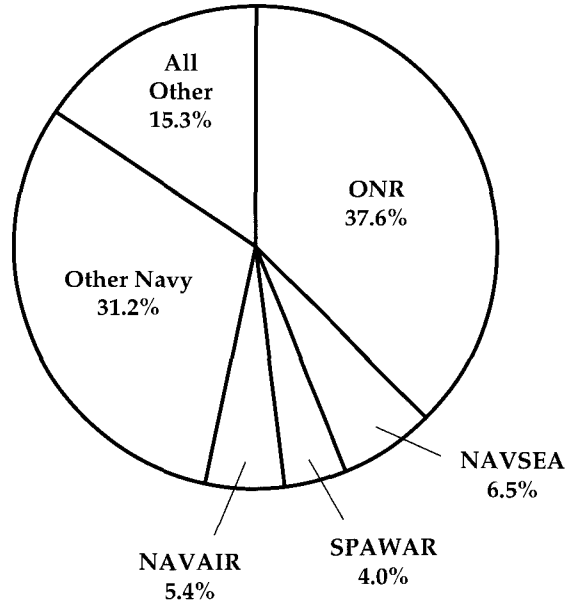
Patents

NRL scientists have made significant contributions in many areas of technology. The quality and quantity of these contributions can be measured by the number of patents received and applications filed. During fiscal year 1992, researchers were awarded 59 patents; this brings NRL's total of patents issued since 1923 to 3492. The number of patent applications filed during this period increased to 101; 2 SIRs (Statutory Invention Registry) were also filed. To date, 39 SIRs have been issued to NRL researchers.

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 between laboratories such as NRL and nonfederal 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.

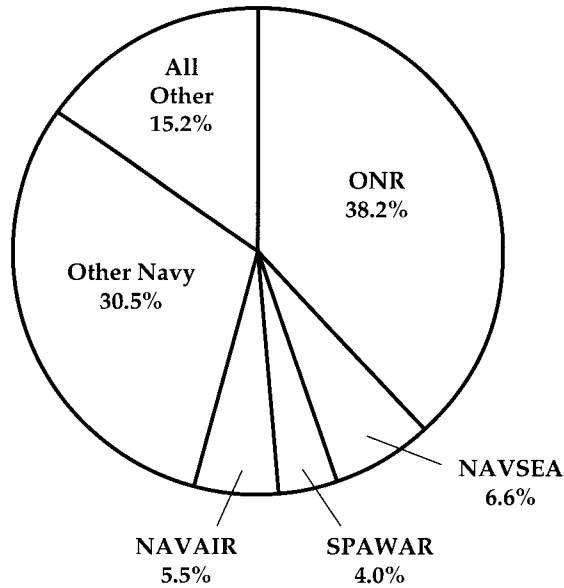
FY 1992 Sources of New Funds (Actual)



Source of Funds (%)

	<u>\$M</u>		<u>Total</u>
	<u>Reimbursable</u>	<u>Direct Cite</u>	
Office of Naval Research (ONR)	223.0	51.6	274.6
Space and Naval Warfare Systems Command (SPAWAR)	18.3	11.1	29.4
Naval Air Systems Command (NAVAIR)	30.8	8.7	39.5
Naval Sea Systems Command (NAVSEA)	39.4	7.8	47.2
Other Navy	134.3	93.3	227.6
All Other	<u>73.8</u>	<u>38.1</u>	<u>111.9</u>
Total Funds	519.6	210.6	730.2

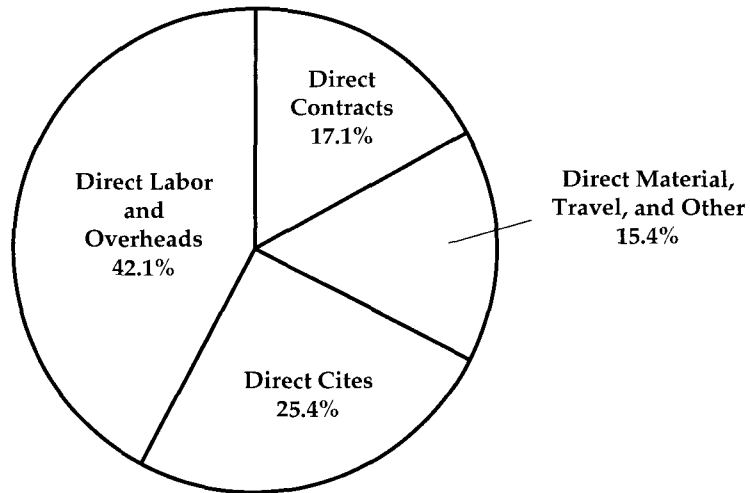
FY 1993 Sources of New Funds (Plan)



Source of Funds (%)

	<u>\$M</u>		<u>Total</u>
	<u>Reimbursable</u>	<u>Direct Cite</u>	
Office of Naval Research (ONR)	231.2	44.9	276.1
Space and Naval Warfare Systems Command (SPAWAR)	19.0	9.6	28.6
Naval Air Systems Command (NAVAIR)	31.9	7.6	39.5
Naval Sea Systems Command (NAVSEA)	40.8	6.8	47.6
Other Navy	139.0	81.1	220.1
All Other	<u>76.4</u>	<u>33.1</u>	<u>109.5</u>
Total Funds	538.3	183.1	721.4

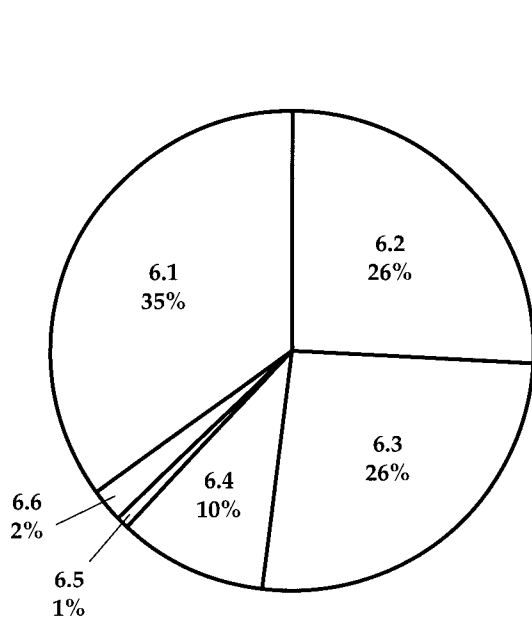
FY 1993 Distribution of New Funds (Plan)



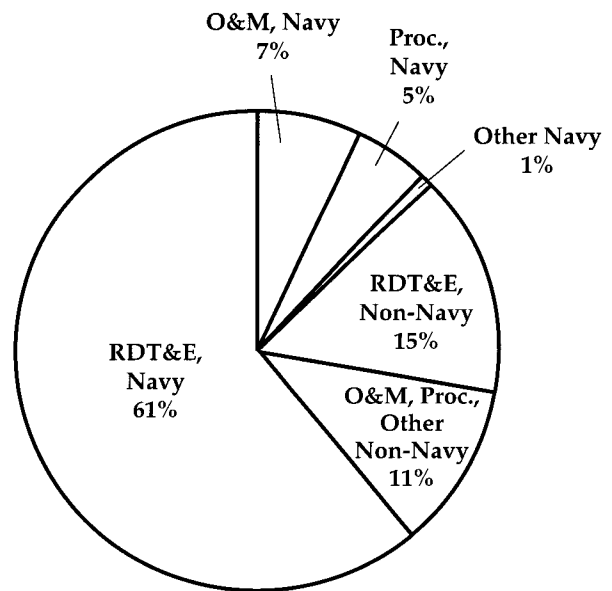
Distribution of Funds (%)

	<u>\$M</u>
Direct Labor	149.7
General Overhead	83.9
Indirect Overhead	70.1
Direct Material, Travel, and Other	110.9
Direct Contracts	123.7
Direct Cites	<u>183.1</u>
 Total Funds	 721.4

FY 1993 Reimbursable New Funds by Category (Plan)



Distribution of RDT&E, Navy (%)
(\$327.1)



Distribution of Reimbursable (%)
(\$538.3)

<u>Category</u>	<u>\$M</u>		<u>Total</u>
	<u>Navy</u>	<u>Non-Navy</u>	
6.1 Research	114.9	1.5	116.4
6.2 Exploratory Development	84.5	10.7	95.2
6.3 Advanced Development	84.2	68.0	152.2
6.4 Engineering Development	33.6	0.3	33.9
6.5 Management and Support	3.6	0.1	3.7
6.6 Operational Systems Development	<u>6.3</u>	<u>1.2</u>	<u>7.5</u>
Subtotal RDT&E	327.1	81.8	408.9
Operation and Maintenance	37.2	1.5	38.7
Procurement	26.5	2.2	28.7
Other	<u>0.9</u>	<u>61.1</u>	<u>62.0</u>
Total Funds	391.7	146.6	538.3

Personnel Information*

Civilian

Full-Time, Permanent (FTP)	
Graded	3505
Ungraded	<u>281</u>
Total	3786

Temporary, Part-Time, Intermittent (TPTI)	
TPTI	<u>399</u>
Total Civilian	4185

Graded FTP Breakdown	
Scientists, Engineers, and SES	1894
Administrative—Professional	52
Administrative—Management	502
Technicians	537
Other-Clerical	382
Other-General	<u>138</u>
Total	3505

Civilian Budgeted	
End-Strength	3996

Military

Officers	36
Enlisted	<u>69</u>
Total Military	105
Military Allowance	118

<u>On-Board</u>	<u>Total Military</u>	<u>Total Civilian</u>	<u>FTP</u>	<u>TPTI</u>	<u>FTP Ungraded</u>	<u>FTP Graded</u>
4290	105	4185	3786	399	281	3505

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

	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>
Research divisions	6.73	8.2	7.7	8.0	5.1
Nonresearch areas	11.83	14.5	14.6	11.9	9.2
Entire Laboratory	8.16	10.6	9.6	9.7	6.2

Highest Academic Degrees Held by Permanent Employees

Bachelors	800
Masters	514
Doctorates	885

*As of 30 September 1992; figures include NRL at all sites.

		Professional Development		

Professional Development

NRL has established many programs for the professional and personal development of its employees so they may better serve the needs of the Navy. These programs develop and retain talented people and keep them abreast of advanced technology and management skills. Graduate assistantships, fellowships, sabbatical study programs, cooperative education programs, individual college courses, and short courses for personal improvement contribute to professional development.

Programs also exist for non-NRL employees. These programs enhance research efforts by providing means for non-NRL professionals to work at the Laboratory, thereby improving the interchange of ideas, meeting critical short-term technical requirements, and providing sources for new scientists and engineers. The programs include two-year graduate fellowships, faculty and professional interchanges, undergraduate work, and introducing gifted and talented high school students to the world of technology.

Programs for NRL Employees

During 1991, NRL employees participated in approximately 5000 individual training events. Many of these were presented as either videotaped or on-site instructed courses on diverse technical subjects, management techniques, and enhancement of personal skills (efficient use of time, effective writing, interpersonal communications, speed reading, etc.).

One common study procedure is for employees to work full time at the Laboratory and take job-related courses at universities and schools in the Washington, D.C. area. The training ranges from individual courses to full-time graduate- and postgraduate-level programs. Tuition for job-related training is paid by NRL. Formal programs offered by NRL include the following:

Graduate Programs

- The **Advanced Graduate Research Program** (formerly the Sabbatical Study Program) enables selected professional employees to devote full time to research in their own or a related field for one year at an institution or research facility of their choice without the loss of regular salary, leave, or fringe benefits. NRL pays all education, travel, and moving expenses for the individual and dependents. The program is open to paraprofessional (and above) employees who have completed six years of Federal service, including four years at NRL.

- The **Edison Memorial Graduate Training Program** enables employees to pursue advanced studies in their fields at local universities. Eligible employees who are selected for participation in this program normally spend 16 hours of every work week in their studies. The criteria for eligibility include a minimum of one year of service at NRL, a bachelor's or master's degree in an appropriate

field, and professional standing in keeping with the candidate's opportunities and experience.

- To be eligible for the **Select Graduate Student Program**, employees must have a bachelor's or master's degree in an appropriate field. Accepted students devote a full academic year to graduate study. While attending school, they receive one half of their salary, and NRL pays for tuition, books, and laboratory expenses. During the summer, they work at the Laboratory and receive normal pay and fringe benefits.

- Research conducted at NRL may be used as **thesis material for an advanced degree**.

This original research is supervised by a qualified employee of NRL who is approved by the graduate school. The candidate should have completed the required course work and should have satisfied the language, residence, and other requirements of the graduate school from which the degree is sought. NRL provides space, research

facilities, and supervision but leaves decisions on academic policy to the cooperating schools.

- Federal Executive fellowships are available each year for employees to study in the **Brookings Institute Advanced Study Program**. In this program, the Fellow is exposed to and participates in planning, developing, and conducting educational conferences on public policy issues for leaders in public and private life.

- The **Congressional Fellowship Program**, sponsored by the American Political Science Association, provides an opportunity for some of the most promising young, technically oriented Federal executives to participate in a variety of assignments designed to develop their knowledge and understanding of Congressional operations. These Fellows share activities with other members of the Congressional Fellowship Program who come mainly from journalism, law, and college teaching.

- The **LEGIS Fellows Program** provides assignments for personnel whose current or prospective positions may require working knowledge of the operations of the Congress. The Fellows receive instruction and hands-on experience in a Congressional office through training/developmental activities such as seminars, intensive briefings, and assignments on the staff of a Member, committee, or support agency of the Congress in Washington, D.C.

- The **Maxwell Midcareer Development Program** of the Maxwell Graduate School of Citizenship and Public Affairs, Syracuse, New York, increases the managerial knowledge, ability, and skills of experienced Government officials who have been identified by their agencies as having potential for advancement to positions demanding progressively greater managerial and executive responsibilities.

- The **Practicing Engineer Advanced Study Program** of the M.I.T. Center for Advanced Engineering, Cambridge, Massachusetts, enables experienced engineers and applied scientists to work in-depth in technological areas pertinent to their professions, preparing for continued leadership in an age of unparalleled technological change.

- The **Science and Technology Fellowship Program**, a subsidiary of the Commerce Science Program, includes a variety of special events, lectures, seminars, visits, conferences, field trips,

and interactions with key people from both the public and private sectors. Participants spend one week on Capitol Hill in an intensive, Congressional orientation; they spend one week with the Brookings Institute, Science Policy Conference; and they take two week-long field trips for on-site inspection of scientific institutions and industrial complexes.

- 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. It awards a Master of Arts Degree in National Security Affairs and a Master of Science Degree in many technical disciplines. In addition, a Doctor of Philosophy Degree may be earned in select fields of science and engineering.

NRL employees desiring to pursue graduate studies at NPS may apply for a maximum of six quarters away from NRL, with thesis work accomplished at NRL. Specific programs are described in the NPS Catalog. Participants will continue to receive full pay and benefits during the period of study.

Continuing Education

- Local colleges and universities offer **undergraduate courses** at NRL for employees to improve their skills and keep abreast of current developments in their fields. These courses are also available at many other DoD installations in the Washington, D.C. area.

- The Employee Development Branch at NRL offers to all employees **short courses** in certain program areas that are not available at local schools; Laboratory employees may attend these courses at nongovernment facilities as well. Inter-agency courses in management, personnel, finance, supervisory development, clerical skills, and other areas are also available.

Other Programs

- **Foreign Liaison Scientist Program.** To assist the Chief of Naval Research (CNR), the Chief of Naval Operations (CNO), and the Commandant of the Marine Corps (CMC) in discharging their responsibilities on matters of general scientific and technical interest to the United States in the United Kingdom, Europe, and Far East, foreign liaison

offices are maintained in several areas of the world. Foreign liaison scientists serve in these offices to establish relationships with overseas scientific activities and their scientists, to monitor contract and treaty agreements, and to promote the exchange of information and research results between foreign sources and the U.S. Navy R&D establishment. Each year, NRL will make assignments to the Office of Naval Research European Office (ONREUR), London, England, and the Office of Naval Research Liaison Office, Far East (ONRFE), Tokyo, Japan. The purpose of such assignments is to acquaint a limited number of NRL's technical professionals with the functions of international operations, including such activities as developing productive liaison with foreign scientists and research activities, representing the interests of the U.S. Navy in multinational conferences and scientific meetings, and preparing technical reports and papers with editorial interpretation for appropriate audiences in the United States.

For further information on any of these programs, contact the Employee Development Branch at (202) 767-2956.

Technology Transfer

- The **Office of Research and Technology Applications Program (ORTA)** ensures the full use of the results of the nation's Federal investment in research and development by transferring Federally owned or originated technology to the private sector and to state and local governments. This office is responsible for cooperative research and development agreements (CRADAS) as well as licensing NRL patents.

- The **Navy Science Assistance Program (NSAP)** establishes an information loop between the Fleet and the R&D shore establishments to expedite technology transfer to the user. The program addresses operational problems, focuses resources to solve specific technical problems, and develops a nucleus of senior scientific personnel familiar with the impact of current research and system performance on military operations.

- The **Scientist to Sea Program (STSP)** is a COMNAVSURFLANT initiative providing increased opportunities for Navy R&D laboratory/center personnel to go to sea to gain first-hand insight into operational factors affecting system design and performance.

Inquiries concerning the **ORTA Program** should be made to Dr. Richard Rein at (202) 767-3744 or to Mr. Steven Roberts at (202) 404-8411. Inquiries concerning **NSAP** or **STSP** should be made to Dr. George Abraham at (202) 767-3521.

Growth Opportunities

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

- The **Career Counseling Center** helps employees to define short- and long-range career goals, to improve their job-seeking skills, and to deal with issues affecting job productivity.

- A chartered chapter of **Women in Science and Engineering (WISE)** has been established at NRL. Informal monthly luncheons and seminars are held to inform scientists and engineers of women's research at NRL and to provide an informal environment for practicing their presentations.

- **Sigma Xi**, the Scientific Research Society, encourages original investigation in pure and applied science. The NRL chapter, of approximately 450 active members, meets nine times each year (from October to June) and sponsors a series of lectures on a wide range of pure and applied scientific topics of interest to both scientific and Government communities. Each spring it sponsors an Edison Memorial Lecture at which a distinguished scientist, usually a Nobel Laureate, speaks on his or her research. The chapter also presents annual awards in pure and applied science.

- Any employee who is interested in developing effective self expression, listening, thinking, and leadership potential can join either of the two NRL chapters of **Toastmasters International**. Members of these clubs, who possess diverse career backgrounds and talents, meet two to three times a month to learn to communicate, not by rules but by doing, in an atmosphere of understanding and helpful fellowship.

Other programs that enhance the development of NRL employees include two computer clubs (NRL-MUG (Macintosh User Group) and the NRL-IBM PC) and the Amateur Radio Club. The Recreation Club offers many facilities to promote physical fitness. The Showboaters, a nonprofit drama

group, presents live theater for the enjoyment of NRL and the community and produces two major productions each year, in addition to occasional

performances at Laboratory functions and benefits for local charities.



Programs for Non-NRL Employees

Programs also exist for non-NRL employees. These programs encourage and support the participation of visiting scientists and engineers in research of interest to the Laboratory. Some of the programs may serve as stepping stones to Federal careers in science and technology. Their objective is to enhance the quality of Laboratory research activities through working associations and interchanges with highly capable scientists and engineers and to provide opportunities for outside scientists and engineers to work in the Navy laboratory environment. Along with enhancing NRL research, these programs acquaint participants with Navy capabilities and concerns.

Recent Ph.D., Faculty Member, and College Graduate Programs

- The **National Research Council (NRC)/NRL Cooperative Research Associateship Program** selects associates who conduct research at NRL in their chosen fields in collaboration with NRL scientists and engineers. The tenure period is two years, and following their tenure, the Office of Naval Research offers the associate posttenure research grants tenable at an academic institution.

- The American Society for Engineering Education (ASEE) administers the **Office of Naval Research Postdoctoral Fellowship Program** to increase the involvement of highly trained scientists and engineers in disciplines to meet the evolving needs of naval technology. Appointments are for one year (renewable for a second and sometimes a third year). The appointments are competitive and are made jointly by ONR and ASEE.

- The American Society for Engineering Education also administers the Navy/ASEE **Summer Faculty Research Program** for university faculty members to work for 10 weeks with professional peers in participating Navy laboratories on research of mutual interest.

- The **NRL/United States Naval Academy (USNA) Cooperative Program** for Scientific Interchange allows faculty members of the U.S. Naval Academy to participate in NRL research. This collaboration benefits the Academy by providing the opportunity for USNA faculty members to work on research of a more practical or applied nature. In turn, NRL's research program is strengthened by the available scientific and engineering expertise of the USNA faculty.

- The **Office of Naval Research 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. This research must lead to doctoral degrees in specified disciplines such as electrical engineering, computer sciences, material sciences, applied physics, and ocean engineering. Award recipients are encouraged to continue their study and research in a Navy laboratory during the summer.

Contact: Mrs. Jessica Hileman, (202) 767-3865

- The **United States Naval Academy Ensign Program** assigns Naval Academy graduates to NRL to work in areas of their own choosing and commensurate with their academic qualifications.

These graduates provide invaluable summer research assistance while gaining experience in Navy R&D programs.

Contact: Military Administrative and Personnel Branch, (202) 767-2103

Professional Appointments

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

- **Consultants and experts** are employed because they are outstanding in their specialized fields or because they possess rare abilities but cannot normally be employed as regular full-time 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.

Contact: Special Recruitment Programs Section, (202) 767-3030

Undergraduate College Student Programs

Several programs are tailored to the undergraduate that provide employment and work experience in naval research. These are designed to attract applicants for professional employment in the Laboratory's shortage category positions such as engineers, physicists, mathematicians, and computer scientists. The student employment programs foster an understanding of NRL job opportunities among students and educational personnel so that educators can provide students who will meet NRL's occupational needs. The employment programs for college students include:

- **The Cooperative Education Program** alternates periods of work and study for students pursuing bachelor degrees in engineering, computer science, or the physical sciences. Several universities participate in this program.

- **The Federal Junior Fellowship Program** hires students entering college to be assistants to scientific, professional, or technical employees.

- **The Summer Employment Program** employs students for the summer in paraprofessional and technician positions in engineering, physical sciences, and computer sciences. A limited number of positions are also filled in administrative occupations.

- **The Student Volunteer Program** helps students gain valuable experience by allowing them to voluntarily perform educationally related work at NRL.

- **The 1040-Hour Appointment** employs students on a half-time basis to assist in scientific work that is related to their academic program. A limited number of positions are also filled in administrative occupations.

Contact: Special Recruitment Programs Section, (202) 767-3030

High School Programs

- **The DoD Summer Science and Engineering Apprenticeship Program** employs high school juniors and seniors to serve for eight weeks as junior research associates as part of a university grant program. Under the direction of a mentor, students gain a better understanding of research, its opportunities, and challenges through participation in scientific programs. Criteria for eligibility are based on science and mathematics courses completed and grades achieved; scientific motivation, curiosity, and capacity for sustained hard work; a desire for a technical career; teacher recommendations; and ability and achievement test scores.

- **The Clerical Cooperative Education Program** allows students to work part time while attending high school. Several high schools participate in this program.

Contact: Special Recruitment Programs Section, (202) 767-3030

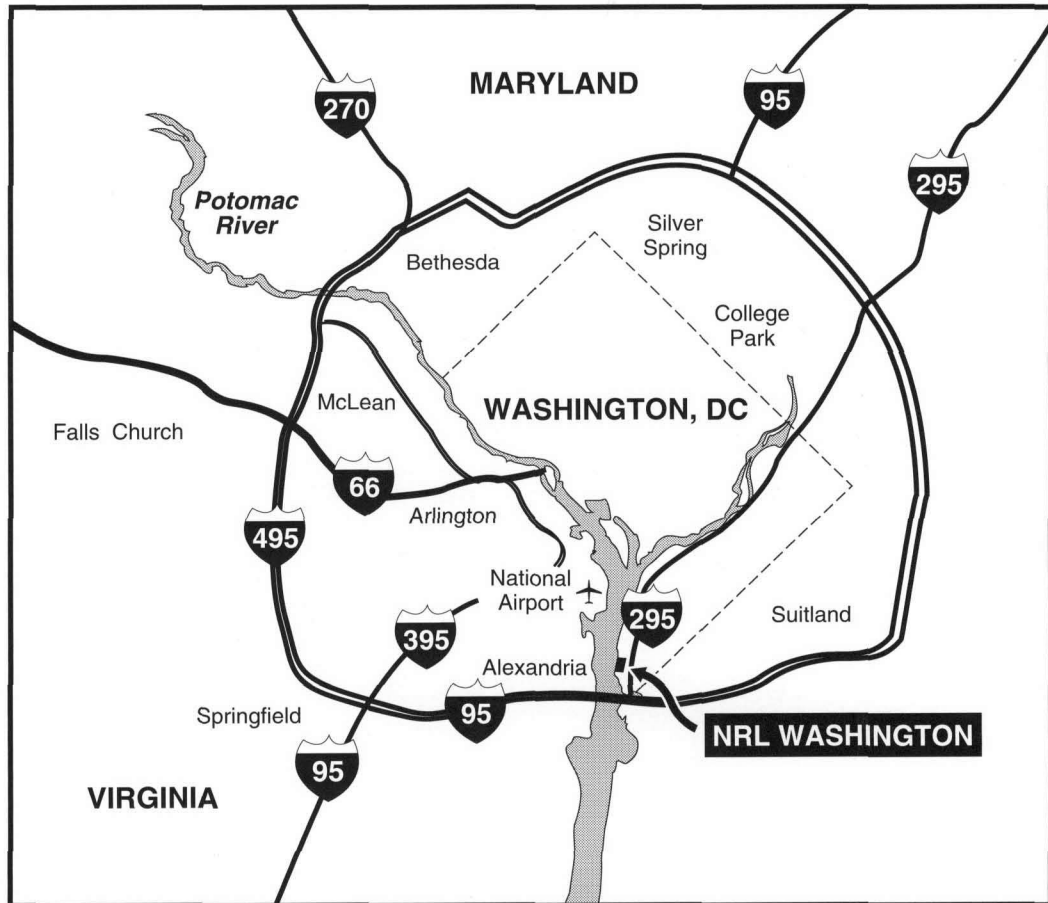


1991-1992 Government Awards to Civilian Employees

Senior Executive Service Distinguished Rank Award	1
Navy Meritorious Civilian Service Award	5
Navy Superior Civilian Service Award	1
Captain Robert Dexter Conrad Award for Scientific Achievement	1
E.O. Hulburt Award for Science and Engineering	3
NRL Award for Achievement in the Field of Equal Opportunity	5
Navy Award for Distinguished Achievement in Science	1
Navy Award of Merit for Group Achievement	6
DoD Distinguished Civilian Service Award	1
1991 Federal 100 Award	1
1991 Federal Laboratory Consortium Award for Excellence in Technology Transfer	2
1992 Federal Laboratory Consortium Award for Excellence in Technology Transfer	1
Office of the Chief of Naval Research's Outstanding Employee with Disabilities Award	1

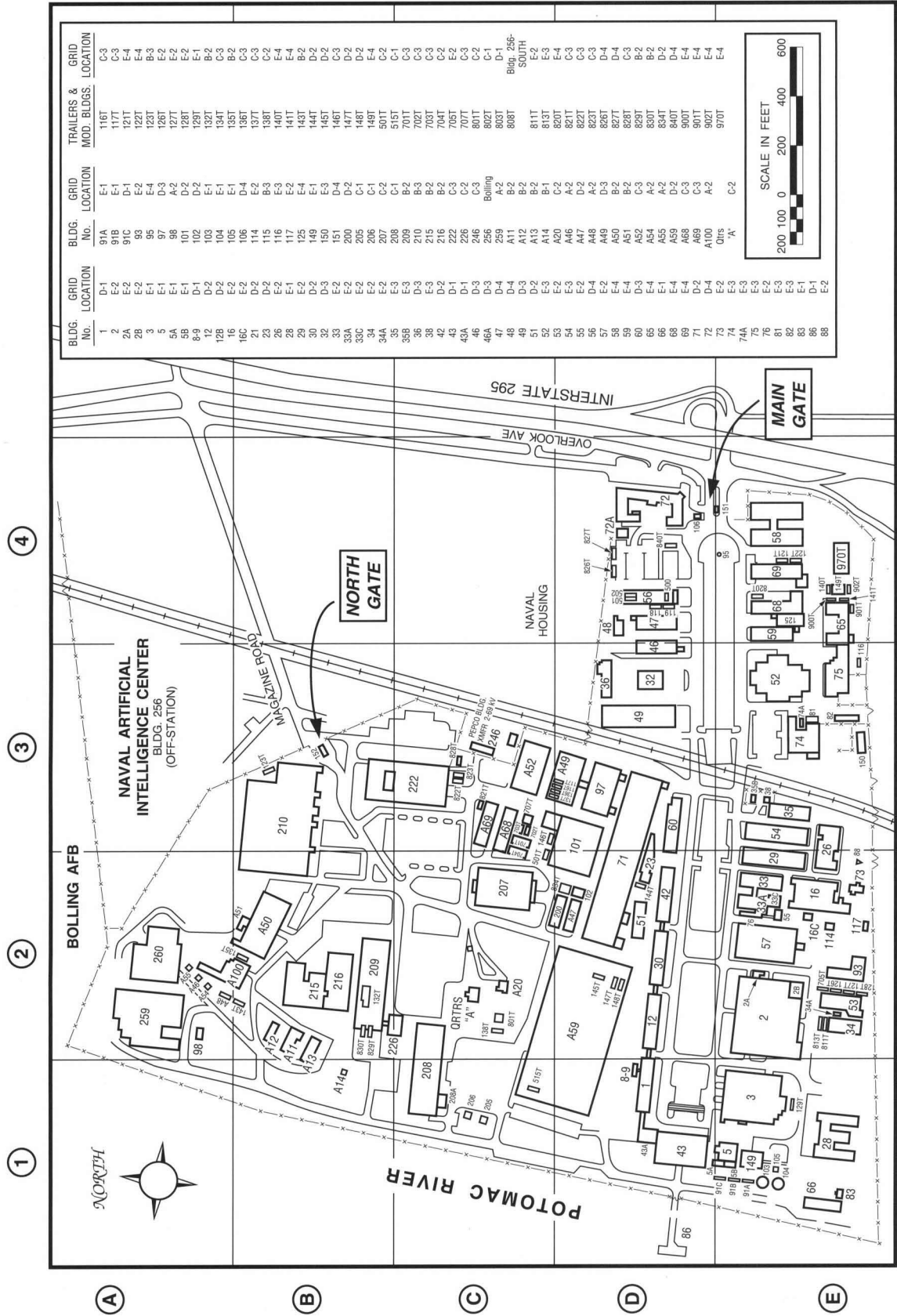
		General Information		

Naval Research Laboratory (Washington, DC)



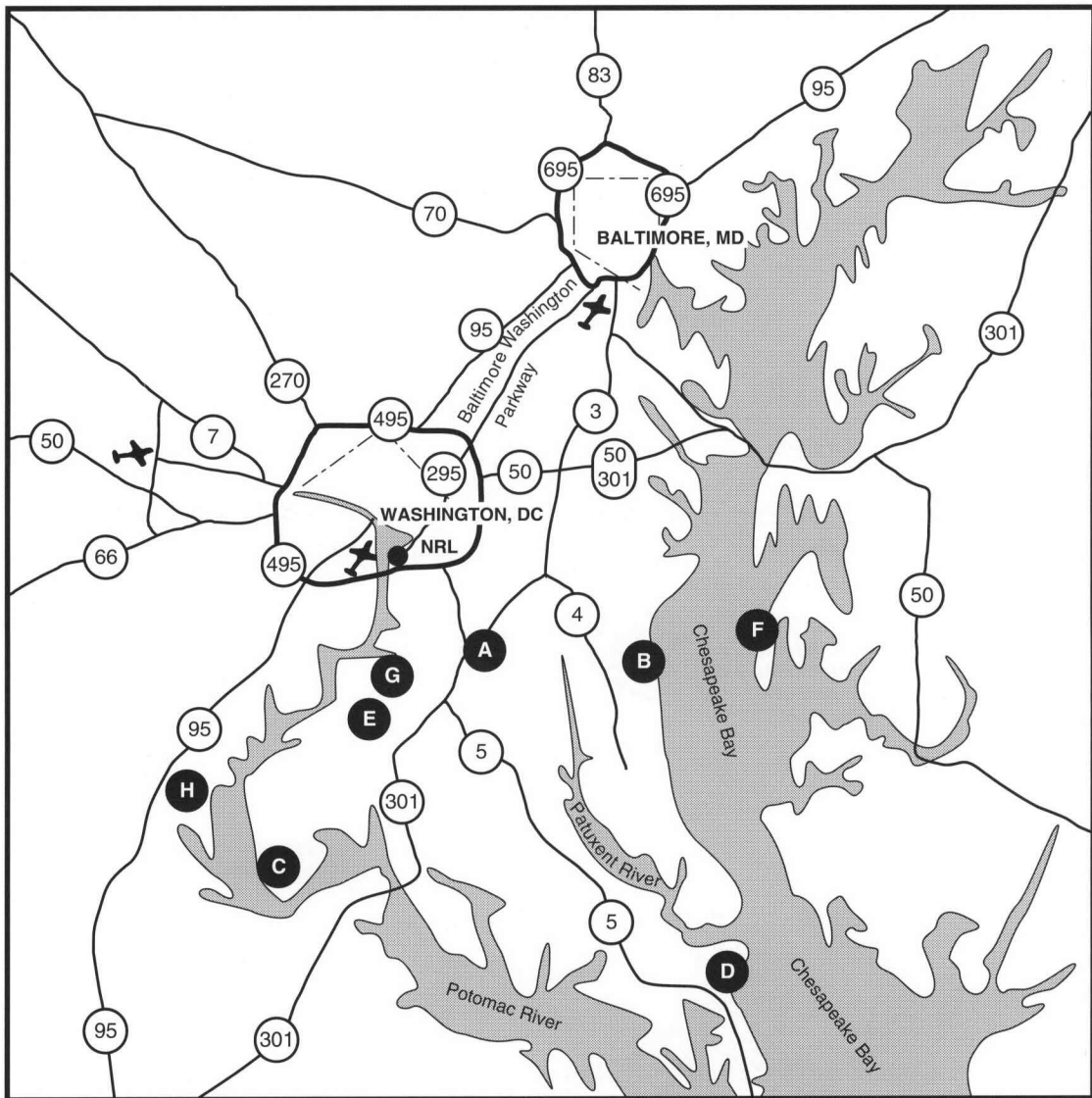
Naval Research Laboratory
4555 Overlook Avenue, SW
Washington, DC 20375-5320
(202) 767-3200

Location of Buildings at NRL Washington



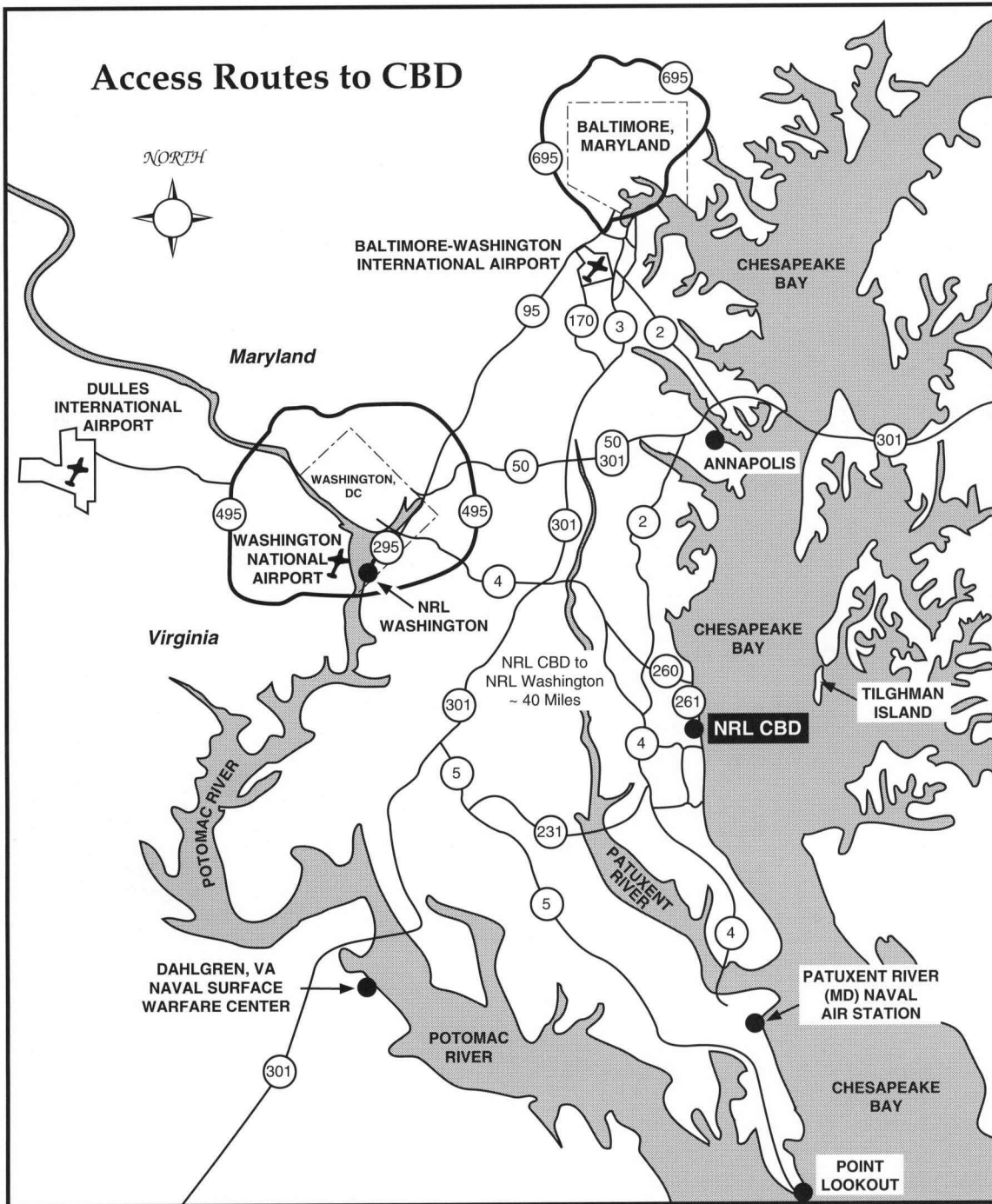
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2B	E-2	122T	E-2
2C	E-2	123T	E-4
3	E-1	126T	B-3
5	E-1	127T	E-2
5A	E-1	128T	E-2
5B	E-1	129T	E-1
8-9	D-1	132T	E-1
12	D-2	134T	B-2
12B	D-2	135T	C-3
16	E-2	136T	B-2
16C	D-2	137T	D-2
21	D-2	138T	C-3
21C	D-2	139T	C-3
23	D-2	140T	E-4
26	E-2	141T	E-4
28	E-1	142T	B-2
29	E-2	143T	B-2
30	D-2	144T	D-2
32	D-3	145T	D-2
33	E-2	146T	C-3
33A	E-2	147T	C-3
33C	E-2	148T	D-2
34	E-2	149T	D-2
34A	E-2	150T	E-4
35	E-3	151T	C-2
36	E-3	152T	C-2
38	D-3	153T	C-3
38C	E-3	154T	C-3
38D	E-3	155T	C-3
42	D-2	156T	E-2
43	D-1	157T	E-2
43A	D-1	158T	C-3
46	D-3	159T	C-2
46A	D-3	160T	C-2
47	D-4	161T	D-1
48	D-4	162T	D-1
49	D-4	163T	D-1
51	D-2	164T	B-2
52	E-3	165T	B-2
53	E-2	166T	B-1
54	E-3	167T	B-2
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60	D-3	173T	C-3
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66	E-1	175T	B-2
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74A	E-3	182T	E-4
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76	E-3	184T	E-4
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82	E-3	186T	E-4
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86	D-1	188T	E-2
88	E-2	189T	E-2

Location of Field Sites in the NRL Washington Area



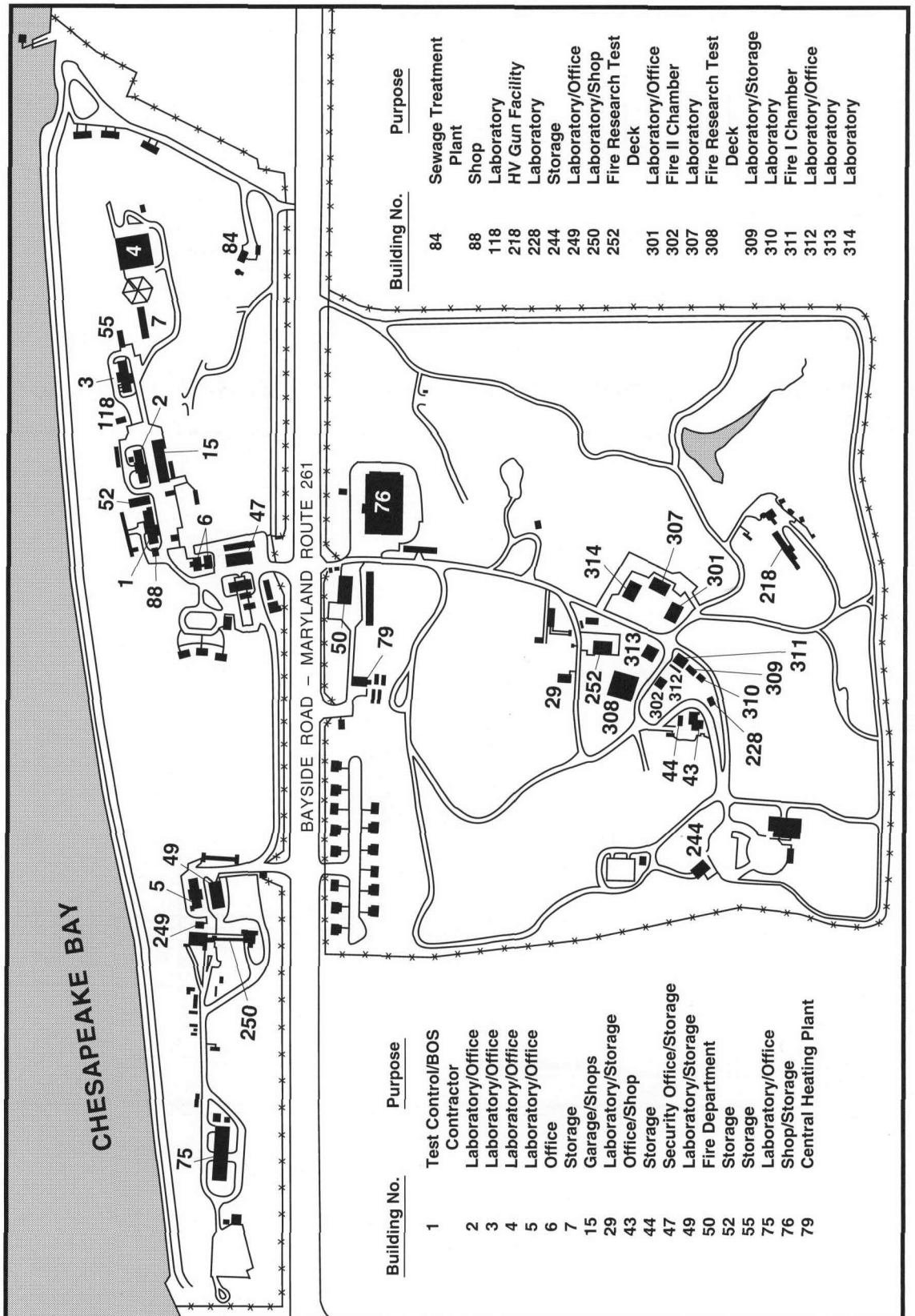
<u>Location</u>	<u>Approximate Mileage from NRL Washington</u>	<u>Cognizant Code</u>
A - Brandywine, MD	28	5500
B - Chesapeake Bay Detachment (CBD), Chesapeake Beach, MD	40	3520
C - Maryland Point (MD) Observatory	45	7210/7220
D - Patuxent River (MD) Naval Air Station	64	1280
E - Pomonkey, MD	20	8106
F - Tilghman Island, MD	110	3520
G - Waldorf Radio Site, MD	24	5500
H - Midway Research Center, Quantico, VA	38	8140

Chesapeake Bay Detachment (Chesapeake Beach, Maryland)

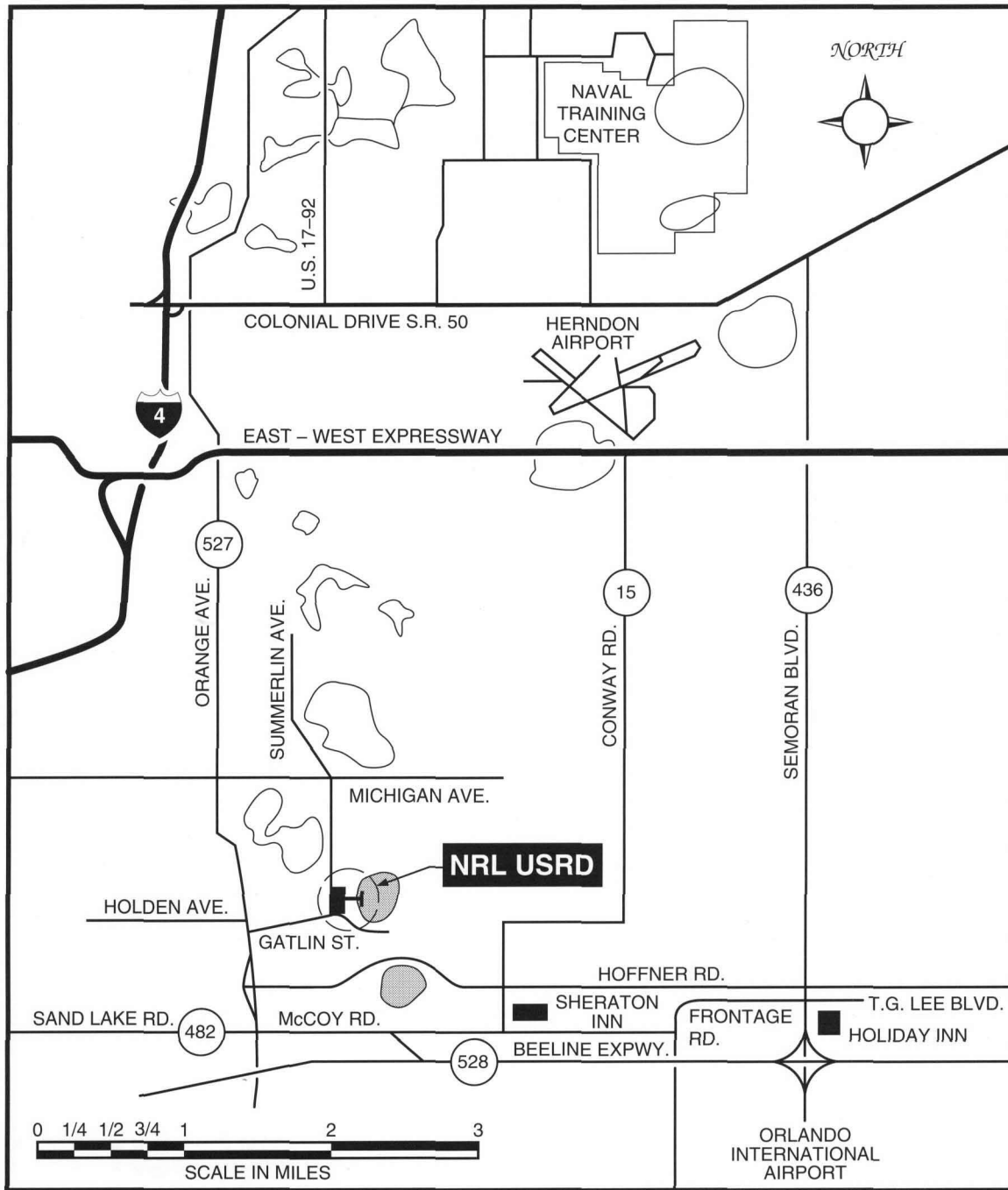


Naval Research Laboratory
 Chesapeake Bay Detachment
 5813 Bayside Road
 Chesapeake Beach, MD 20732
 (301) 257-4004

Location of Buildings at the Chesapeake Bay Detachment

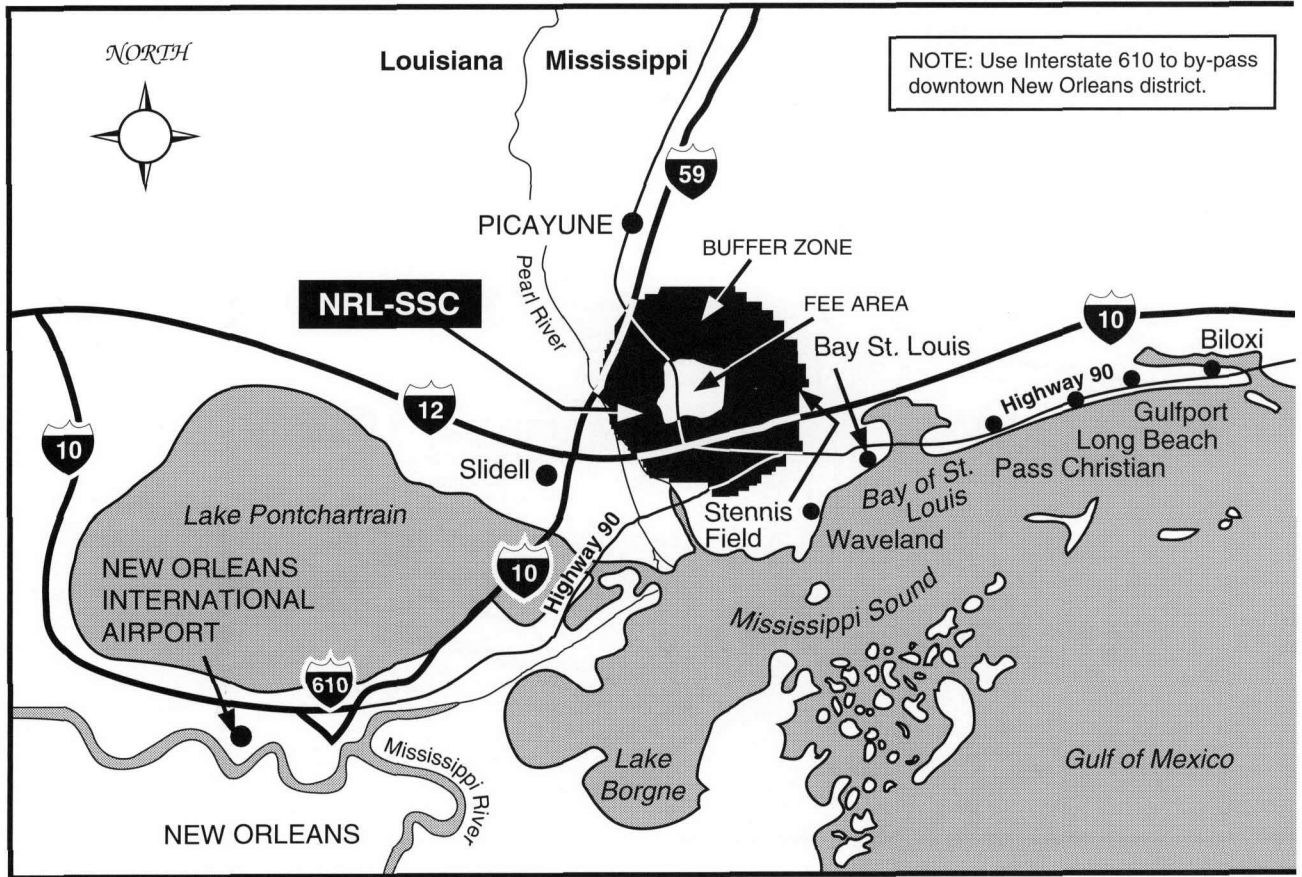


Underwater Sound Reference Detachment (Orlando, Florida)



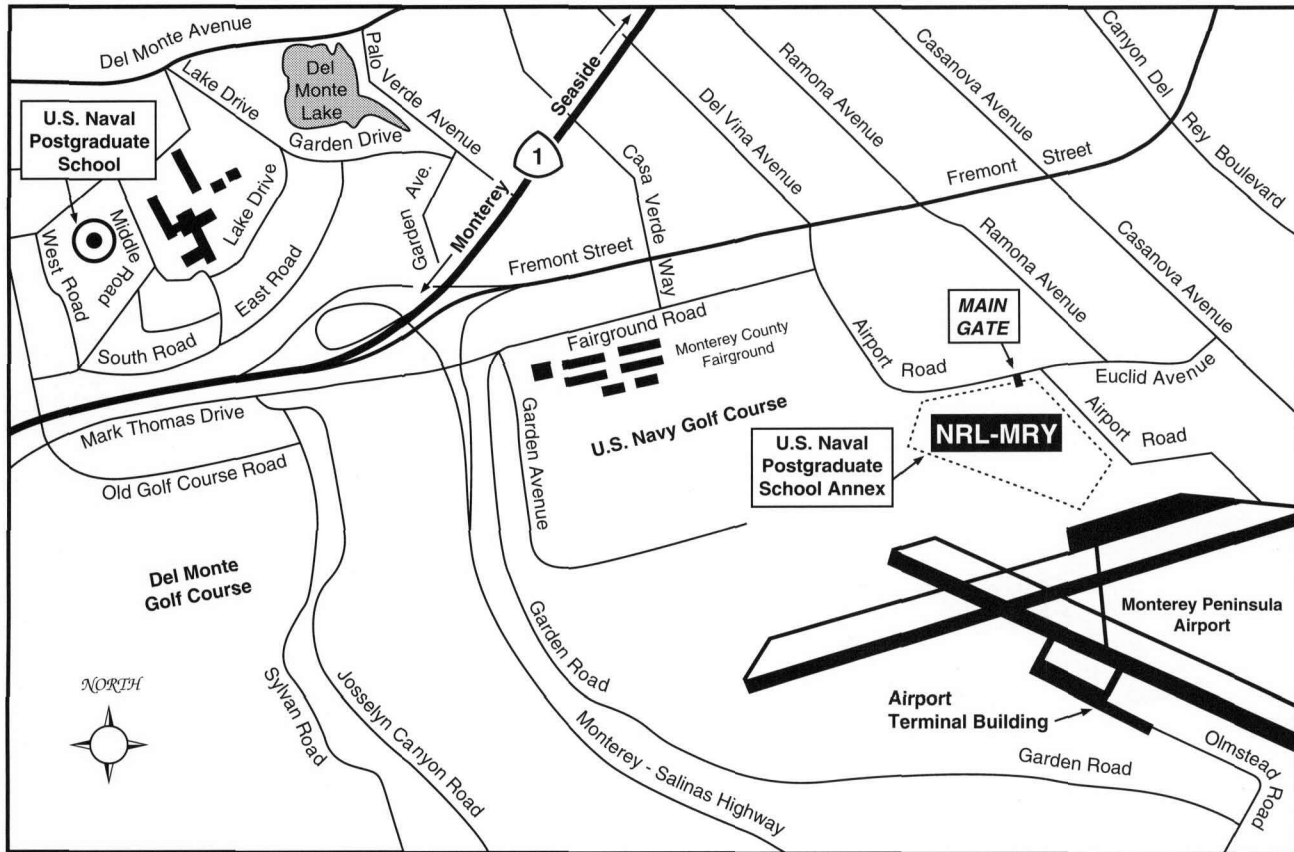
Naval Research Laboratory
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 P.O. Box 568337
 Orlando, FL 32856-8337
 (407) 857-5230

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



Naval Research Laboratory
John C. Stennis Space Center
Stennis Space Center, MS 39529-5000
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Naval Research Laboratory Monterey (Monterey, California)



Naval Research Laboratory
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Monterey, CA 93943-5006
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1992-1993 Fact Book**



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REVIEWED AND APPROVED

A handwritten signature in black ink, appearing to read "P.G. Gaffney II", with a date "10" written at the end.

**CAPT P.G. Gaffney II, USN
Commanding Officer**

June 1993