FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2008
Exhibit R-2

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)	15,575	16,403	17,298	18,285	18,261	18,762	18,863

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program element (PE) sustains U.S. Naval Science and Technology (S&T) superiority by providing new technological concepts for the maintenance of naval power and national security and by helping to avoid scientific surprise while exploiting scientific breakthroughs and providing options for new Future Naval Capabilities (FNCs). The Department of Navy (DON) component responds to S&T directions of the Naval S&T Strategic Plan for long term Navy and Marine Corps improvements and is in consonance with future warfighting concepts and doctrine developed at the Naval Warfare Development Command and the Marine Corps Combat Development Command. It enables technologies to significantly improve the Joint Chiefs of Staff's Future Joint Warfighting Capabilities. The In-house Laboratory Independent Research (ILIR) program also adds increased emphasis to the revitalization of the scientist and engineer workforce component at the Navy's Warfare Centers and Laboratories by attracting superior candidates and retaining our best members through the provision of exciting and meaningful work. It is managed by the Director of Research of the Office of Naval Research (ONR) and executed by the Commanding Officers (COs) and Technical Directors (TDs) of the Naval Warfare Centers, and the Bureau of Medicine and Surgery laboratories.

The vision of the DON S&T strategy is "to inspire and guide innovation that will provide technology-based options for future Navy and Marine Corps Capabilities", where "Innovation is a process that couples Discovery and Invention with Exploitation and Delivery". DON Basic Research, which includes scientific study and experimentation, directed toward increasing knowledge and understanding in national-security related aspects of physical, engineering, environmental, and life sciences is the core of Discovery and Invention. Basic research projects are developed, managed, and related to more advanced aspects of research in some hundred-plus technology and capability-related 'thrusts', which are consolidated in thirteen research focus areas: Power and Energy; Operational Environments; Maritime Domain Awareness; Asmmetric and Irregular Warfare; Information, Analysis and Communication; Power Projection; Assure Access and Hold at Risk; Distributed Operations; Naval Warfighter Performance and Protection; Survivability and Self-Defense; Platform Mobility; Fleet/Force Sustainment; Affordability, maintainability and Reliability.

FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2008
Exhibit R-2

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

This portion of the DON Basic Research Program provides participating Naval Warfare Centers and Laboratories with funding for: basic research to support the execution of their assigned missions; developing and maintaining a cadre of active researchers who can distill and extend results from worldwide research and apply them to solve Naval problems; promoting hiring and development of new scientists; and encouragement of collaboration with universities, private industry, and other Navy and Department of Defense laboratories, in particular the corporate Naval Research Laboratory (NRL).

ILIR projects are selected by Naval Warfare Centers/Lab COs and TDs near the start of each Fiscal Year through internal competition. Projects typically last three years, and are generally designed to assess the promise of new lines of research. Successful efforts attract external, competitively awarded funding. Because the Warfare Centers and Labs encompass the full range of naval technology interests, the scope of ILIR topics roughly parallels that of PE 0601153N, Defense Research Science.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

B. PROGRAM CHANGE SUMMARY:

	FY 2007	FY 2008	FY 2009
FY 2008/FY 2009 President's Budget Submission	15,856	16,556	17,221
Congressional Undistributed Reductions/Rescissions	0	-105	0
Program Adjustments	-238	0	0
Rate Adjustments	0	0	77
SBIR Assessment	-43	-48	0
FY 2009 President's Budget Submission	15,575	16,403	17,298

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Not applicable.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.

E. PERFORMANCE METRICS:
The ILIR initiative seeks to improve the quality of defense research conducted predominantly through the Naval Warfare Centers/Laboratories. It also supports the development of technical intellect and education of engineers and scientists in disciplines critical to national defense needs through the development of new knowledge in a military laboratory environment. Initial research focus is often conducted in an unfettered environment since it is basic research, but many projects focus on applying recently developed theoretical knowledge to real world military problems with the intention of developing new capabilities and improving the performance of existing systems. Individual project metrics then become more tailored to the needs of specific applied research and advanced development programs. The National Research Council of the National Academies of Science and Engineering’s Congressionally directed "Assessment of Department of Defense Basic

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N
PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

Research" concluded that the DoD is managing its basic research program effectively.

FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2008
Exhibit R-2a

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)	15,575	16,403	17,298	18,285	18,261	18,762	18,863

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project sustains U.S. Naval S&T superiority, provides new technological concepts for the maintenance of naval power and national security, and mitigates scientific surprises, while exploiting scientific breakthroughs and providing options for new Future Naval Capabilities. It responds to S&T directions of the Naval S&T Strategic Plan for long term Navy and Marine Corps improvements. It is in consonance with future warfighting concepts and doctrine developed at the Naval Warfare Development Command (NWDC) and the Marine Corps Combat Development Command (MCCDC), and enables technologies to significantly improve the Joint Chiefs of Staff's Future Joint Warfighting Capabilities. It is managed by the ONR Director of Research and executed by the COs and TDs of the Naval Warfare Centers, Bureau of Medicine and Surgery laboratories.

This portion of the DON Basic Research Program provides participating Naval Warfare Centers and Laboratories with funding for basic research to support the execution of their assigned missions, for developing and maintaining a cadre of active research scientists who can distill and extend results from worldwide research and apply them to naval problems, to promote hiring and development of new scientists, and to encourage collaboration with universities, private industry, and other Navy and Department of Defense laboratories, in particular the corporate NRL.

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2007	FY 2008	FY 2009
OCEAN/SPACE SCIENCES	3,974	4,289	4,658

FY 2007 Accomplishments:

• Continued research into Beaked Whale bioacoustic and spatial/temporal habitat characterization in the Tongue of the Ocean, Bahamas.
• Continued research into in the field of Nonparametric Tolerance Intervals to construct a distribution-free method to generalize the performance of decision trees and neural networks. This work allows for effective adaptive classification in uncertain environments.
• Continued research into 3D elastic wave propagation in layered prolate spheroids with losses using the vector wave equation in prolate spheroidal coordinates for sonar array applications.
• Continued Naval Research Enterprise Intern Program (NREIP) to support undergraduate and graduate students performing Navy-related research at Naval R&D Centers under the supervision and mentorship of DON scientists, thus exposing them to interesting and challenging work done at these centers.
• Continued investigation into and application of level sets to the problem of acoustic propagation in shallow water regimes, providing a robust theoretical and numerical foundation for accurate range-dependent acoustic modeling at a feasible computational cost. This will provide greater flexibility for simulating propagation in littoral environments, and improved accuracy.
• Continued research to determine whether chaos based communication can be applied to typical range tracking scenarios. Challenges that have not been previously explored include the differences in littoral environments and the higher range of Doppler encountered when tracking underwater vehicles like torpedoes and submarines.
• Continued research to develop methods to automatically segment and characterize data using Bayesian networks. Resulting algorithms will be verified with data collected from a new Airborne-Laser Swath Mapping (ALSM) system for Unmanned Aerial Vehicles (UAVs) called photon-counting ALSM.

FY 2008 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2008 will focus on supporting the Naval S&T Strategic Plan in naval focus areas such as: Operational Environments; Martime Domain Awareness; Asymmetric and Irregular Warfare; Assure

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

Access and Hold at Risk; Survivability and Self-Defense; Platform Mobility; Affordability, Maintainability and Reliability. Projects selected for FY 2008 will also support National Naval Responsibility (NNR) initiatives in Ocean Acoustics and Undersea Weaponry.

FY 2009 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2009 will focus on supporting Naval S&T Strategic Plan in naval focus areas such as: Operational Environments; Martime Domain Awareness; Asymmetric and Irregular Warfare; Assure Access and Hold at Risk; Survivability and Self-Defense; Platform Mobility; Affordability, Maintainability and Reliability. Projects selected for FY 2009 will also support NNR initiatives in Ocean Acoustics and Undersea Weaponry.

	FY 2007	FY 2008	FY 2009
ADVANCED MATERIALS	2,953	3,117	3,343

FY 2007 Accomplishments:

• Continued exploration of high performance nanocomposite barrier coatings for next generation acoustic sensors.
• Continued studies applying synthetic chemistry techniques to ferromagnetic materials to control their properties and then elucidate the roles they play in microwave absorption.
• Continued research into applying refined scattering measurement techniques to a range of suitable sample media in order to investigate the sensitivity and range of applicability (e.g., from the single scattering limit to multiple scattering and beyond).
• Continued development of a fracture criterion for piezocrystals (piezoelectric single crystals). The traditional stress intensity factor and energy release rate are not suitable as a fracture criteria for piezoelectric materials. The energy density theory shows qualitative promise for piezoelectric materials, but recent work indicates possible shortcomings in the existing the theory.
• Continued research to seek a substrate to maximize the Surface enhanced Raman Spectroscopy (SERS) effect. The SERS effect has been shown to be dependant on nanostructure size and distance between neighbors. SERS has been studied using roughened surfaces, nanocolloids, deposited films, electrode tips, metal islands, and a few other variations. This research seeks to deposit self-assembled monolayers (SAMs) of conducting organic

molecules on a gold surface and then attach gold nanoparticles to the SAMs. The distance between the nanoparticles will be optimized to create more SERS "hot spots" by varying the concentration and lengths of the molecules used for the SAMs.
• Continued research to identify a method of protecting underwater structures from bio-fouling without using toxins. Recent advances in conductive polymers (which can also be piezoelectric), plastic film technology, nano-release mechanisms and non-chromate metal finishing indicate that technology is now mature enough to mimic natural non-toxic antifouling methods on artificial structures with the added benefit of electric fields and piezoelectric movement.

FY 2008 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2008 will focus on supporting the Naval S&T Strategic Plan in: Power and Energy; Operational Environments; Assure Access and Hold at Risk; Naval Warfighter Performance and Protection; Survivability and Self-Defense; Platform Mobility; Fleet/Force Sustainment; and Affordability, Maintainability and Reliability. ILIR projects will also support Innovative Naval Prototypes (INP) initiatives in Electromagnetic Gun and Sea Basing, and NNR initiatives in Undersea Weaponry, Ocean Acoustics and Naval Engineering.

FY 2009 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2009 will focus on supporting the Naval S&T Strategic Plan in Power and Energy; Operational Environments; Assure Access and Hold at Risk; Naval Warfighter Performance and Protection; Survivability and Self-Defense; Platform Mobility; Fleet/Force Sustainment; and Affordability, Maintainability and Reliability. ILIR projects will also support INP initiatives in Electromagnetic Gun and Sea Basing, and NNR initiatives in Undersea Weaponry, Ocean Acoustics and Naval Engineering.

	FY 2007	FY 2008	FY 2009
ELECTRONICS SENSOR SCIENCES	2,401	2,384	2,455

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

FY 2007 Accomplishments:

• Continued research to numerically model the reduction of semicondutor laser phase noise and linewidth through optical injection locking, and then experimentally verify the model.
• Continued research investigating Particle Filtering (PF) techniques to improve Global Positioning System/Inertial Navigation System (GPS/INS) navigation performance within an environment subject to platform motion and location constraints. This effort is particularly appropriate for combat in urban settings, the type of environment in which anti-terrorist operations are likely to be conducted.
• Continued research to extend negative index materials (NIM) wavelengths into the visible region. Near-field scanning optical microscopy (NSOM) lithography is utilized in the fabrication of nanophotonic component structures. The component structure of primary interest is layered parallel nanowire pair arrays separated by dielectric. According to recently published models, such layered nanowire pair arrays are NIMs.

FY 2008 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2008 will focus on supporting the Naval S&T Strategic Plan in: Power and Energy; Asymmetric and Irregular Warfare; Information, Analysis and Communication; Power Projection; Naval Warfighter Performance and Protection; Survivability and Self-Defense; and Affordability, Maintainability and Reliability. ILIR projects will also support INP initiatives in Electromagnetic Gun, Persistent Surveillance, and the NNR Initiative in Undersea Weaponry.

FY 2009 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2009 will focus on supporting the Naval S&T Strategic Plan in: Power and Energy; Asymmetric and Irregular Warfare; Information, Analysis and Communication; Power Projection; Naval Warfighter Performance and Protection; Survivability and Self-Defense; and Affordability, Maintainability and Reliability. ILIR projects will also support INP initiatives in Electromagnetic Gun, Persistent Surveillance, and the NNR Initiative in Undersea Weaponry.

	FY 2007	FY 2008	FY 2009
INFORMATION SCIENCES	1,901	2,015	2,081

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

FY 2007 Accomplishments:

- Continued research into Wavelet inspirited data mining.
- Continued exploration of natural language communications between humans and information systems.
- Continued research to develop software mechanisms to be inserted between chat servers and their associated server-to-server communication transceivers to improve performance and user efficiency over low-bandwidth intermittent tactical links and to permit bridging between chat protocols in support of pending transition from current Internet Relay Chat (IRC) protocols to Extensible Messaging and Presence Protocol (XMPP).
- Continued research to develop Active Conceptual Modeling technology to enhance understanding how to model continual learning from past experiences and how to capture knowledge from transition of system states.
- Continued research focusing on abnormality detection/classification and blood vessel detection with respect to diabetes, a disease that affects blood vessels throughout the body. The goal is to advance development of an automated image analysis system, capable of detecting/diagnosing diabetic retinopathy to help improve quality of life for those at risk.

FY 2008 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2008 will focus on supporting the Naval S&T Strategic Plan in Asymmetric and Irregular Warfare; Information, Analysis and Communication; Power Projection; Assure Access and Hold at Risk; Naval Warfighter Performance and Protection; Survivability and Self-Defense; Fleet/Force Sustainment. ILIR projects will also support INP initiatives in Persistent Surveillance, the Electromagnetic Gun and Sea Basing, as well as NNR initiatives in Ocean Acoustic and Undersea Weaponry.

FY 2009 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2009 will focus on supporting the Naval S&T Strategic Plan in Asymmetric and Irregular Warfare; Information, Analysis and Communication; Power Projection; Assure Access and Hold at Risk; Naval Warfighter Performance and Protection; Survivability and Self-Defense; Fleet/Force Sustainment. ILIR

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

projects will also support INP initiatives in Persistent Surveillance, the Electromagnetic Gun and Sea Basing, as well as NNR initiatives in Ocean Acoustic and Undersea Weaponry.

	FY 2007	FY 2008	FY 2009
HUMAN PERFORMANCE SCIENCES	1,909	2,019	2,056

FY 2007 Accomplishments:

• Continued investigation of the distribution of free subspace identification for data exploration and bi-clustering.
• Continued development of a specific and sensitive biological sensor for microbial agents employing a partial complement fixation reaction.
• Continued research into short-term statin administration that can reduce the volume or frequency of precordial bubbles detected immediately following decompression from a hyperbaric exposure.
• Continued research in the potentiation of B-cell immune responses to Enterotoxigenic Escherichia Coli Surface Antigen 3 (CS3) adhesin by genetic fusion with a binding peptide
• Continued research to develop and demonstrate a chemical and biological sensor based on the use of a miniature array of Micro-Electro-Mechanical Systems (MEMS) based Fabry-Perot Interferometers (FPIs). The goal of the research is to yield a very small, inexpensive (potentially disposable) arrayable device capable of rapidly detecting a variety of biological warfare agents (BWA) with low levels of false positives.
• Continued research proposing a series of experiments designed to prove a theory that adding spark arc conditions during the electrospin process will have tremendous impact on the chemistry of polymer formation and more accurately describe the electrospinning phenomena. A thorough understanding of the fundamental science of the electrospinning phenomena will allow for a more intelligent approach to the design of new formulations of nanotechnology based materials of military importance.

FY 2008 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2008 will focus on supporting the Naval S&T Strategic Plan in Asymmetric and Irregular Warfare; Information, Analysis and Communication; Naval Warfighter Performance and Protection; Survivability and Self-Defense; and Fleet/Force Sustainment. ILIR projects will also support INP initiatives in Sea Basing, and Naval interest in optimizing human performance in military environments.

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

FY 2009 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2009 will focus on supporting the Naval S&T Strategic Plan in Asymmetric and Irregular Warfare; Information, Analysis and Communication; Naval Warfighter Performance and Protection; Survivability and Self-Defense; and Fleet/Force Sustainment. ILIR projects will also support INP initiatives in Sea Basing, and Naval interest in optimizing human performance in military environments.

	FY 2007	FY 2008	FY 2009
NAVAL PLATFORM DESIGN SCIENCES	1,216	1,296	1,419

FY 2007 Accomplishments:

• Continued experimental investigation and theoretical modeling of microscale processes associated with phase change heat transfer.
• Continued development & integration of high-lift actuators and neuroscience based control for Maritime Reconnaissance Autonomous Vehicle (MRAV).
• Continued developing and validating analysis procedures to predict powering, cavitation and unsteady shaft forces for specific water jet designs.
• Continued activities to measure the Hugoniot shock wave equation of state and fracture strength for structural steels
• Continued research to extend the use of a well-developed fault detection algorithm, based on a multi-model identification, to apply to nonlinear models and models which have been designed in Simulink. Extending this algorithm will make it widely applicable to support Naval efforts in intelligent systems and Condition Based Maintenance (CBM), increasing both reliability and survivability of the systems.
• Continued research into basic understanding of the unsteady turbulent airwake flow field, necessary to support modeling and simulation of flight operations and the design of future Navy ships. In investigating these flows, a method for quickly identifying and tracking pertinent flow features would greatly aid in ship design, operational evaluation of aircraft deployed at sea, and simulation of new flow control concepts.
• Continued research to understand the influence of various metallurgical factors on the strengthening or softening mechanisms of iron-based friction stir welds. The ultimate goal is to develop a predictive tool

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

that will interchangeably correlate process parameters to mechanical property requirements for any given material and thickness.

FY 2008 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2008 will focus on supporting the Naval S&T Strategic Plan in Operational Environments; Assure Access and Hold at Risk; Distributed Operations; Survivability and Self-Defense; Platform Mobility; Fleet/Force Sustainment; and Affordability, Maintainability and Reliability. ILIR projects will also support INP initiatives in Electromagnetic Gun and Sea Basing, and NNR initiatives in Undersea Weaponry and Naval Engineering.

FY 2009 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2009 will focus on supporting the Naval S&T Strategic Plan in Operational Environments; Assure Access and Hold at Risk; Distributed Operations; Survivability and Self-Defense; Platform Mobility; Fleet/Force Sustainment; and Affordability, Maintainability and Reliability. ILIR projects will also support INP initiatives in Electromagnetic Gun and Sea Basing, and NNR initiatives in Undersea Weaponry and Naval Engineering.

	FY 2007	FY 2008	FY 2009
ENERGY SCIENCES	1,221	1,283	1,286

FY 2007 Accomplishments:

• Continued research into kinetics measurement studies and understanding the reaction mechanisms of energetic and binder materials during the combustion process using T-Jump Fourier transform infrared (FTIR) spectroscopy.
• Continued the study of the effects of impurities and defects on the absorption spectra of material that exhibits a range of shock sensitivity.
• Continued the effort to develop structures that are conceptually the products of fusing rings such as nitrotriazole, 1,2,4,5-tetrazine, 1,2,3,5-tetrazine, and triazine.

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601152N PROGRAM ELEMENT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
PROJECT TITLE: IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)

• Continued work to determine the effect of defects on properties of energetic materials from first principles calculations in conjunction with experimental measurements.
• Continued research into the cure chemistry and aging characteristics of Hydroxy Terminated PolyButadiene (HTPB) prepolymer. A characterization and accelerated aging program is being conducted on the polymer to determine the chemical and physical changes that occur as the material ages.
• Continued research to prepare and study new high-nitrogen heterocyclic anion-metal oxidizer complexes for use as initiating materials sensitive to LASER initiation.

FY 2008 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2008 will focus on supporting the Naval S&T Strategic Plan in Power and Energy; Asymmetric and Irregular Warfare; Power Projection; Survivability and Self-Defense; and Affordability, Maintainability and Reliability. ILIR projects will also support the INP in Electromagnetic Gun and Sea Basing, and NNR initiatives in Ocean Acoustics, Undersea Weaponry and Naval Engineering.

FY 2009 Plans:

ILIR projects are intended to be roughly three years long. Typically 30% of ILIR projects turn over each year. Projects selected for FY 2009 will focus on supporting the Naval S&T Strategic Plan in Power and Energy; Asymmetric and Irregular Warfare; Power Projection; Survivability and Self-Defense; and Affordability, Maintainability and Reliability. ILIR projects will also support the INP in Electromagnetic Gun and Sea Basing, and NNR initiatives in Ocean Acoustics, Undersea Weaponry and Naval Engineering.

C. OTHER PROGRAM FUNDING SUMMARY - NAVY RELATED RDT&E:
PE 0601153N Defense Research Sciences

OTHER PROGRAM FUNDING SUMMARY - NON-NAVY RELATED RDT&E:
PE 0601101A In-House Laboratory Independent Research
PE 0601102F Defense Research Sciences

D. ACQUISITION STRATEGY:
Not applicable.