Mechanical and Aerospace Engineering professor Luke Brewer and student LT Brian Banazwski, USN, recently visited Pearl Harbor Naval Shipyard to examine the cracking of marine aluminum alloys used in Ticonderoga (CG-47)-class cruiser superstructures. Currently, twenty-two cruisers exhibit cracking, from a few inches to more than nine feet long. Superstructure replacement would cost more than a billion dollars and take ships out of service for extended periods. The NPS faculty-student team evaluated the extent and sources of cracking and reviewed the deployment of repair technologies such as composite patching and ultrasonic impact treatment, subsequently discussing their findings with VADM Richard Hunt, Commander, Third Fleet, and NAVSEA personnel. Brewer is developing research plans with the Third Fleet, NAVSEA, and NSWC–Carderock to monitor and trend-analyze the health of these alloys and to repair damage. This project is but one example of our academic faculty training the future leaders of U.S. Navy while helping solve today’s fleet challenges.

JACLYN CLEMENT KINNEY successfully defended her dissertation entitled “The Bering Sea: Communication with the Western Subarctic Gyre, mesoscale activity, shelf-basin exchange, and the flow through Bering Strait.” Jaclyn is a civilian doctoral candidate in oceanography. Her work, supervised by Research Professor Wieslaw Maslowski, advances understanding of the exchange of water between the Bering Sea and the North Pacific, at the surface and at depth, via the western Aleutian Island passes. Understanding the physical oceanography of the Bering Sea is important for the U.S. Navy, due to the increase in ship traffic and exploration of natural resources that will likely coincide with the ongoing retreat of sea ice in the Western Arctic. Two chapters from her dissertation have been published in the peer-reviewed journal Deep-Sea Research (Clement et al., 2005, Clement Kinney et al., 2009), and another chapter has been submitted for publication in a Springer Media book on the Pacific-Arctic Region. Congratulations, Jackie!

BROWN-BAG SEMINAR SERIES
WA-302, 1200-1300
• Wednesday, 16 February: Export Control
• Wednesday, 16 March: Working with Industry
• Wednesday, 13 April: Research Initiation Program

NPS OFFERS EXPERTISE TO THIRD FLEET

By School

By Sponsor

By Type of Activity
SPONSORED PROGRAM STATISTICS

Graduate School of Engineering and Applied Sciences
Funds available to date: $32.9M

By Department

Graduate School of Business and Public Policy
Funds available to date: $4.8M

By Sponsor

Projects funded in December–January:

- GED Special Project Research, Vicente Garcia, ECE, OSAF
- Distance Learning Program, Clark Robertson, ECE, Various
- GaNi HEMT Reliability Analysis, Todd Weatherford, ECE, AFRL
- Shipboard Calibration, Xiaoping Yun, ECE, NSWC–Corona
- Spacecraft Design, Brij Agrawal, MAE, ORSO
- Wavefront Sensing and Control Techniques in High-Energy Laser Beam Control Testbed, Brij Agrawal, MAE, AFRL
- Complex Exponential Method for Modal Parameter Estimation from FSST Data, Josh Gordis, MAE, NSWC–Carderock
- Autonomous USV Riverine Navigation, Doug Horner, MAE, ONR
- Autonomous Floating Spacecraft Simulators, Marcello Romano, MAE, NRL
- EM/EO Prediction Systems, Paul Frederickson, MR, SSC-Pacific
- North Pacific Tropical Cyclone Formation and Structure Change in TCS08 and TCS08 Experiment Support, Pat Harr, MR, ONR
- Hurricane and Severe-Storm Sentinel, Mike Montgomery, MR, NASA
- NASA Observation and Simulations to Understand Hurricane Fuel and Anti-Fuel Problems, Mike Montgomery, MR, NASA Goddard Space Center
- Smart Climatology Implementation, Tom Murphree, MR, SPAWAR
- Ocean Acoustics Postdoctoral Fellowship, John Colosi, OC, ONR
- Wave Observation in High-Resolution Air–Sea Interaction DRI, Tom Herbers, OC, ONR

Projects funded in December–January:

- River-Mouth and Inlet Tracer Dispersion and Moving AUV Observations, Jamie MacMahan, OC, ONR
- Super-Energetic Explosive Proof of Principle, Ron Brown, PH, ONR
- Hydro-Reaction in Hypervelocity Impact, Ron Brown, PH, ONR
- Armor Concepts from Fundamental Physics, Robert Hixon, PH, ONR
- Combat Systems Science and Technology Curriculum, Andres Larraza, PH, PEO IWS
- NPS Beam Physics Lab FEL Research, John Lewellen, PH, ONR
- Target Signatures Studies, Chris Olsen, PH, OSD
- MASINT Outreach/Liaison Project, Chris Olsen, PH, DIA
- Lithium Battery for Military Applications, Sebastian Osswald, PH, MAE, Polystor Energy Corporation
- Current-Transduction Systems and Measurement Infrastructure, Kevin Smith, PH, ONR
- Bioacoustic Data Collection and Academic Guidance, Kevin Smith, PH, NUWC–Newport
- Naval Chair of Systems Engineering and SE Research Program, Jim Kays, SE, Strategic Systems Program
- Knowledge and Curriculum to Advance Systems Engineering, Dave Olwell, SE, OSD
- Support of Red Teaming Initiative, Dave Olwell, SE, USMA
- Naval Space Systems Engineering and Acquisition Chair, Al Scott, SP, SPAWAR
- MS in Space Systems Operations, Rudy Pankowzy, SP, Various
- Exploring Future Unmanned Systems, Don Brutzman, USW, Battelle Memorial Institute

School of International Graduate Studies data found on p. 5
Graduate School of Operational and Information Sciences

Funds available to date: $20.8M

By Department

- Affordable Quality Assurance for Reusable Components in Open Architectures, Valdis Berzins, CS, NAVSEA
- Hardware Security Evaluation, George Dinolt, CS, SSC–Atlantic
- Multilevel Security Services, Cynthia Irvine, CS, NRO
- Special Operations Academic Curriculum, Gordon McCormick, DA, NAVSPECWARCOM
- NPS Program Support to the Staff of the Secretary of the Navy, Dan Boger, IS, SECNAV
- TNT-CENETIX Student Research for USSOCOM Center for Network and Communications, Alex Bordetsky, IS, USSOCOM
- Network-centric Warfare Acceleration, Shelley Gallyp, IS, CNO
- Information Dominance Center, Jen Hfy, IS, Navy Cyber Forces
- Adaptability in Information Flow for Command and Control, Sue Hutchins, IS, ONR
- NPS Joint Battlespace Awareness ISR Integration Capability Project, Bill Roeting, IS, USJFCOM
- Next CBA, Matt Carlyle, OR, NAV-Weapons Division
- Research, Analytical Tools, and Training Support for DOT&E, Pat Jacobs, OR, DOT&E
- Masters Program for Cost Analysis, Greg Midick, OR, Various
- Simulation-Optimization Model of Organizational Capacity for Army Corps of Engineers, Scott Nestler, OR, USA COE
- BCA of MAGIC, JCTD, Dan Nasbaum, OR, USCENTCOM
- Battlespace-on-Demand Decision Making Through Effective Use of METOC Data, Eva Regnier, OR, NRL
- Chair for Strategic Maritime Analysis, LCDR Harrison Schramm, USN, OR, CNO
- Statistical Analysis for the Deployed Analyst, Lyn Whitaker, OR, TRAC - Monterey

Research and Education Institutes, Centers, and Other

Funds available to date: $22.3M

By Department

- Consortia for Robotics and Unmanned Systems Education and Research, Jeff Kline, NSI, ONR
- Undersea Warfare Research Support, Jerry Ellis, Meyer, NAVSEA
- Marine Corps Small Arms/Marksmanship, Bill Becker, MOV’ES, ONR
- Autonomous Robot Targets, Bill Becker, MOV’ES, ONR
- Innovation Strategy & Technology Experimentation, Dana Debruce, Cebrowski, ONR
- Back to Basics: an Interactive Simulation to Train SWO Decision Making, Perry McDowell, MOV’ES, ONR
- 3D Display and Capture of Humans for Live-virtual Training, Amelia Sadagic, MOV’ES, ONR
- Behavior Analysis and Synthesis for Intelligent Training, BASE-IT, Amelia Sadagic, MOV’ES, ONR
- TRAC Information Technology, CDR Joe Sullivan, USN, MOV’ES, TRAC - Monterey
- Precision Targeting Program, Al Jaeger, CAW, 100th Chem BN
- Armed-Reconnaissance Aircraft Research, Ray Buettner, NPS- USSOCOM, NELO
- Field Experiment Cooperative, Ray Buettner, NPS-USNCOM, ARL
- NPS/CIRPAS Support of ONR Airborne Research Objectives, Haflidi Jonsson, CIRPAS, ONR
- Aerosol Duct Sealing Technology, Fernand Marquis, Meyer, NAVFAC
- JMMES Support to C3F, Richard Kimmel, Meyer Institute, OSD
SUNNI AND SHIIITE MARTYRDOM: A COMPARATIVE ANALYSIS OF HISTORICAL AND CONTEMPORARY EXPRESSION
Kelly F. Kafeyan—Major, USAF
Master of Art in Security Studies—December 2010
Advisor: Mohammed M. Hafez, Department of National Security Affairs
Co-advisor: Abbas Kadhim, Department of National Security Affairs

While Shia organizations such as Hezbollah pioneered the use of suicide bombings as “self-sacrifice operations” in the early 1980s, Shia groups have abandoned the practice since the 1990s, while Sunni organizations like Hamas and Al Qaeda in Iraq have not only exponentially increased the use of “martyrdom operations,” they have expanded the target set to include civilians, and now primarily target other Muslims. By first analyzing the historical tradition of martyrdom within Shia and Sunni Islam and then conducting case studies on Shia Hezbollah, Sunni Hamas and Sunni Al Qaeda in Iraq, this essay seeks to discover whether there are historical factors that can help explain the differences in the contemporary expression of martyrdom between the two main sects of Islam.

The main findings of this essay are that the less prominent role martyrs play in the Sunni tradition, contrasted against the consistent 1,400-year history of venerating prominent Shia martyrs, allowed Sunni extremists to essentially rewrite their history and reinvent “martyrdom” to suit their own contemporary political goals. Additionally, the essay reveals that in the vacuum of restraint from the Sunni theologians, Sunni Salafi-Jihadist organizations like Al Qaeda have pushed the boundaries of the religious justification that supports martyrdom operations so far that they are now primarily killing Muslims and noncombatants – a practice that is not only forbidden, but one of the greatest sins in Islam. Maj Kafeyan is the winner of the Louis D. Liskin Award for Excellence in Regional Security Studies.

EXPLORING THE FINANCIAL BENEFITS OF U.S. ARMS-EXPORT PRODUCTION
Andrew A. Yeung—Captain, USMC
Master of Science in Business Administration—December 2010
Co-advisor: Keenan D. Yoho, Graduate School of Business and Public Policy
Co-advisor: Jeremy Arkes, Graduate School of Business and Public Policy

This research examines the role of arms export production in achieving financial cost savings to the U.S. Department of Defense. A review of three theoretical benefits, identified by arms trade scholars, that DoD enjoys as a result of arms export production shows that there is some merit to the claim that unit costs may be lowered as a result of exports. Using the F-16 fighter aircraft as a case study, this research employs financial cost analysis using cost improvement curves to estimate the extent to which DoD benefited in terms of reduced per-unit costs through concurrent export production. This research makes a significant contribution to the cost analysis and arms exports literature by quantifying commonly purported financial benefits attributable to arms export production.

Captant Yeung was awarded the Department of the Navy Award for Academic Excellence in Financial Management.

THE NARCOTICS EMIRATE OF AFGHANISTAN: EXAMINING ARMED POLITIES AND THEIR ROLES IN ILLICIT DRUG PRODUCTION AND CONFLICT IN AFGHANISTAN 1980–2010
Matthew C. DuPee—Civilian, Department of Defense
Master of Arts in Security Studies—December 2010
Advisor: Thomas H. Johnson, Department of National Security Affairs
Second Reader: Mohammad Hafez, Department of National Security Affairs

The production of illicit narcotics in low-intensity conflict environments remains a serious concern for U.S. policymakers. Afghanistan is a solid example where the intersection of crime, narcotics production and insurgency has successfully thwarted U.S. stabilization and security efforts despite a 10-year military engagement there. This study seeks to examine the role of crime better, particularly narcotics related criminal enterprise, and its effect on the Taliban-led insurgency in Afghanistan. This study explores political, economic and conflict related factors that facilitate the narcotics industry and forges cooperation between drug trafficking organizations and insurgent movements. A key argument of this study is that nontraditional participants in narcotics production, such as insurgent groups or state representatives and institutions, acquire more than just profit and resources. Participants stand to gain political leverage, the social and political legitimacy derived from “protecting” the livelihoods of rural farmers, as well as “freedom of action,” the ability to operate unimpeded within a given territory or space because of public support. This study also suggests that one additional factor, social control, is a key motivator for an actor’s participation in the narcotics industry. Mr. DuPee received the NPS Outstanding Academic Achievement Award for a Department of Defense Student.

A CONFIGURATION FRAMEWORK AND IMPLEMENTATION FOR THE LEAST PRIVILEGE SEPARATION KERNEL
Chee Luan Quek—Defense Science & Technology Agency, Singapore
Master of Science in Computer Science—December 2010
Co-advisor: Cynthia Irvine, Department of Computer Science
Co-Advisor: Paul C. Clark, Department of Computer Science

The Least Privilege Separation Kernel (LPSK) configuration vector defines the initial secure state and the operational configuration of the kernel, including its security policies. Enhancements made to the LPSK functional specification necessitated substantial changes to the configuration vector data format defined previously. Moreover, the earlier format used an ad-hoc syntax that did not adhere to any standard. This work leverages Extensible Markup Language (XML) to standardize the configuration vector format. The new configuration vector format is depicted in a XML Schema, and its limitations are discussed. A more compact binary representation is defined, with an offline tool provided to generate binary configuration vectors for the target platform. Creation of a configuration vector file is a laborious and error-prone task. A good user interface can ease the process by removing underlying complexities from users. Pertinent features of XML editors were assessed in a survey. Using these as requirements, an XML editor with a suitable graphical user interface was selected. Ms. Quek received the Rear Admiral Grace Murray Hopper Computer Science Award.
DISPARITY IN DEMOCRACIES: A COMPARATIVE CASE STUDY OF MALI AND NIGER
Gregory Starace–Major, USMC
Master of Arts in Security Studies–December 2010
Advisor: Letitia Lawson, Department. of National Security Affairs
Second Reader: Eugene Mensch, Center for Civil–Military Relations

In order to understand variation in post-transition levels of democracy, this thesis undertakes a comparative case study of Mali and Niger. Despite similarities, Mali had substantially more success with democratization than Niger. This thesis employs a detailed process tracing of the decisions of political and civil society leaders in Mali and Niger at critical junctures when democratic institutions were put to the test to evaluate the empirical validity of existing explanations. It seeks to validate the causal mechanisms linking political culture and democratic success. Evidence however, suggests otherwise. A remarkable parallel in the behavior of political and civil actors in the countries invalidates the hypotheses. The most likely explanation is the role of key individuals. Analysis indicates that “good guys” in Mali may have encouraged application of the rule of law, as they accepted rulings counter to their agendas, whereas “bad guys,” in varying degrees, engaged in actions counter to the respective Niger constitutions, and may have had a part in encouraging the abandonment of the rule of law. Maj Starace won the Marina Corps Association Superior Serve Award for Outstanding USMC Student.

JEMAHAH ISLAMIYAH: REEVALUATING THE MOST DANGEROUS TERRORIST THREAT IN SOUTHEAST ASIA
Gregory R. Kippe–Lieutenant Commander, USN
Master of Arts in Security Studies–December 2010
Advisor: Michael Malley, Department. of National Security Affairs
Second Reader: Sandra Leavitt, Department. of National Security Affairs

This thesis examines Jemaah Islamiyah, Southeast Asia’s most dangerous terrorist threat. Since manifesting its presence with suicide bombings in Bali, Indonesia, in October, 2002, considerable effort has been devoted to describing the group responsible and interpreting how it has changed over time. Over the last decade, two competing interpretations of JI emerged. One view held that JI was divided between a large group of traditionalists and smaller group of pro-violence militants. This became the conventional wisdom and served as the foundation for most countries’ counterterrorism policies. The other held that the two factions worked closely together. By reconsidering JI’s evolution in light of recently available evidence, this thesis shows that the second view more accurately describes JI and suggests the factions should be viewed as mutually supportive “administrative” and “operational” components of a single, adaptable group. Counterterrorism policies should pay greater attention to the administrative faction and its relationship to the operational wing, which conducts actual terrorist attacks. LCDR Kippe won the Naval Intelligence Foundation, Admiral B. R. Inman Award for Outstanding Performance in the Field of Intelligence.

HYBRID MODES IN LONG-WAVELENGTH, FREE-ELECTRON LASERS
Younhoan Bae–Captain, Republic of Korean Army
Master of Science in Applied Physics–December 2010
Co-Advisor: William B. Colson, Department of Physics
Co-Advisor: Robert L. Armstead, Department of Physics
Co-Advisor: Joseph Blau, Department of Physics

Most free-electron lasers (FELs) are big and expensive, across the wavelength spectrum, from long to very short. In contrast, the FEL facility in progress at NPS, which will initially operate at long wavelengths and at electron energies of only a few MeV, is inexpensive and small. Longer wavelengths lead to more diffraction, which may result in beam spread and interaction with undulator surfaces. We analyze the free space Hermite–Gaussian modes of the optical beam, then compare them to hybrid modes, where waveguide plates control diffraction along one axis, allowing free space diffraction along the other. We analyze the relativistic electron beam, co-propagating with the optical wave in the hybrid mode, to define new operating conditions for the FEL. Captain Bae was awarded the Naval Sea Systems Command Award for Excellence in Combat Systems.

School of International Graduate Studies
Funds available to date: $7.6M

By Department

Projects funded in December–January:
• Support of Naval Intelligence Research and Education, CAPT Jen-nith Hoyt, USN, ONI
• U.S.–China Strategic Lexicon and Concepts, Chris Twomey, DTRA
APPLIED MATHEMATICS

COMPUTER SCIENCE


GRADUATE SCHOOL OF BUSINESS AND PUBLIC POLICY


INFORMATION SCIENCES


Bordetsky, A., gave keynote speech, “Field Experimentation with Tactical Networks and Unmanned Systems,” at SIGE Symposium, ITA, Brazil, September 2010.


METEOROLOGY

NATIONAL SECURITY AFFAIRS

Jeffrey W. Knopf presented to and organized a panel for a workshop, “Influencing Violent Extremist Organizations,” held in February in Bethesda, MD, sponsored by the Office of the Secretary of Defense and US Strategic Command. The workshop was the kickoff for a strategic multilayer assessment to develop principles for achieving intended effects and minimizing unintended effects of against violent extremism.


OCEANOGRAPHY

OPERATIONS RESEARCH

PHYSICS
John Lewellen wrote a chapter on SRF photoinjector design for a new handbook, Photoinjectors: an Engineering Guide, developed in collaboration with other researchers.

SYSTEMS ENGINEERING
Art Pyster of Stevens Institute of Technology and David Olwell are leading an OSD-funded international initiative to prepare foundational documents in systems engineering, called the “Body of Knowledge and Curriculum to Advance Systems Engineering,” or BKCASE. Professional societies collaborating on the project include the Institute of Electrical and Electronics Engineers and the International Council on Systems Engineering.
COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS (CRADAS)

**Title:** Language Evidence for Social Goals: A Linguistic Approach to Persuasion Moves in Discourse  
**Partner:** University of Maryland  
**PI:** Craig Martell, Department of Computer Science

Summary: The collaborators will develop a method to use language to identify social constructs pertaining to the notion of group influencers and measure subgroup formation and cohesion, to develop a well-defined, computationally tractable characterization of variables for analysis. NPS and UMD will build datasets for development, refinement, and formative evaluation of the models. The collaborators will perform human coding of relevant variables in the data sets for model training and evaluation and produce evaluation metrics to compare alternative approaches, assess progress, and identification of error categories for further improvements.

**Title:** Port of Hueneme Emergency Planning and Preparedness Studies  
**Partner:** Oxnard Harbor District, Port of Hueneme  
**PI:** Alan Jaeger, Center for Asymmetric Warfare

Summary: The Port of Hueneme is a dual-use port with commercial and Navy operations. The commercial portion is operated by the Oxnard Harbor District (OHD). The primary goal of this effort is to increase the ability of the OHD, Navy, and local agencies to prepare for, respond to, and recover from technological, natural and manmade disasters. NPS and OHD will collaborate on a port-security exercise to analyze current emergency planning and training. Collaborators will also design and participate in an exercise to address deficiencies identified during the review/evaluation phase.

**Title:** An Ultra-High Energy and Safety Lithium Battery for Military Portable Power Applications  
**Partner:** Polystor Energy Corporation  
**PI:** Sebastian Osswald, Departments of Physics and Mechanical and Aerospace Engineering

Summary: NPS and Polystor are interested in the development of safe, ultra-high energy Silicon-Nanowire/Nickelate Lithium-Ion batteries for military portable power applications. Collaborators will design and execute experiments and characterization activities to establish baseline non-destructive evaluation (NDE) data for qualification of battery materials and devices.

**Title:** Probabilistic Ceiling and Visibility Prediction  
**Partner:** University Corporation Atmospheric Research  
**PI:** Joshua Hacker, Department of Meteorology

Summary: UCAR and NPS will improve weather prediction by leveraging mesoscale ensemble predictions to produce probabilistic ceiling and visibility predictions. The results could assist AFWA by improving estimates of slant-path visibility, percent cloud-free, line of sight, and weaponeering and targeting parameters.

TECHNICAL SERVICES AGREEMENTS (TSAs)

**Title:** Manta UAV Flight Test  
**Partner:** BAE Systems  
**NPS POC:** Bob Bluth, CIRPAS

Summary: NPS/CIRPAS through its prime contractor Zivko, will provide pre-flight and flight coordination, range management, flight safety of BAE Systems Manta UAV flight testing at the CIRPAS facility.

**Title:** Flight Testing of HAVOC UAS  
**Partner:** Brock Technologies  
**NPS POC:** Bob Bluth, CIRPAS

Summary: NPS/CIRPAS through its prime contractor Zivko, will provide pre-flight coordination, flight coordination, range management, flight safety of Brock Technologies HAVOC UAS flight testing at CIRPAS facility.

**Title:** Basset Flight Testing  
**Partner:** Toyon Research Corporation  
**NPS POC:** Bob Bluth, CIRPAS

Summary: NPS/CIRPAS through its prime contractor Zivko, will provide pre-flight coordination, flight coordination, range management, flight safety of Toyon’s Basset flight testing activities at CIRPAS facility.

**Title:** Flight Testing of HAVOC UAS  
**Partner:** NextGen Aeronautics, Inc.  
**NPS POC:** Bob Bluth, CIRPAS

Summary: NPS/CIRPAS through its prime contractor Zivko, will provide pre-flight coordination, flight coordination, range management, flight safety of NextGen’s HAVOC flight testing activities at CIRPAS facility.

MEMORANDA OF UNDERSTANDING/AGREEMENT (MOUS/MOAs)

**Title:** Port of Hueneme Emergency Planning and Preparedness Studies  
**Partner:** Oxnard Harbor District, Port of Hueneme  
**PI:** Alan Jaeger, Center for Asymmetric Warfare

Summary: The purpose of this agreement is to provide a direct relationship between PEO IWS and NPS to continue the development and delivery of the Combat Systems Science & Technology (CSS&T) course work and related research projects of direct interest to PEO IWS.

**Title:** Probabilistic Ceiling and Visibility Prediction  
**Partner:** National Weather Service  
**PI:** Joshua Hacker, Department of Meteorology

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## TECHNICAL REPORTS PUBLISHED

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<td>U.S.-China Strategic Dialogue, Phase V, 2010</td>
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<td>M. Nissen</td>
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**Technical reports may be obtained at [http://www.nps.edu/Research/TechReports.html](http://www.nps.edu/Research/TechReports.html)**

### NOTICES

- The Counterintelligence Support Plan (CISP) is being implemented at NPS. Associate Dean Douglas Fouts is coordinating the effort along with security personnel. Additional information is forthcoming. The purpose of the CISP is to protect critical program information (CPI) from exploitation by foreign intelligence collectors.
- The NPS “ITAR and Export Control” website will soon be online. The next Brown Bag Seminar will cover this important topic. The seminar will be led by CAPT Rod Abbott, USNR, and is scheduled for Wednesday, 16 February, in the MAE Conference Room, Watkins-302.