



Panamax crane loading containers onto a cargo ship at the Garden City Terminal of the Port of Savannah

The Sam Nunn Security Program Visits Port of Savannah and Savannah River Site

During the 2006 fall break, the fellows and faculty of the Sam Nunn Security Program traveled to Savannah, Georgia and Aiken, South Carolina to advance their understand of a number of critical issues involving technology and global security. On Monday October 16th, the Program visited the Port of Savannah. The group first arrived at Georgia Tech's Savannah Campus, which houses the Maritime Logistics Innovation Center (MLIC), and visited the MLIC office to meet its Director, Page Siplon. Mr. Siplon served as our guide on a tour of the Garden City Terminal of the Port of Savannah, and he ably answered the many questions put to him about port and container security vulnerabilities. Tech's Savannah Campus currently consists of three white contemporary buildings in a new circular business / research park just off I-95 north of the Savannah / Hilton Head Airport and, conveniently, minutes away from the Garden City Terminal. Georgia Tech Savannah is wired into the Atlanta campus, but has its own research emphasis that takes advantage of the unique geographic, ecological, and economic position of Savannah. GT Savannah has about 27 faculty members home-based at this campus, and most of these are in the academic disciplines of Civil and Environmental Engineering, Electrical and Computer Engineering, and Mechanical Engineering. The campus is also home to a number of research centers in addition to the MLIC.

The MLIC is one of Georgia's Centers of Innovation. These centers are funded by the state government to advance research and development in a number of strategic economic sectors such as agriculture, aerospace, information technology, manufacturing, and the biological sciences. The MLIC facilitates research and partnerships between academia, corporations, and government to make Georgia Ports operate more efficiently, competitively, and securely. This center has been working with a company called Savi Networks on installing Radio Frequency Identification (RFID) technologies that will allow companies (and the port operators) to track the location of a tagged container as it moves around the Port of Savannah and other facilities with this technology in place. RFID systems provide both economic and security advantages by allowing for real-time tracking of containers, but these benefits are gained at no insignificant cost in terms of installation, monitoring, and maintenance. There are distinct differences of opinion about the degree to which such systems are cost efficient.

Georgia has three other ports in addition to the Port of Savannah (Brunswick, Bainbridge, and Columbus), and the Savannah port itself consists of two primary terminals – Garden City and Ocean. The Garden City Terminal, which our group visited, specializes in containers, and is the largest single-terminal facility on the East or Gulf Coasts. It handles close to 2 million containers a year. This terminal is the fifth largest container port in the US and has eight large berths and fifteen giant cranes capable of handling huge cargo ships and tankers.

Maintaining a thriving global economy requires ports be able to quickly and efficiently move large numbers of shipping containers as well as bulk cargo and roll-on / roll-off items (e.g. cars) in short periods of time. The Garden City Terminal averages over 40 containers loaded or unloaded per hour, and has the capacity to handle many more. Any delays can be costly for companies; and for the port, which is in competition with other ports for cargo-handling contracts. However, there are many national security vulnerabilities associated with container shipping through ports that must be considered. Containers could be used to smuggle weapons of mass destruction, terrorist cells, or contraband items into the country fairly cheaply. A weapon set off at a port could cause a costly disruption of operations and lead to an even costlier imposition of new security measures in the aftermath. Attacks could also be mounted against ships transporting bulk materials such as chemicals or petrochemicals or against storage facilities at the port that temporarily hold such materials. In considering solutions to these vulnerabilities, it is necessary to take into account the need of commerce for quick and efficient handling of goods and materials in a manner that minimizes the economic costs. Fellows and faculty members learned about what actions were being taken to reconcile these economic and security considerations.

After touring the terminal, the Program members gathered into a conference room with Mr. Siplon and the head of the Garden City Terminal's Georgia Ports Authority (GPA) police unit. Our hosts answered many questions about a number of technological elements of security at the port. Among the topics was the new Transportation Worker Identification Card (TWIC) program that will provide a standardized identification for drivers and other workers that need unescorted access to ports and other transportation

related facilities. The TWIC has biometric information stored on it that can be used to verify that its subject is its bearer. With the TWIC, an individual's card can be "turned off" upon discovery of wrong-doing, card loss, or card theft to prevent access to all transportation complexes, and the card can be used to track which individuals have entered a facility. This will be an advance over the system that is now being phased out under which it would be fairly easy to move to another facility and gain access if an individual were blocked from one, and under which news of lost or stolen cards did not spread efficiently if at all. There are also a number of systems in the works that will allow containers to be tracked and their status to be assessed in real-time. (e.g. Are the doors open or closed; is the unit empty or full; has the container been diverted from its scheduled course?) Also discussed were new seal technologies that will make it more difficult to tamper with the contents of a container. However, much of the time was taken discussing what has and has not been done since September 11th to minimize damage caused by attacks to the soft underbelly of this infrastructure. Among the problems that have not yet been adequately addressed is lack of interoperability of communications. Port police can still not talk to all agencies with whom it might be useful for them to be in touch.

At the end of the day we left for Aiken, South Carolina in preparation for our visit to Savannah River Site the next day. After checking into the hotel we conducted a group meeting over dinner. This allowed some of the fellows to meet and talk with Dr. Rick Houska, who recently finished up a tour of duty as Georgia Tech's CIA Officer-in-Residence. Dr. Houska has spent a career working in intelligence on Science and Technology related issues, and has a unique insight into the role of S&T in the world of intelligence.

Tuesday October 17th was spent at the Savannah River Site [SRS.] This 310 square mile installation was originally developed to produce the tritium (a radioactive form of hydrogen that is used to obtain the high yields seen in hydrogen bombs.) Today it is the nation's only source of tritium, but during the Cold War it also produced about one-third of the plutonium used for nuclear weapons (Hanford in Washington State being the other major producer.) SRS also produced its own heavy water that was needed to serve as neutron moderator in the five reactors located on the site. None of SRS's five nuclear reactors have been operational since 1990.

Because the US is no longer producing more fissile material for bombs, and is not engaged in reprocessing plutonium, the mission of SRS has changed. Though tritium must still be produced because it has a limited shelf life and must be periodically replaced. One aspect of SRS's mission is environmental in nature. This includes cleaning up the site of waste products produced over the decades on the complex, and also making radioactive nuclear waste products safe for storage by "glassifying" them. SRS is also the home of the newest of America's national laboratories. The Savannah River National Laboratories (SRNL) does a wide range of work, but most of it falls under three headings: energy security (e.g. hydrogen as a form of energy), environmental processes and technologies, and national security and homeland defense related projects (e.g. consideration of new warhead designs, technologies used in verification of treaty

compliance, etc.) SRS is involved in down-blending highly enriched uranium (HEU) that was developed for, but not used in, nuclear weapons. The down-blended fuel is used in the Tennessee Valley Authority (TVA) nuclear power plant. The TVA plant utilizes Low Enriched Uranium (LEU) that is not suitable for use in nuclear weapons. Soon SRS will be taking plutonium from dismantled nuclear weapons and converting it into Mixed Oxide (MOX) fuel that can be used for nuclear power, but cannot be employed in nuclear weapons.

After receiving our security badges and watching a safety briefing by video, we boarded a bus to tour a few of the facilities before traveling to the Central Training building for briefings. We drove through the A and M areas seeing the slabs that were once fuel fabrication facilities. A great deal of demolition is taking place at SRS as buildings put up for the mission of a different era are eliminated. The tour traveled into the M area that is integral to the clean up efforts. There is a seepage basin in this area (as is true of other areas as well) where pollutants can be captured for cleanup. SRS has monitoring wells located throughout the entire installation. These wells allow environmental scientists to check ground water for contaminants, and to monitor the success of cleanup efforts. Steam lines criss-cross the entire site, and this steam is injected into the ground to scour and capture pollutants.

Among the highlights of the tour was our trip to the F-canyon facility that was used to separate out plutonium and uranium from spent reactor fuel so it could be used in nuclear weapons. The term “canyon” comes from the long deep nature of the facilities’ interior. The F-canyon was one of two such reprocessing facilities. The other, H canyon, is still in use down-blending uranium for use as nuclear fuel. The interior of the F-canyon facility is highly radioactive, and this has raised questions about how it might ultimately be disposed of (i.e. whether it should be left as is, entombed in concrete, or, in a potentially risky move, demolished.) Our last stop before traveling to the briefing room was the Saltstone facility that is used to process liquid wastes that display low levels of radioactivity.



A “canyon” at Savannah River Site where the PUREX process was used to reprocess plutonium

The Program was next briefed by the Associate Laboratory Director of SRNL. The Associate Director gave an overview of the activities of the SRNL, and then more specifically spoke about the scope of the work being done related to national security and homeland defense. These programs include improved portable radiation detectors such as the RadRope that can be draped down between containers to determine if there is a radiation source on a ship or a container stack at a port. Also discussed was technological assistance to agencies like the International Atomic Energy Agency [IAEA], the FBI's Nuclear Forensics Laboratory, the Coast Guard, the Port of Charleston, and governments involved with the Proliferation Security Initiative (PSI) that encourages and facilitates interdiction of shipments of weapons of mass destruction and precursors and equipment used in their development.

Next a scientist who conducts applied microbiology research gave an overview of the work that SRNL is doing in the area of the biological sciences. This encompasses a wide variety of studies and engineering work. SRNL has studied the nature and health implications of the molds and fungi that developed in New Orleans in the aftermath of Hurricane Katrina. They have conducted training for law enforcement personnel at the Federal Law Enforcement Training Facility (FLETC) in Brunswick, Georgia and at the Port of Charleston. Perhaps the most interesting aspect of the discussion was about *Kineococcus Radiotolerans*. This organism, discovered at SRS, is able to survive comfortably in radioactive materials at 4000 times the lethal dose for humans. There are two critically important aspects to the study of this organism. First, if it could be determined how this microorganism is able to repair itself from damage and mutation caused by radioactivity, this might have major ramifications for cancer research. Second, the organism can also degrade organic solvents and pesticides, and so there is potential use in environmental cleanup efforts.