

**United States Senate Armed Services Committee**  
**Statement of Rear Admiral F. P. Gustavson, U.S. Navy (Retired)**  
**Executive Vice President**  
**Lockheed Martin Energy Systems, Inc.**  
**February 26, 1999**

Mr. Chairman and members of the Strategic Forces Subcommittee.

Thank you for the opportunity to update you on the Defense Programs activities at the Y-12 Plant in Oak Ridge over the past year, and to give you my views on our ability to meet the requirements of the Stockpile Stewardship Program, both in the near and long term.

This is an appropriate time for this discussion for several reasons.

- First: The first life extension program is underway. In conjunction with Lawrence Livermore National Laboratory (LLNL), the production complex is conducting the Life Extension Program on the W87 warhead for the Peacekeeper ICBM, the first major life extension program since the signing of the Comprehensive Test Ban Treaty.
- Second: Production plant workload is increasing, up 10-15% at Y-12 from FY 1999 to FY 2000; but overall funding is down.
- Third: We have not yet reached a balance between science and production for the long term. The safety and reliability of our nuclear weapons stockpile is contingent on two essential capabilities: the capability to predict performance and evaluate problems in our weapons, and, just as importantly, the capability to rapidly repair and replace hardware. We must also be able to do this at a cost that is affordable to our country, and must have a balanced program between our science and technology requirements and our production facilities. The balance that we choose now could very well determine whether or not Stockpile Stewardship will be successful when viewed ten to twenty years from now.

For over 50 years, the men and women of Y-12 have provided vital support to the advanced manufacturing requirements of the Nuclear Weapons Complex. Y-12 is a very unique, one-of-a-kind, precision manufacturing facility, incorporating all facets of manufacturing technology, from concept through production, quality control and recycling of the waste streams. This integrated application of world class knowledge, expertise and equipment is not duplicated anywhere in the United States.

**Y-12: Outstanding Performance in FY 1998**

Our performance over the past year is indicative of how vital Y-12 and the production plants are to the success of the Stockpile Stewardship Program. The plant again met all of

its deliverables on time or early, and ended the fiscal year on budget. Specific highlights of the last year include:

- The first W87 components were delivered early. We are very proud of that accomplishment. Three years ago, Y-12 agreed to an aggressive schedule for the refurbishment of the secondaries of the W87 warhead under the W87 Life Extension Program, with initial deliveries to Pantex in December 1998. Although the scope of the refurbishment increased dramatically, the delivery date held firm over that period. I will say more about this program later.
- The innovative Process Based Restart of our Enriched Uranium Operations that I described to you last year has been very successful, resulting in the resumption of Enriched Uranium casting, rolling and machining operations in June 1998. This restart was the final of five major mission areas to be restarted over the past three years, and established an operational rigor commensurate with the risk of the operations. We are continuing this year to bring the enriched uranium metal and chemical recovery programs back on line following this same approach.
- We conducted more controlled disassemblies of secondaries under the stockpile surveillance program than any other time in recent Y-12 history, providing critical material condition data to the design laboratories. The surveillance program continues to grow in scope, with 25 units scheduled to be completed in FY 1999.
- We manufactured 24 flight and ground test assemblies in FY 1998, twice as many as FY 1997, and will complete a similar amount in FY 1999. Y-12 received about 865 shipments from Pantex returning weapons assemblies for dismantlement, disassembled 128% of the weapons scheduled for FY 1998 and refurbished over 1100 containers in support of Pantex dismantlement activities.

Overall, this has been a very successful year for Y-12; and I am very proud of our entire workforce. They have not backed away from major changes in our operational and business culture, but rather have adopted a very strong commitment to continuous improvement in everything we do.

### **Stockpile Life Extension Program (SLEP)**

Last year the Department of Energy (DOE) instituted the Stockpile Life Extension Program (SLEP) to determine what design and manufacturing capability is required to maintain our nuclear weapons in a safe, reliable and certifiable condition. As I mentioned above, we are presently conducting the first of these SLEPs on the Peacekeeper warhead. Our weapons systems were designed with a nominal 25-year life expectancy, and in the past they were replaced by new programs about halfway through their lifetime. Our stockpile is presently older than ever before, and 70% of our weapons systems will reach the limits of their design lifetime by the year 2005. Therefore, it is critical that our country retains the technologies, facilities and the people necessary to not only assess and surveil,

but also remanufacture any component in the stockpile. We need your continued support of both the design and the manufacturing components of the SLEP program.

The ability to rapidly respond to problems and issues in the stockpile is strongly dependent on a proactive and interactive relationship between our weapons laboratories and our production facilities. The W87 LEP has been an example of a successful relationship between the designers, physicists and engineers at Livermore; the manufacturing experts, quality engineers, machinists and chemical workers at both Y-12 and Kansas City; and the assembly personnel at Pantex.

There are also some very strong "lessons learned" for our production facilities from the SLEP program. Although we are not designing new weapons with these life extension programs, neither are we refurbishing and re-assembling them just as we did the first time around. The procedures are now much more complex, the tolerances more restrictive, the processes much better characterized than our previous manufacturing. This is not unexpected. The increased complexity stems from three areas: the need to certify the LEP refurbishment without nuclear testing; the expectation that the weapons systems will be required to last much longer; and new, improved technologies that were not yet developed during the initial manufacturing. Two examples of these new technologies are electronic data collection of part measurements, and the use of infrared technologies to measure levels of contaminants in critical materials. These technologies were developed jointly between the labs and the plants under the Advanced Design and Production Technologies (ADAPT) Program and the Enhanced Surveillance Program (ESP).

Stockpile Stewardship, and in particular, SLEP, results in an increased workload at the production plants. This occurs not just due to the remanufacture and disassembly/assembly of components, but due to increased flight and ground test units, and increased stockpile surveillance. One of our biggest challenges is to meet these production requirements, without sacrificing critical infrastructure and technology improvements, without losing our capabilities due to the retirement of our aging workforce, and within the boundaries of increasing compliance requirements and a declining budget.

## **Facilities**

Y-12 continues to perform its missions in a very safe, compliant and cost effective manner, maintaining the capability to rapidly repair or replace secondary components in the stockpile. This capability is crucial to the Stockpile Stewardship Program, and demands facilities, processes and people which can respond to these needs continuously and indefinitely. However, our facilities are aging. Over 70% of the facilities are greater than 40 years old, and were not designed to meet today's health, environmental, safety and security requirements. The newest of our major production buildings was built in 1969. Safe operations in these aging facilities require a continuously increasing investment in operating, maintenance and repair costs. It has been expensive to upgrade our nuclear facilities to current operating standards during our restarts, and maintaining them to those standards is difficult. Therefore, we are at a critical juncture in Y-12. An investment in the

Y-12 facilities is needed now to create a smaller, modern and more efficient manufacturing operation through a combination of existing and replacement facilities.

The first step of this Y-12 modernization is underway. We have a pressing need to consolidate our storage of special nuclear materials and prepare for increased storage, International Atomic Energy Agency (IAEA) and transparency requirements. To this end, DOE has approved the mission need for a new Highly Enriched Uranium (HEU) Storage Facility to consolidate operations, thereby vacating multiple aging facilities and greatly reducing operating costs. We are completing the conceptual design for this new facility this year, leading to a Fiscal Year 2001 Line Item project. In addition, DOE has established a senior oversight group to further examine the modernization needs for Y-12 and lead the development of a Y-12 modernization strategy.

## **People**

Our workforce is also aging. About 85% of the Y-12 workforce are over 40 years old, and over 50% of our workforce in critical skill areas will be eligible for retirement within five years. Our people are our most important asset; so we must revitalize this workforce, and soon.

Last year Congress formed the Commission on Maintaining U.S. Nuclear Weapons Expertise to develop a plan for retaining the skills necessary for our missions well into the next century. We have been working closely with Admiral Chiles and the commission members, and I think their report ( which is due out next month) will reflect our concerns over our aging workforce.

## **Technologies**

### **Enhanced Surveillance Program (ESP)**

The U.S. Government is faced with a great challenge to uphold the key defense strategy of continuing nuclear weapons as a deterrent in view of the aging stockpile and constraints of no nuclear tests. In the past, any changes in design, materials, or manufacturing processes for nuclear weapons could be verified by performance tests. Today and in the future, the stockpile is setting new age records (beyond our experience) every day. The behavior of materials and components as they age beyond past experience must be defined in terms that can facilitate preventive maintenance of the stockpile and/or provide data which can be used to model weapon behavior and link it to historical nuclear weapons performance tests. The surveillance of nuclear weapons (destructive evaluation of units from the stockpile) has historically been an important mission element. However, surveillance alone only detects problems that are already occurring. The Enhanced Surveillance Program adds predictive capability...to predict the life of materials, components and assemblies with enough lead time to enable preventive maintenance of the stockpile.

The Y-12 Plant is playing a key role in the ESP, working collaboratively with the Los Alamos National Laboratory and LLNL, for the "secondary" portion of nuclear weapons. Several technologies developed by ESP have already been deployed at Y-12. Efforts currently underway will yield predictive modeling capability in the near future. Baseline characterization of materials and assemblies is being improved under ESP to provide input to models utilized to link production data and conventional surveillance data to the existing underground test envelope. The ESP is a key part of DOE's strategy for maintaining the safety and reliability of the nuclear weapons stockpile, and Y-12 is performing a unique and essential role for secondaries.

### **Advanced Design and Production Technologies (ADAPT)**

In addition to producing safe, reliable hardware for the stockpile, Y-12 is also instrumental in more fully characterizing weapon components made at Y-12. This is essential to enable the design laboratories to predict weapon performance without underground nuclear testing. For Y-12, we must understand the science basis for our manufacturing processes and create models that can be used by the design laboratories in their simulations. DOE's Advanced Design and Production Technologies (ADAPT) Program provides the direction for Y-12's effort in this area. ADAPT will seamlessly integrate Y-12 processes with the modeling and simulation capabilities of the design laboratories.

ADAPT is also our program for re-engineering some of our core manufacturing technologies. This is necessary to meet current and future manufacturing needs of the stockpile. One example is enhancement of our precision metal-cutting capability with the Femto-Second Laser that resulted from teaming with LLNL. Enhanced technologies are also required to meet more stringent health, safety, and environmental requirements. Our approach is to limit our people's exposure through engineered safeguards and containment of hazards. ADAPT is crucial in establishing a modern manufacturing technology base at Y-12 that will meet the needs of the stockpile for the foreseeable future.

### **Complementary Work**

Another key to enhancing our technologies is execution of work that is complementary to the needs of stockpile stewardship. Through complementary partnerships with industry, academia, and other government agencies, we work to stay at the cutting edge of manufacturing technology. We recognize the need to look beyond the weapons complex and incorporate the best that both industry and government have to offer. By leveraging the intellectual and capital assets of our partners, we are able to maximize the benefits from our limited budget. This work is also important in exercising and enhancing the skills of our workforce.

Through complementary work, we are also highly successful at transferring manufacturing technology to other government agencies and industry by addressing manufacturability and affordability issues. We have been privileged to assist the Department of Defense and its contractors on several projects that are important to national security. Among these

are fabrication of propulsors for the Seawolf submarine, development of a mobile surgical suite for military and emergency use, and fabrication of a prototype hull for the Marine Corps' Advanced Amphibious Assault Vehicle.

We find the machine tool industry especially anxious to work with us to test and evaluate their equipment in our rigorous manufacturing environment. Working with industry to transform our collective ideas into commercially available processing equipment, our goal is to minimize the development and support costs to DOE. A prime example is the commercialization of software developed at Y-12 that automatically generates machine tool control codes from the product design model. As a result of our success in developing and transferring new technology, Y-12 has been placed in a lead role by several federal agencies in developing technology roadmaps for the Nation.

### **Summary**

One of our nation's most important national security requirements is an adequate, safe and reliable nuclear weapons capability, maintained indefinitely without nuclear testing. This requirement can only be met through a balanced approach that fosters the science and technology necessary to predict performance and problems, and retains the manufacturing expertise and capability to re-manufacture any component in the enduring stockpile. Manufacturing expertise infers modern technologies, efficient facilities, and a well-trained, flexible workforce.

Our production plants are doing an excellent job of meeting current stockpile requirements, especially given the age of our facilities. Our ability to cost effectively meet more demanding manufacturing requirements and modern standards of safety and environmental protection in World War II facilities presents an ever increasing challenge. Our workforce is well trained and is ready to take on new challenges. However, this workforce is aging, and most critical people are near retirement eligibility.

Over the past few years, this balance between science and manufacturing has been of necessity tipped in the direction of science. However, now that the Department of Energy has embarked upon the Stockpile Life Extension Program to surveil, assess and remanufacture weapons components, we must ensure that we attend to the manufacturing capability as well.

The bottom line is that without safe, reliable hardware in the nuclear weapons stockpile, there is no nuclear deterrent.