G. TITLE III OF THE DEFENSE PRODUCTION ACT

The Defense Production Act (DPA) (50 U.S.C. App. 2061 et seq.) is the primary legislation to ensure the timely availability of industrial resources and critical technology items that are essential for national defense. The mission of Title III of the DPA is to establish, modernize, or expand domestic production capability and capacity for technology items, components, and industrial resources that are essential for national defense and for which either no domestic capacity exists or it is insufficient to meet defense needs. Title III accomplishes this by providing domestic industry with a variety of financial incentives, which reduce the risk of establishing the needed capacity. These incentives include the use of purchases or purchase commitments, loans and loan guarantees, and the purchase or lease of advanced manufacturing equipment which can be installed in government or privately owned facilities. Purchases and purchase commitments are the incentives used most frequently.

The Title III Program is unique among DoD programs. It is the only program specifically aimed at establishing or expanding domestic production capacity. Furthermore, Title III has proven to be an exceptionally effective tool for transitioning new technologies from the laboratory to the factory floor.

Title III is organized and executed as a DoD-wide program. Title III efforts generally focus on materials and components that can be used in a broad spectrum of Defense systems. The Title III Program undertakes projects that have multi-system application and enables these programs to acquire materials that would otherwise be unavailable or too expensive. The Office of the Secretary of Defense provides top-level management, direction, and oversight. The Air Force is the Executive Agent for the program and is responsible for the execution of approved and funded projects.

During 1999 six projects were active, including one new start; three were pending initiation; and two were completed. The cumulative value of all active Title III projects is approximately $76 million.

Active Projects:

Silicon Carbide (SiC) Substrates (New start in 1999)

The goal of this project is to establish long-term, world-class domestic sources of high-quality silicon carbide semiconductor substrates. This Title III project will increase material availability, improve quality, reduce cost, and accelerate the insertion of SiC technology into defense applications. It will enable the transition to full scale manufacturing by establishing the capability to produce 75mm diameter SiC substrates for device fabrication.

Future requirements for high temperature, high power applications will exceed the capabilities of second-generation semiconductor materials such as gallium arsenide and indium phosphide. Semiconductor devices fabricated on SiC will enable the development of systems with performance capabilities that are unattainable with current materials. The advantages gained by the application of SiC technology are essential for the continued technological superiority of U.S. Defense weapon systems.

In September 1999, Title III contracts were awarded to Cree Research Inc., Durham, NC; Litton Airtron Inc., Morris Plains, NJ; and Sterling Semiconductor Inc., Sterling, VA. This project is planned to run through December 2002. Title III funding is $8.5 million with the contractors investing in excess of $8.5 million in cost sharing.

Titanium Metal Matrix Composites (Ti MMCs)

The objective of this project is to establish an economically viable production capability for Ti MMC materials by reducing the cost of Ti MMC parts to affordable levels and promoting the use of such parts in gas turbine engines and other aerospace applications.

Ti MMCs will be used primarily for the fabrication of various gas turbine engine components. A major objective of the project is to demonstrate a "production ready" industry in time to incorporate this material in the Joint Strike Fighter (JSF). Other candidates for use of this material include the F-22 (F119 engine) and the F-14/F-15/ F-16 (F110 engine). Other DoD and commercial aircraft engine applications are expected to follow. This technology is vital to propulsion system improvements for the next generation of commercial and military aircraft. The project was initiated in August 1996 and is scheduled to be completed in September 2000.

Semi-Insulating Indium Phosphide (SI InP) Wafers

The goals of this project are to establish an economically viable, domestic production capability for Semi-Insulating Indium Phosphide substrates, improve material quality, and reduce material cost.

SI InP is a compound semiconductor material critical to a variety of very high frequency, millimeter wave, and high power microwave electronics applications. The existing manufacturing infrastructure for SI InP wafer production is incapable of meeting current and future Defense requirements for quality, price, size, and availability. Numerous DoD communication and weapon systems, including satellites, aircraft, and munitions, are dependent on SI InP-based devices. Additionally, SI InP is highly resistant to radiation and is essential to radiation-tolerant weapon systems and satellite components.

Title III incentives will enable the transition to full-scale manufacturing, improve quality and affordability, target military systems insertions, and leverage government investments. The Title III investment is $5.5 million, with contractor cost sharing contribution exceeding $4.0 million. This project was initiated in May 1997 with the award of contracts to American XTAL Technology, Fremont, CA and M/A-COM, Inc., Lowell, MA. This effort is scheduled for completion in May 2000.

Active Matrix Liquid Crystal Displays (AMLCDs)

This project constitutes a portion of the National Flat Panel Display (FPD) Initiative and is aimed at developing competitive domestic suppliers and providing DoD with affordable access to this advanced technology for Defense applications. Title III's primary role was to provide financial incentives to selected program offices, which used the incentives to qualify and/or accelerate purchases of flat panel displays from domestic vendors. By qualifying or purchasing flat panel displays from vendors of their choosing, the program offices were able to facilitate and/or accelerate the insertion of FPDs into military cockpit avionics and other Defense applications.

AMLCDs offer significant performance, weight, and space advantages compared with current cathode ray tube display technology and are important considerations in aircraft and space vehicle applications. Because of their advantages, AMLCDs have been inserted into a number of major Defense systems such as the AH-64D Longbow Apache, F-18 Hornet, AV-8B Harrier, C-141 Starlifter, P-3C Orion, UH-60Q, CH-46 Seaknight, and the Army's Drivers Vision Enhancer.

Title III investments of $25.8 million contributed to the early insertion of superior technology into numerous aircraft platforms and other Defense systems. This project was initiated in January 1995 and will continue through 2000.

Aluminum Metal Matrix Composites (Al MMCs)

The primary objective of this program is to design, fabricate, test, and qualify Al MMC track shoes for the Bradley Fighting Vehicle System.

The project will demonstrate that Al MMCs provide an optimal cost/performance alternative approach to fabricating military components. Replacing the current steel track with Al MMC track is expected to produce life cycle cost savings of $8.2 million per year, reduce vehicle weight by 600 pounds, and extend track shoe service life from the current 600 miles to 3000 miles. Other applications for Al MMCs include missile and space vehicle structural parts, powertrain parts, optical system components (e.g., mirrors), and electronic packaging components.

The U.S. Army Tank-Automotive and Armaments Command is executing the project via a contract with Advanced Refractory Technologies, Inc., Buffalo, NY. The contract for this project was awarded in January 1998 and will be completed in December 2001. The value of this project is $3 million.

Power Semiconductor Switching Devices (PSSDs)

The purpose of this project is to establish a viable domestic production capability able to provide DoD with assured access to medium and high power PSSDs, including MOS controlled thyristors, which will be used in both current production and retrofit programs.

Power Semiconductor Switching Devices (PSSDs) are widely used in the Defense and commercial sectors for a variety of power control, conversion, and conditioning applications. These solid state devices are used as medium and high-power electrical switches, replacing larger, heavier electro-mechanical switches. This allows for increased switching efficiency and power handling capability with reduced acquisition and life-cycle costs. These devices will be essential to future applications for aircraft, ships, and ground vehicles as well as directed energy weapons and systems such as the Electromagnetic Aircraft Launch System being developed by the Navy.

Title III incentives will be used to establish a production capacity, perform product and process improvement, and have customers evaluate and qualify devices. Total contract value is $11.5 million with Title III investing $9.7 million and the contractor cost sharing an additional $1.8 million. This project was initiated in August 1998, with the award of a Title III contract to Silicon Power Company (SPCO) of Malvern, PA. The project is scheduled to run through December 2003.

New and Pending Projects:

Laser Productive Eyewear

This project will establish a highly responsive, affordable production capacity for thin film dielectric coatings on polycarbonate substrates. The thin film coating technology will enable the production of a new generation of laser protective eyewear. The widespread use of lasers in military operations is posing an increasingly significant threat of eye injury to military personnel. The project will assure that domestic producers are available to supply these devices in sufficient quantities and at affordable prices to meet defense needs. The Title III project will use purchase and purchase commitment incentives to assist in establishing a viable, domestic capacity on a high-volume, commercial "dual produce" production line for laser protective eyewear for military and commercial applications. This project also will accelerate the implementation of compatible interference filter technologies, such as dry process holographic filters and/or rugate filters, to protect against a broader range of laser threats. Projected Title III funding is $5 million, plus cost sharing from the project contractor(s). The project is expected to run approximately 36 months.

Silicon-on-Insulator (SOI) Wafers

SOI substrates can significantly improve the performance of low power and/or radiation-tolerant integrated circuits used in Defense systems. This project will establish domestic sources for SOI wafers (up to eight inches in diameter) that have emerged from research and development but which require lower cost, higher volume production capabilities before they can be affordably inserted into DoD systems. The project is designed to provide sufficient incentives to create a domestic SOI wafer production capacity of 1.4 million square inches per year. The total value of this three-year effort, including industry cost sharing, is $9.3 million.

Microwave Power Tubes

Microwave power tubes generate and amplify microwave energy in radar systems, electronic warfare systems, and telecommunications systems where high frequency and high power are required. This project will facilitate DoD's assured access to affordable microwave power tubes by providing incentives to encourage lower tier microwave power tube suppliers to make consistent, quality-driven improvements. DoD's goal is to transition advanced manufacturing processes to the lowest-tier suppliers of components and materials; thus improving overall quality and lead times and driving down the production and life cycle costs of microwave power tubes for the DoD. The Department will use Title III authorities to facilitate supplier process improvements, qualify alternate materials and processes, and share integration and investments both horizontally across the supplier base and vertically between suppliers and microwave power tube manufacturers. Congress appropriated $3.0 million in the FY 00 Defense Appropriation Act (P.L. 106-79) specifically for this Title III project.

Completed Projects:

Small Flat Panel Displays

This project was exceptionally successful. DoD qualified a night vision heads-up-display system incorporating small format active matrix electroluminescent flat panel displays for Special Operations Forces applications, and helped establish an efficient domestic production base capable of producing affordable small format flat panel

displays for both military and commercial applications. The project began in April 1997 and was completed in February 1999.

The benefits accruing from this project are significant. Operational capabilities were significantly improved. Unit system cost is $7,000 less than previous unit system cost. Reliability was increased by more than 20 times (from 450 hours to over 10,000 hours), and the size and weight of the displays was reduced by more than 70 percent. Commercial design practices and components ensure the system will be supportable in the future. The improved capability to see in the dark and to have immediate access to critical flight information will provide the Services with an enormous advantage during military operations.

High Purity Float Zone (HPFZ) Silicon

This project, initiated in November 1993, was designed to use Title III incentives to establish a self-sustaining domestic capability to competitively produce world-class high purity float zone silicon products essential for many DoD and commercial applications. Prior to completing this Title III project, the DoD was dependent on foreign sources for all HPFZ silicon used in Defense systems.

HPFZ silicon is widely used by the U.S. Army, Navy, and Air Force for critical high power electronic devices used to control radar systems, advanced aircraft, tanks, submarines, and other weapon systems. Defense applications for HPFZ silicon center around three specific applications: high power switching devices, infrared (IR) detectors, and vidicons. High power switching devices enable the replacement of large electromechanical switches with smaller, faster, less expensive devices with greatly enhanced reliability. Defense applications for high power switching devices include radar/sonar systems, missile systems, ships/submarines, and armored vehicles. IR detectors are employed in laser seeking and heat seeking weapons systems. Vidicons convert infrared light to visible radiation for night vision applications. At its conclusion in April 1999, this project had established a full-scale, affordable, domestic manufacturing capability with the ability to provide an assured source of high quality HPFZ silicon for defense and commercial needs.