

# **The Renewed Spirit of Y-12**

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## **ABSTRACT**

The Y-12 National Security Complex began operations in 1943 as a part of the Manhattan Project, the secret U. S. program that developed the first atomic weapon. With the end of the Cold War, the advent of the War on Terror, and the changing security needs of the US, Y-12 has begun to modernize and make changes to better meet the requirements of a smaller stockpile while supporting uranium supply needs and nuclear nonproliferation missions. Although we are proud of our place in history, after 60 years, we have begun to write a new chapter that will enable us to meet the new challenges facing the world today by strengthening our security posture and utilizing existing Y-12 expertise in nuclear nonproliferation initiatives. The modernization of Y-12 will enable us to be agile enough to adapt and respond to a much wider range of U. S. national security needs.

As part of the National Nuclear Security Administration, nuclear nonproliferation has become one of the primary Y-12 missions. Some of the nuclear nonproliferation programs we support include the supply of low enriched uranium (LEU) to research and test reactors. The LEU provided to the research reactor community is derived from down blending highly enriched uranium (HEU) that is removed from dismantled nuclear weapons. Y-12 expertise has been used in numerous nonproliferation programs in Russia, the recent effort to remove material from Libya, and various activities supporting the new Global Threat Reduction Initiative (GTRI).

The Y-12 National Security Complex stores significant quantities of HEU and therefore, has a security posture that must adapt to these new threats of global terrorism. This year, Y-12 has made real progress in modernizing its site so that it is better able to meet these new world challenges. Our modernization efforts will increase security, improve productivity, minimize health and safety risks and enable the Y-12 Site to continue to operate far into the future. This paper will summarize how Y-12 modernization will provide a safer, more secure and stable supply of uranium to research and test reactors for many years into the future, and how Y-12 will continue to support nuclear nonproliferation initiatives.

## **1. The History of Y-12**

On a cold February morning 60 years ago (February 18, 1943), ground was broken in rural East Tennessee for the first production building at the Y-12 Electromagnetic Separation Plant, a critical part of the massive Manhattan Project. The plant's first mission was to produce enough enriched uranium for a new weapon, an atomic bomb. At its peak in 1945, more than 22,000 workers were employed at the site in Oak Ridge. After the war, the electromagnetic separation process was soon abandoned for more

efficient enrichment technologies and Y-12 began what was to be the first of many transformations to meet the changing needs of the U. S. nuclear weapons program. This transformation included the development of precision manufacturing technologies, lithium processing technology and expertise in physical security and material control and accounting. While much of the work at Y-12 has been cloaked in secrecy its expertise in the processing of highly enriched uranium is well known and it has also become known as a place where the latest technology and highly skilled craftsmanship are brought together to meet unique and complex manufacturing needs.

## 2. Where are we going?

Today, Y-12 employs more than 4,000 people. We are pursuing an aggressive program of infrastructure reduction, modernization and investment in technology to make the plant as safe, secure and efficient as possible and to better match our production capabilities to the needs of maintaining a reduced stockpile and to apply Y-12 expertise to other areas of national security interest. Since Y-12 maintains one of the largest inventories of special nuclear material in the US, physical security is a primary driver especially given the events of 9/11 and subsequent terrorist threats. Today, Y-12's site covers 5,428 acres or almost 22 square kilometers. Actual floor space is 7.5 million square feet or more than 696,000 square meters. In the future, the most secure area of Y-12 will be reduced by 90 percent.

In addition to significantly improving security, our processing facilities and technology will move from use of equipment that may be 40 or 50 years old, to an efficient modern state-of-the art facility. For example, to produce the uranium supplied to the research reactor community, we currently use induction furnaces. We are currently developing a new microwave technology that will not only use significantly less electricity but will also reduce the potential for radiological contamination in our work areas while producing a high quality product.

Some of the new facilities we are building include the Highly Enriched Uranium Materials Facility and the Enriched Uranium Manufacturing Facility.

An integral part of our modernization effort includes using skills and capabilities at Y-12 to expand our missions to meet other national security needs including the supply of fuel to the US nuclear navy and support of numerous nuclear nonproliferation initiatives. Y-12 also has a technology transfer program that works with private industry and other government organizations to solve unique manufacturing and material problems.

By tearing down old buildings, building new state-of-the-art facilities, and revitalizing our workforce, Y-12 will continue to meet its uranium deliveries to our research reactor fuel customers and continue to meet its vital national security and nonproliferation missions.

## 3. Y-12 and Nuclear Nonproliferation

Today, Y-12 is a unique national asset in the manufacture, processing and storage of special materials that are vital to US national security. Y-12 is also playing an important role in all of the major US nonproliferation programs that aid in the prevention of the spread of weapons of mass destruction. As an operating production facility, Y-12 has first hand expertise in such areas as physical security, security sustainability, material control and accounting, packaging and transportation, safe handling of hazardous materials as well as the manufacturing expertise need to support a nuclear weapons program. This same set of skills and capabilities are finding direct application in many of the US nuclear nonproliferation programs.

Y-12 personnel have been involved in the monitoring of the conversion of HEU to LEU in Russia as well as directly supporting many other US nonproliferation efforts in Russia and republics of the former Soviet Union. Recently, Y-12 played a part in the removal of nuclear material and equipment from Libya. In support of the Reduced Enrichment for Research and Test Reactors (RERTR) program, Y-12 is the sole US provider of 19.75% low enriched uranium (LEU) for reactor fuel. The LEU we provide to the research reactor community is derived from down blending surplus highly enriched uranium (HEU) that is removed from dismantled US nuclear weapons. Y-12 is the lead site for the disposition of the U.S. surplus HEU.

In a similar manner cold war facilities in Russia are being extensively used to meet nonproliferation objectives. A prime example of this is the US- Russian HEU-LEU purchase, which is in the process of down blending 500 tons of HEU from Russian nuclear weapons to low enrichment for use in US power reactors. LEU from this program is currently providing 10% of the all electricity generated in the US. The benefits from such programs are obvious; they employ cold war expertise directly for peaceful purposes and help local economies while eliminating large inventories of HEU.

In 1994 the US government voluntarily placed approximately 10 tons of HEU under IAEA safeguards. This represents almost half of the world's HEU inventory currently under safeguards. Since that time Y-12 has hosted well over 100 IAEA inspections.

As the size of the US weapons complex has been reduced, Y-12 has worked with the Oak Ridge community and other former weapons sites to reindustrialize the local economy by seeking to attract non-weapons related commercial businesses to the area. These problems are similar to those being addressed by programs such as the International Science and Technology (ISTC) Centers, and Initiatives for Proliferation Prevention (IPP), which seek to employ former weapons workers in non-weapons-related work. To date, tens of thousands of former Soviet weapons scientists have been employed through these programs.

As the lead US site managing disposition of U.S. surplus HEU, Y-12 is very well suited to address many of the needs of the recently announced Global Threat Reduction Initiative (GTRI). We are now conducting technical assessment visits to various sites around the world to help each site determine the final disposition of surplus materials. We are also supporting NNSA's efforts by meeting with processors in various countries to understand their capabilities and to determine the most efficient disposition path for sites with orphaned or surplus materials. We encourage nuclear material processors as well as research reactor operators with surplus materials to contact us so that we can try to help with disposition efforts.

#### 4. Conclusion

Many of the same skills and capabilities that were used to build and maintain the large stockpiles of nuclear weapons during the cold war, are the same as those now needed to safely dismantle these weapons, put materials to peaceful purposes where applicable and to secure and disposition those that are no longer needed. The Y-12 National Security Complex which has been an essential part of the US nuclear Weapons program is now in a position to play a key role in the world wide efforts to address the dangers of nuclear proliferation. The program to reduce the enrichment of fuel in research and test reactors is but one example of this work. An extensive modernization program is now underway at Y-12. This effort will ensure that Y-12 will continue with this important work well into the future.