

Y-12 National Security Complex

TODAY'S COMPLEX

The U.S. nuclear weapons complex—the laboratories and facilities that research, design, produce, maintain, and dismantle such weapons—must ensure that the arsenal is reliable, safe from accidents, secure from unauthorized use, and no larger than needed to maintain national security. To fulfill those goals, the complex needs resources and facilities to extend the life of nuclear warheads, assess their reliability and safety, understand how aging and modifications affect weapons, and retain employees with essential expertise. It also requires the capacity to dismantle retired weapons in a timely fashion, and methods for verifying further reductions in nuclear weapons. Additionally, the complex must minimize security risks of storing, transporting, and disposing of weapons-usable materials.

The administration and Congress will make important decisions over the next few years on how the complex can use limited resources to best meet these challenges. Doing so requires smart choices based on strict attention to priorities.

The Y-12 National Security Complex was part of the original Manhattan Project, producing enriched uranium for the “Little Boy” bomb dropped on Hiroshima in 1945. The site takes its name from the World War II code name for the electromagnetic isotope separation plant at the Clinton Engineer Works in Oak Ridge, TN. During the cold war, Y-12 enriched uranium through electromagnetic separation and later gaseous diffusion, and manufactured nuclear weapons components from uranium and lithium.

The site includes the Y-12 plant, Oak Ridge National Laboratory, and the East Tennessee Technology Park. B&W Y-12, a partnership between Babcock & Wilcox Company and Bechtel Corporation, manages the Y-12 site; it employs about 4,600 workers.

Like the other sites in the nuclear weapons complex, the Y-12 plant is overseen by the National Nuclear Security Administration (NNSA), a semi-autonomous agency within the Department of Energy (DOE).

Y-12 Today

Today Y-12 is one of four production facilities in the U.S. nuclear weapons complex; it focuses on uranium processing and storage and development of related technologies. Its missions are to maintain the safety, security, and effectiveness of the U.S. nuclear weapons stockpile; reduce the global threat of nuclear



Y-12 National Security Complex, 2011

proliferation and terrorism; and provide highly enriched uranium (HEU) for use in U.S. naval reactors.¹

Y-12 produces all U.S. nuclear weapons secondaries, canned subassemblies (CSAs), and radiation cases. U.S. thermonuclear weapons have two stages: a primary and a secondary. The secondary contains HEU and is contained within a CSA. A uranium-lined radiation case encloses both the primary and CSA. Y-12 is also the main U.S. site for processing and storing HEU for nuclear weapons use.

Y-12's additional nuclear-weapons-related tasks include:

- Performing quality evaluation and surveillance activities on subassemblies and components
- Maintaining Category I/II quantities of HEU, which can be used to build nuclear weapons and require the highest level of security
- Dismantling secondaries, radiation cases, and other weapons components
- Storing and disposing of enriched uranium

Y-12 has completed work on life extension programs (LEPs) for two weapons: the W87 intercontinental ballistic missile warhead and the B61-7 and B61-11 strategic nuclear bombs. The B61 LEP included refurbishment of its CSA. It is now working on an LEP of the W76 submarine-launched ballistic missile warhead, which is scheduled to be completed in 2022.

Y-12 also supplies the Navy with HEU from dismantled weapons to make fuel for use in the nuclear reactors that power all U.S. submarines and aircraft carriers. An agreement with the Department of Defense requires Y-12 to provide HEU through 2050.

In addition to weapons work, Y-12's mission includes preventing nuclear proliferation and nuclear terrorism. Its main tasks in this area include securing and removing uranium and nuclear materials from vulnerable sites globally, developing technologies to detect uranium as part of treaty verification and border control, and disposing of excess HEU from dismantled weapons by converting it to low-enriched uranium (LEU) for civil use.

In 1994 the United States declared 174 metric tons of HEU to be excess to military needs; much of this has already been down-blended;² the rest is to be converted by 2015. About 10 percent of excess HEU is down-blended at Y-12 for use as fuel in research reactors or to produce medical isotopes. Y-12 is the primary provider of LEU for research reactors worldwide.

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Remaining excess HEU is shipped to the Savannah River Site or a commercial facility in Lynchburg, VA, to be down-blended for use as fuel in nuclear power reactors.

Budget

Y-12's FY 2013 budget is \$982 million; \$961 million (98 percent) of this is for weapons activities. Within that category, the largest appropriation was \$729 million for Readiness in Technical Base and Facilities (that is, operation and maintenance of NNSA facilities). Another \$215 million went to directed stockpile work, part of the Stockpile Stewardship Program that supports LEPs and weapons surveillance and maintenance activities. After weapons activities, the next-largest budget category at Y-12 is defense nuclear non-proliferation, funded at \$21 million for FY 2013.

Information about funding for Y-12 was not included in the FY 2014 Laboratory Tables put out by the NNSA. However, the overall NNSA budget request includes roughly \$1.2 billion in funding for Y-12 under the NNSA Production Office, with nearly all of this (96 percent) for weapons activities. Within the weapons activities category, about \$325 million is for the Uranium Processing Facility (see below).

Current Issues

URANIUM PROCESSING FACILITY (UPF)

The NNSA plans to build a new UPF at Y-12 as part of an ongoing effort to modernize and consolidate the nuclear weapons

¹ HEU contains more than 20 percent of the isotope uranium-235, while low-enriched uranium contains less than 20 percent; weapons-grade uranium usually contains more than 85 percent.

² In down-blending, HEU is mixed with natural uranium to produce LEU.

complex. This new facility would produce 50 to 80 secondaries per year. This is in line with the plan to develop a capability to produce 50 to 80 plutonium pits (which are at the core of the primaries) per year at Los Alamos. However, no decision has yet been made about producing secondaries for future LEPs, so it is not clear whether this level of production is needed. In an LEP, secondaries may be refurbished, remanufactured, or replaced.

The UPF will be built next to the Highly Enriched Uranium Materials Facility (HEUMF), a high-security storage facility for HEU. When both the HEUMF and UPF are completed, the NNSA estimates that the size of the high-security area at Y-12 will be reduced by 90 percent, saving an estimated \$200 million per year.

Construction of the UPF has slipped significantly and plans now call for an initial operational capability beginning in 2021. Cost estimates have increased significantly as well; the NNSA's most recent estimate is between \$4.2 billion and \$6.5 billion, up from the original 2004 estimate of \$600 million to \$1.1 billion.

The discovery, in October 2012, that the facility must be redesigned because all necessary equipment will not fit in the building will potentially add significantly to this cost. Despite \$500 million and years of work spent on the design, and no change in the scope, a safety hearing on the UPF revealed that the roof would need to be higher and the foundation and walls thicker. Reworking the design to incorporate these changes will cost another \$540 million.

To reduce costs and speed up the schedule, the NNSA now plans to build the UPF in phases. Phase 1 will replace the most critical facility, Building 9212, used for enriched uranium purification and HEU metal production and casting operations. The Defense Nuclear Facilities Safety Board has expressed concerns about the safety of continuing operations at Building 9212 for another decade. Capabilities from two other buildings that contribute to weapons production would be added in later phases, with full capabilities now not planned to be in place until at least 2038.

SECURITY CONCERNS

In July 2012, three antinuclear protestors, including an 82-year-old nun, entered Y-12's "Protected Area"—the highest security section of the facility—and painted messages on the exterior of the HEUMF. Although they cut through fences and set off multiple alarms, the three were not immediately discovered.

A DOE Inspector General's investigation determined that several monitoring systems, including video cameras, were inactive during the break-in and that security forces took too

long to respond and initially did not effectively control the situation. A high number of past false alarms was cited as one reason for the slow response.

One security officer was fired, others disciplined, and additional security training was instituted for all employees as a result of the incident. Top officials at B&W Y-12 and the site's security contractor, WSI-Oak Ridge, were also removed from their jobs, and the NNSA issued a "show cause" notice to B&W Y-12, giving the company 30 days to explain why its contract should not be revoked. In October, WSI-Oak Ridge was fired as security contractor; the NNSA had awarded the company a citation for high performance just one month before the break-in.

The NNSA suspended nuclear weapons activities at Y-12 for two-and-a-half weeks following the incident and stated that it "raises important questions about the security of Category I nuclear materials across the DOE complex." The NNSA



Graffiti and blood on the Highly Enriched Uranium Materials Facility left by trespassers during the Y-12 break-in, 2012.

U.S. government photo courtesy of Transform Now Poughkeepsie

said it would undertake a complex-wide review of security measures as part of its response. Several subsequent incidents, such as one in June 2013 in which guards let a lost driver into the site without checking identification, have continued to raise questions about the effectiveness of the NNSA's response.

CONTRACT DISPUTES

In early 2010, the NNSA announced plans to consolidate the management contracts for Y-12 and the Pantex Plant near Amarillo, TX. The consolidation is intended to increase efficiency across the sites, and the NNSA estimates it will save from about \$900 million to more than \$1 billion over 10 years. Proposals were submitted in March 2012, and in January 2013, the NNSA selected Consolidated Nuclear Security LLC, a team headed by Bechtel and Lockheed Martin, as the winner.

Two rival teams protested the award, saying that the NNSA had not followed its established criteria in evaluating the cost savings promised by the winning bidders, among other problems.

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The protest was partially upheld by the Government Accountability Office (GAO), and the NNSA reopened procurement, requesting additional information from all teams. One of the protesting teams filed a further protest, citing problems with the revised request. In September 2013, the GAO denied the second protest, but the NNSA still has not announced whether it will uphold its original decision or award the final contract to a different bidder based on the additional information it received. Depending on the outcome, it is also possible that further protests may be filed, delaying the contract transition further.

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