

What does Y-12 do?

The Y-12 Nuclear Weapons Complex in Oak Ridge, Tennessee, plays a crucial role in making US weapons of mass destruction.

THE Y-12 NUCLEAR Weapons Complex in Oak Ridge, Tennessee manufactures thermonuclear weapons of mass destruction. More specifically, Y-12 makes the thermonuclear core for every nuclear warhead and bomb in the US nuclear stockpile. Every one. Ever. There is no other place in the US that can make this key component for warheads and bombs.

They call it the secondary. That describes its place in the fission/fusion chain reaction that takes place in a nanosecond when a modern thermonuclear weapon is detonated.

The primary is first—a plutonium sphere (also called a pit) with a vial of tritium inserted is compressed by high explosives, resulting in a small atomic bomb—a fission reaction, if you remember your high school physics.

But the primary's job in a modern warhead is to act as the trigger of a much larger—by many orders of magnitude—bomb, the Hydrogen bomb. This is contained in the “secondary,” made at Y-12 of highly enriched uranium, lithium deuteride, depleted uranium, beryllium, some classified materials like “fogbank,” and more. Inside the secondary, these materials undergo nuclear fusion. The result is a release of energy that has the power to level an entire city in a second.

With 1,400-plus actively deployed nuclear bombs and warheads on hair-trigger alert in silos, on airbases, in attack submarines trolling the high seas, the United States has the capacity to render life on planet earth uninhabitable in one afternoon. Russia has a similar capacity; France, China, Great Britain and the other nuclear powers can contribute, too, to a lesser degree.

The work at Y-12 requires great care, and a cadre of skilled workers to operate the precision machining equipment—there is no margin for error in a nuclear warhead's design. The materials used at Y-12 are deadly and hazardous.

Highly Enriched Uranium has a half-life of 708 million years, meaning it is hazardous to humans for 7 billion years while it goes through its decay chain—eventually becoming lead, another toxic element.

HEU is used and stored and processed in various forms at Y-12. In solid form, it poses a moderate hazard—but if ground to dust and released into the air, it is highly carcinogenic. If enough of it is clumped together it can go critical—not like a bomb, but like an enormous pulse of energy that would kill anyone nearby immediately and subject others to radiation poisoning.

How much does it take for a criticality? That depends—if the material is submerged in water, it takes much less because water will reflect neutrons back into the mass, accelerating the process.

HEU is also pyrophoric—meaning it burns in the presence of oxygen, so fire is a great concern at Y-12, and fire-suppression equipment is a first-line defense against catastrophe.

Criticality safety is of paramount importance at Y-12, though errors and miscommunications lead to criticality safety violations on a fairly regular basis. Y-12 does not report these incidents or violations—we learn about them only later from reports compiled by agencies that exercise oversight over Y-12. This is also true when workers are contaminated—which happened 20 times in 2020.

Most of the Enriched Uranium operations at Y-12 take place in buildings that were built during the Manhattan Project or soon thereafter. They are, according to site officials, being used in “run to failure mode.” They do not meet current environmental or safety standards.

The \$6.5 billion Uranium Processing Facility bomb plant is being built to replace some of these facilities, but the NNSA says it will continue to carry out dangerous operations with Highly Enriched Uranium in substandard buildings for 30 years.

In 2019, the Oak Ridge Environmental Peace Alliance won a case in federal court—the judge found that NNSA had not prepared an adequate environmental analysis on the risks of earthquakes at Y-12. NNSA largely ignored the judge's decision.

Y-12 has other missions—preparing HEU to be turned into fuel for the Nuclear Navy, dismantling retired warheads, storing HEU safely, doing work for other federal agencies, including NASA.

But the primary and overriding mission is nuclear weapons production. Funding for weapons activities takes priority over all other spending, including cleaning up contaminated buildings. These days, Y-12 manufactures secondaries for the W76-1 warhead, and is preparing to begin doing the same thing for the B61-12 bomb in a few years.

Y-12 is highly contaminated; it was placed on the EPA's Superfund list in 1989 and has yet to be cleaned up because funding for bomb production takes precedence over cleanup funding, even when safety is at stake. The abandoned Alpha-5 building at Y-12 tops the Inspector General's “High Risk” list as the most dangerous “excess” building in the entire US nuclear weapons complex. According to DOE, Alpha-5 poses “an ever-increasing risk to workers and the public.”

Artist's sketch of the UPF bomb plant to be built at Y-12 in Oak Ridge

