

Mission. The RIFs conduct baseline inspections to determine conformance, quality, anomalies, and failure analysis when inspecting very large ordnance items. X-ray testing is conducted and documentation prepared regarding the internal configuration of existing and prototype ordnance and non-ordnance items.

Unique Features. Frequently referred to as “the world’s largest X-ray,” the HECT inspection system, with digital imaging capability, is used to x-ray systems up to 86 inches in diameter and 27 feet long, weighing up to 130,000 pounds. It is one of only four highly specialized machines in the U.S. capable of x-raying the largest submarine launched ballistic missile motors in the Navy’s inventory.

Combat Support. The RIF supports inspections associated with static firing of rocket motors and large bombs. This facility was invaluable in providing quality assurance testing for the various large bomb systems deployed to Iraq and Afghanistan. The Tomahawk and missile intercept programs for the Navy and Air Force programs are regularly tested here. The RIF is also evaluating the new Massive Ordnance Penetrator (MOP) bomb.



RDT&E. Nondestructive inspections are performed on test articles ranging in size from small ordnance to very large strategic rocket motors. Warheads, large penetrating bombs, fuzes, and associated subsystems are all inspected and analyzed. All X-rays are automatically processed onsite, and interpretation, assessment, and analysis of the results are documented. All HECT system operators are certified radiographers as per the American Society for Nondestructive Testing (ASNT). The HECT facility personnel frequently respond to numerous fleet emergencies and exercises.

Size / Description / Scope. The secure facility is located in a restricted area of the base inside the China Lake Propulsion Laboratory. The explosive limits are 225,000 pounds of 1.1, 300,000 pounds of 1.3 and 1.4, and 5,000 pounds of 1.2.1, 1.2.2. **Annual Test Events:** 50. **Plant Value:** \$150M+.

Main RIF. The building is a reinforced continuous pour concrete and steel structure built into a hillside. The system consists of an L-6000 HRO (high-radiation output) linear accelerator that provides a 14,000-rad, 16-MeV (million electron volts) energy source, detectors, and an elevator system in a 34-foot deep pit capable of

supporting rocket motors weighing up to 130,000 pounds. The system is fully computer automated, and the images can be presented on a standard computer display screen for real-time assessment and stored on a hard drive or CD/DVD. The imaging system, upgraded in 2011, is all digital and state-of-the art. The facility is equipped with 65- and 6-ton gantry bridge cranes and all the necessary handling equipment.

Unique or Historic Tests. There are many first-time achievements and one-line article inspections, including testing of the MOP weapon system by the U.S. Air Force. Also tested was the Massive Ordnance Air Blast (MOAB), a 30,000-pound, ultra-large bunker busting bomb (known as the “mother of all bombs”). MOAB is planned to be the largest non-nuclear bomb in the U.S. inventory. Also, many other missiles / components for the Strategic Defense Initiative have been inspected here for use prior to space missions. Another unique test was conducted for academia and involved scanning a whale’s head to try to determine the cause of death. In one area of California, many sperm whales were dying and beaching themselves for no apparent reason. High tech X-ray scans and detailed reports were generated, providing some clues as to the cause, and interesting results also helped the Navy to better understand how a whale’s sonar system works. Lessons learned have application to future Navy sonar systems.



Historical Significance. To support the submarine launched ballistic missile program. **Year Opened:** 1985.

Future Plans. There is a current procurement in process for adding an additional linear accelerator to expand the current capability.

Conventional X-Ray Facility

Mission. Nondestructive evaluation of existing and prototype ordnance and non-ordnance items to determine conformance, quality, anomalies, and failure analysis.

Unique Features. The facility operates the only operational Betatron 23-MeV magnetic inductance accelerator in the U.S.

Combat Support. This facility, built in the mid-1940s, has supported every hostile / combat mission beginning in World War II to Operation Iraqi Freedom. Virtually every existing and new weapon system designed and built at the Weapons Division is regularly tested here. During Operation Iraqi Freedom, this facility supported quick turn-around on programs such as the Low Collateral Damage Bomb (LCDB) that was provided to the Fleet and went from design to qualification and procurement in 18 months.



Cost / Time Savings. This X-ray facility has responded to numerous fleet emergencies and exercises, including failure analysis on FMU-139 fuzes, HARM and Sidewinder motors, JSOW gas generators, and numerous other systems. The facility supports all other nondestructive evaluations, which includes, but is not limited to, environmental engineering, safety testing, propulsion and warhead testing, SNORT, airfield, G2 survivability, and FMS and materials exploitation.

RDT&E. The facility can inspect strategic rocket motors up to 24 feet long and 72 inches in diameter. Capabilities exist for helium and nitrogen leak testing as well as visual and bore scoping inspection using state-of-the-art rigid and fiber optic video scopes. X-ray machines include 320 KvP (kilo voltage peak), a variable energy 1-MeV / 3-MeV linear accelerator, and 23-MeV Betatron linear accelerator. All X-rays are automatically processed onsite, and interpretation, assessment, and analysis of the results are documented.

Size / Description / Scope. The explosive limits are 50,000 pounds of 1.1, 60,000 pounds of 1.3 and 1.4, and 5,000 pounds of 1.2.1, 1.2.2. **Annual Test Events:** 2,000. **Plant Value:** \$200M+.

Main Facilities / Equipment. This X-ray machine was installed at China Lake in 1960 to support the first submarine-launched ballistic missile program (Polaris A1, A2, A3). The Betatron also supported the Poseidon C3 and Trident I C4 programs in the 1970s and 1980s. The machine is still used today to inspect Polaris missiles for the Missile Defense Agency and supports inspection of large penetrating bombs and other missile and rocket programs. The facility also has 1-MeV to 3-MeV linear accelerators for inspection of various size tactical weaponry and a 320-KvP X-ray machine for smaller test article inspection. The facility has crane capabilities of up to 30,000 pounds and has been upgraded with state-of-the-art fail safe interlock and radiation protection hardware and software for personnel protection.

Unique or Historic Tests. There are many first-time achievements and one-line article inspections at this facility. The first qualification motor for Polaris A3R (Restart) was tested here for the British submarine launched ballistic missile. More than 500+ SLAM-ER production and prototype warheads were inspected, and support continues for RDT&E of new and modified developmental ordnance and non-ordnance subsystems.

Historical Significance. To support World War II weapons development. **Year Opened:** Mid 1940s.

Future Plans. Currently in the process of upgrading to a non-film based digital radiographic inspection system.