

Mission. Develop and demonstrate safer, higher power, more robust explosives and propellants for continued dominance in munitions, and provide ordnance assessment and other direct fleet support.

Unique Features. This laboratory serves as the most diverse, one-stop facility to develop, characterize, and scale-up energetic chemicals, explosives, and propellant formulations, in addition to providing life cycle evaluation and incident forensic support for energetic materials. The three building complex is one of the largest laboratory complexes of its kind.

RDT&E. Primary focus is RDT&E in energetic materials to improve warheads, bombs, and solid rocket motors. Ongoing research is funded by the Joint Fuze Technology Program, the Joint Insensitive Munitions Technology Program, the Insensitive Munitions Advanced Development Program, the Office of Naval Research Advanced Energetics Program, the Defense Threat Reduction Agency Advanced Energetics Program, and the Strategic Environmental Research and Development Program.

Size / Description / Scope. The complex includes three main buildings plus one chemical storage unit, one hazardous waste facility, and two magazine facilities encompassing 39,649 SF and the facility is located in the Salt Wells area at China Lake. **Year Opened:** 2005. **Plant Value:** \$30M+.



- **Chemical and Physical Characterization Laboratory.** Conducts basic research and quality control testing for the Pilot Plant and does forensic investigations of energetic incidents.
- **Small-Scale Formulation Laboratory.** The lab is designed for continuous, multiple operations with explosive limits ranging from 3 to 70 pounds NEW. The facility has mix bays designed with “plug-and-play” mixers including pint scale Baker Perkins high shear planetary mixers, melt cast kettles, slurry mixers, and state-of-the-art Resodyne sonic acoustic mixers. The facility also has explosive pressing capability and explosive drying / curing ovens. The newest capability is a direct write laboratory to study the development and printing of explosive inks.
- **Accelerated Aging Laboratory.** It is equipped with small- to mid-scale environmental conditioning chambers capable of cycling between arctic cold and desert heat to study the artificial aging for explosives, propellants, entire rocket motors, and warheads.

- **Nano-Materials Laboratory.** This lab makes use of the rapid expansion of super critical solutions and the super critical anti-solvent method and atomic layer deposition. This building has quarter pint and one pint Baker Perkins high shear planetary mixers to formulate these materials into explosives, propellants, and pyrotechnics.
- **Nitroglycerine Laboratory.** Lab personnel support formulation efforts using nitroglycerine. Equipment includes high shear planetary mixers on the 50-, 500-, and 5,000-gram scale. Additionally, this building hosts the thermal properties scale-up laboratory. This laboratory uses a Mettler RS-1 calorimeter to assess heat flow in chemical reactions and allows for safe scale-up of explosives and novel oxidizers.
- **Research and Chemical Scale-Up Laboratory.** New energetic ingredients are the primary focus. From reactive polymers, to explosive crystals, to novel oxidizers, this laboratory supports energetic materials chemistry from the nano-gram to about 10 kilograms.
- **Pilot Plant Laboratory.** This is a dedicated scale-up laboratory that supports work up to 100 pounds NEW.
- **Improvised Explosives Laboratory.** The lab is used for hazardous work involving sensitive explosives; it supports a collaborative effort with Explosive Ordnance Disposal (EOD) to study improvised explosives being used against U.S. Warfighters in Afghanistan.



- **Thermal Decomposition Laboratories.** The lab includes external firing bays for the study of thermal decomposition of energetic materials for insensitive munitions research. This facility hosts the variable confinement and small-scale bomb cookoff tests. The building is also home to the microcalorimetry laboratory, which supports ordnance assessment work.

Equipment / Instrumentation

- Nine control rooms commanding more than 12 Baker Perkins mixers, 1 Resodyne mixer, 3 explosive presses, a melt kettle, and 2 slurry kettles, in addition to numerous curing / drying ovens, and several environmental conditioning chambers
- Advanced equipment for performing wet chemical investigations and analyzing composition and thermal properties
- One strand burner laboratory to measure solid propellant ballistics
- Mechanical properties equipment to measure tensile properties as well as glass transitions in solid propellants
- Scale capability includes micro-scale to multi-kilogram reactors, a Mettler RC-1 reaction calorimeter, and basic characterization



Recognition / Awards. This laboratory and several distinguished chemists, physicists, and engineers in numerous disciplines are highly decorated in their unique fields of expertise. In addition to receiving numerous NAWCWD Warfighting awards, staff members have also received "Researcher of the Year Awards" by the Office of the Secretary of Defense (OSD)-Joint Insensitive Munitions Program. In addition, one senior staff member chairs an important committee for the JANNAF organization.

