



## Providing Our Warfighters the Decisive Advantage Supporting Naval Aviation and Warfighter Requirements Since 1943 Celebrating the Centennial of Naval Aviation

### Naval Air Warfare Center Weapons Division (NAWCWD) Center for Weapons and Armaments Technology www.navair.navy.mil/nawcwwd

**Mission.** To execute full-spectrum weapons and warfare systems research, development, acquisition, test and evaluation (RDAT&E)

**Vision.** To be the leader providing innovative, integrated and dominant warfighting effects for our Naval, joint and coalition forces

#### Research, Development, Acquisition, Test and Evaluation

- World leader in RDAT&E of guided missiles, advanced weapons and systems, complex software integration on tactical aircraft, energetic materials and subsystems
- Integrate Aircraft Weapons: AV-8B, EA-6B, EA-18G, F/A -18G, EP-3E, H-1, JSF, UAS, F-22
- Provide full-spectrum RDAT&E for free-fall weapons, targets, support equipment, crew systems, and electronic warfare
- Operate the Navy's Land and Sea Ranges using state-of-the-art modeling and simulation, and full-scale surface and sub-scale aerial targets
- Conduct joint live-fire survivability testing
- Conduct energetics formulation and production
- Develop counter Improvised Explosive Device (IED) technology
- Weaponize unmanned systems



**Direct Conflict Involvement.** NAWCWD played a significant role in every U.S. military crisis beginning with WWII. During Operation Iraqi Freedom a few quick-response topics include: CH-53E, Cobra Dos, Low Collateral Damage Bomb, Electronic Warfare Database Support, GBU-24E/B Laser Guided Bomb, Improvised Explosive Devices, Countermeasures, Intrepid Tiger Pod, Jammer Technique Optimization, Joint Direct Attack Munition, Man Portable Air Defense Systems, MH-60R, Precision Strike Suite for Special Operations Forces, P-3C search capability, Rapid Attack Information Dissemination and Execution Relay, Shared Reconnaissance Pod. Many new technologies are now being developed for the ongoing war on terror.



#### Historic Aerospace Site

##### American Institute of Aeronautics and Astronautics

Both China Lake and Point Mugu have been nationally recognized.

**China Lake.** "Conceived and developed rockets during WWII; non-nuclear components for the first atomic bomb; Sidewinder, Shrike, and Walleye missiles; and the Polaris concept. China Lake developed NOTSNIK in 1958 and vital components for the Mars Lander in 2004. The Station, a world leader in aircraft-weapons integration, testing, and electronic warfare, developed 75% of the air-launched weapons used during Vietnam and jointly developed 80% of those used during Operation Iraqi Freedom."

Approved for Public Release

**Point Mugu.** "Established in 1946 to provide a comprehensive T&E site for tactical missiles, Point Mugu has been instrumental in the DT&E and in-service support of systems including Regulus, Sparrow, Phoenix, Bullpup, Harpoon, SLAM, Tomahawk, Standard, and Rolling Airframe Missile. The first missile launch from an operational submarine was also accomplished at Point Mugu."

#### Latest Technologies

**Unmanned Systems.** UxS work is a strategic thrust area and NAWCWD is developing micro munitions for weaponization, and conducting RDT&E on more than 25+ systems including Reaper, Global Hawk, Raven, Predator, Scan Eagle, iRobot, and Fire Scout. In FY 2011, UxS efforts outpaced those for manned systems in terms of total flight hours and revenue generated for the China Lake land ranges.



• **Scan Eagle Guided Munition.** 3-1/2 pound laser guided bomb designed for operation from small UAVs. Advancing toward inert flight demonstration.

• **GPS Guided Munition.** One pound precision miniature munition for use from handheld 40mm grenade launchers and UAVs. Successfully completed guided air gun launches. Potential growth options include IR or EO seeker and extended range.

**Improvised Explosive Device (IED) Countermeasures.** Built unique training facilities replicating Iraq and Afghanistan environments. Developing new weapons, tools, and tactics to counter the serious IED warfighter threat.

#### Thermobaric Metal Augmented Charge (MAC) Warhead.

Developed by NAWCWD and fielded in the Hellfire AGM-114N missile, MAC has proven a huge success with our warfighters. 400 warheads produced locally and 11,000 now produced by ATK!

**Spike.** 5 lb, \$5K, tiny, accurate, shoulder-launched guided missile. Man-portable, UAV capable, and perfect for robotic systems.

**LOGIR.** A low cost, precision accurate, enhancement kit for rockets, able to kill large numbers of small moving targets in a single sortie quickly and surgically, with reduced pilot exposure. LOGIR does for rockets what JDAM does for iron bombs!

**BioFuel.** Researchers are developing new methods to produce diesel and full-performance jet fuels from renewable sources such as waste cellulose. These discoveries have the potential to drastically reduce the DoD carbon footprint.

**DTRA Chemical/Biological Agent Defeat Program.** Investigating explosive fills that, upon detonation, generate species that can kill biological weapons or cause breakdown of chemical weapons.

**E/A-18G.** NAWCWD integration team completed IOT&E and recommended the Growler for fleet deployment.

**Electronic Warfare.** Released F/A-18 and AV-8B EW Suite, the latest intelligence threat update critical to TACAIR survivability.

**Other Technologies.** Directed energy weapons, high-speed weapons, network centric warfare, Homeland Defense, time critical long range strike. Major thrust in alternative and reusable energy.

# China Lake

# Point Mugu

**Land Range**  
1.1 Million Acres

**Sea Range**  
36,000 Square Miles



## Scope of Operations (FY11 Actual. 09/30/11)

<b>Annual Funding</b>	\$2.043 billion
<b>Contracts</b> (labor, supplies, services)	\$697 million
<b>Weapons Division (WD) Personnel</b>	
• Civil Service	4,719
• Military	193
• Contractors	1,706
• <b>Total</b>	<b>6,618</b>

(NAVAIR Personnel at all 8 sites) 24,000+

<b>Annual Test Events</b>	1,524
<b>Training Sorties</b>	
• R-2508 airspace complex	35,550
• Superior Valley only	3,522

### Major Training

- **Major Exercises** conducted on the Sea Range, Land Range, Superior Valley, and Electronic Combat Range. Top Gun training.

**Land.** 1.1 million acres (larger than Rhode Island)

- Navy's largest single landholding
- 85% of Navy RDT&E lands
- 52% of Navy lands worldwide

**Sea.** 36,000 square miles, expandable to 196,000

**Air.** R-2508 is 12% of California's total air space

**Annual Visitors.** 24,431 **Foreign Visitors.** 1,179

## Facilities and Ranges

The Navy Region Southwest proudly hosts NAWCWD on its facilities at China Lake and Point Mugu, California

- Plant replacement value \$2 billion+
- Buildings and facilities 1,800+
- New BRAC construction includes 400,000 Square Feet  
4 new laboratories and 5 new facilities
- Airfields 3
- Warfighter Response Center provides subject matter experts internationally
- Unique world class facilities and test ranges
- Optimal test environment – 350+ clear days per year
- Geographic Diversity – Vast ocean, deep water ports, islands, mountains, deserts, canyons, and forests—in close proximity within restricted air and land space.

### Technology Transfer (Examples)

- CL-20 (most significant energetic material in 50 years)
- Auto air-bag sensors
- Ultrasonic scanning
- Stop-action video
- Chemiluminescent light sticks
- Geothermal energy



**Stop-Action Video**

## Customers and Partners (Partial List)

**Foreign.** Australia, Canada, Croatia, Denmark, Egypt, Finland, France, Germany, Greece, Israel, Italy, Japan, South Korea, Norway, Netherlands, New Zealand, Spain, Switzerland, Thailand, UK.

**Industry Examples.** BAE Systems, Boeing, Lockheed Martin, Raytheon, Northrop-Grumman, General Atomics

**Teaming.** DoD, other agencies, academia, and industry. Cooperative R&D and Commercial Service Agreements, Navy Potential Contractor Program and Patent License Agreements.

### Developmental Testing Naval Test Wing Pacific

- VX-31 (China Lake)
- VX-30 (Point Mugu)

**Operational Testing**  
VX-9 (COMOPTEVFOR)  
Marine Aviation Detachment (MAD)

**Weapons.** Airborne Laser Test bed, AEGIS, AMRAAM, AARGM, ESSM, Bombs, HARM, Harpoon, Hellfire, JDAM, JSOW, Laser Guided Bombs, LCDB, LOGIR, RAM, SLAM, SLAM-ER, Sidewinder, Sparrow, Standard Missile, Tomahawk, Trident

**Programs/Projects/Systems (Examples).** AESA, ASG, CIED, DPSS, DGTDS, Embarkable Link-16, EW Systems, JHMCS, High Speed Weapons, Infrared and Electronic Countermeasures, Intrepid Tiger Pod, Link-16, MIDS, SHARP, Tactical Aircraft Electronic Warfare, TOPSCENE, WSSA

**NASA – Shuttle to Orion.** Designed, tested, and supplied emergency bailout parachute systems for all shuttle astronauts following Challenger. Currently working on the parachute system for NASA's Orion Multi-Purpose Crew Vehicle.

**History. China Lake.** Established during WWII to test rockets developed by the California Institute of Technology. **Point Mugu.** Established in 1946 as the Navy's first instrumented missile test sea range.

### Location.

**China Lake.** 150 miles NE of Los Angeles (desert)  
**Point Mugu.** 50 miles N of Los Angeles (coast)

