



Crane Division Naval Surface Warfare Center



We Support the Warfighter!



*...deter
...defend
...defeat*



Facts



3rd Largest Navy Installation in the World

- 98 Sq Miles (approximately 64,000 Acres)
- 3,000 Buildings
- Facilities: \$3B
 - Sq Feet built FY96-06 – 636,385
- 650,000 Tons Ordnance Storage Capacity

No Encroachment

Unencumbered

- 1,751 Total Buildable Acres (Crane Site)
- 690 Buildable Acres (Ordnance Area (Crane Site))
- 98 Buildable Acres (Glendora Site (Sullivan Co.))
- Environmental Compliance

3rd Largest Employer in SW IN

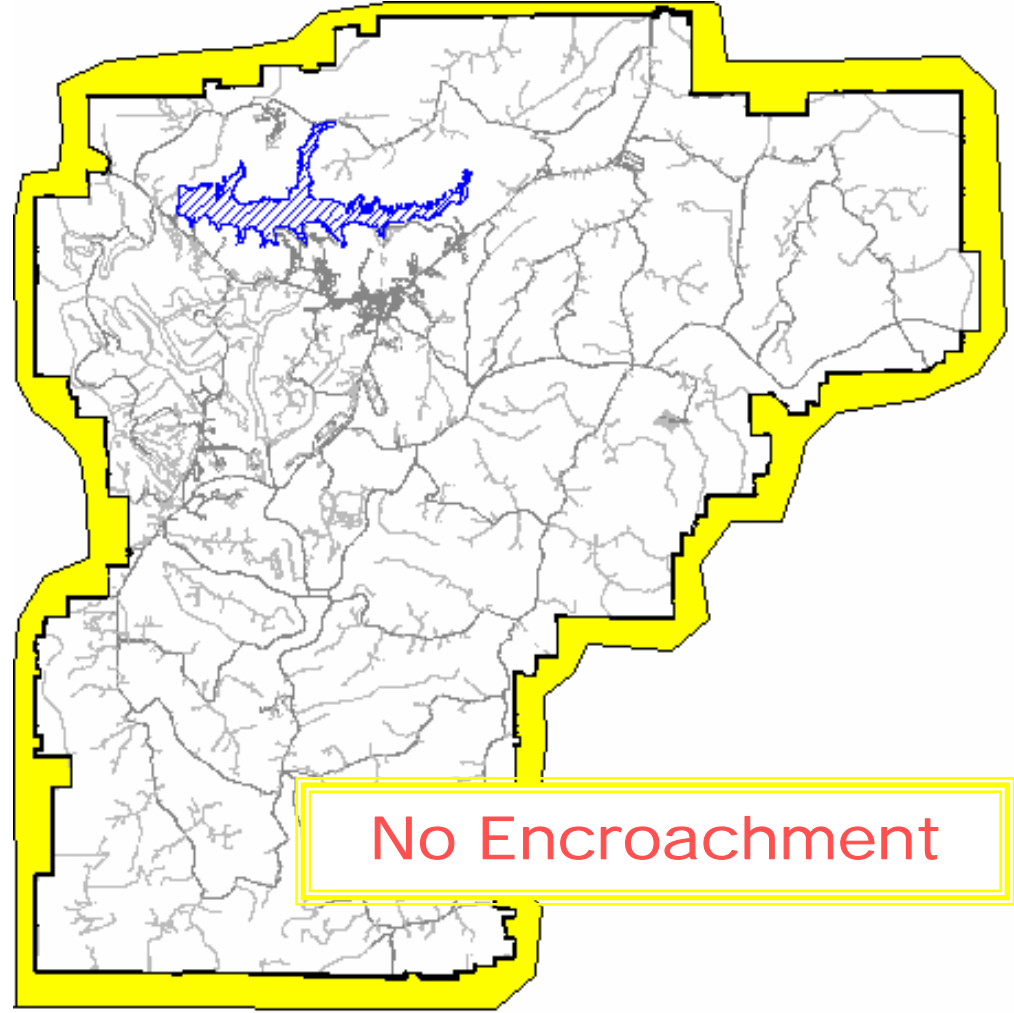
2663 NSWC Crane Navy Employees

- 70% S&E/Tech
- Average Age 46.0

650 Army Employees

71% of Receipts to Commercial Sources

> 900 Work Years of Contract Services



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NSWC Crane Mission

Our Mission . . .

Provide engineering and technical services with a product focus in **SENSORS, ELECTRONICS, ELECTRONIC WARFARE** and **SPECIAL MISSION WEAPONS**. Applies component and system level product engineering expertise principally to the warfighting areas of **STRATEGIC MISSIONS, SPECIAL MISSIONS** and **ELECTRONIC WARFARE/INFORMATION OPERATIONS**.





NSWC Crane: Our Value

- **COMPREHENSIVE SUPPORT** for complex military systems spanning development, deployment and sustainment
- Partnering with private industry to capitalize on **COLLABORATIVE EFFORTS** to streamline the introduction of new products for the Warfighter
- Real time development and **RAPID IMPLEMENTATION** of practical solutions for the military's toughest problems
- Advanced application of **CONTINUOUS IMPROVEMENT** processes for best in class customer satisfaction and value





TEAM Crane



2637 NSWC Crane Navy Employees
"Strong Seaport Engineering Support"
70% S&E/Tech
13 Military Personnel
\$1.71B Business Base



283 NAVFAC Employees
5 Military Personnel
\$84M Business Base



72 FISC Employees
1 Military Personnel
\$6.9M Business Base



650 Army Employees
2 Military Personnel
\$119M Business Base



147 NSA Employees
11 Military Personnel
\$22M Business Base

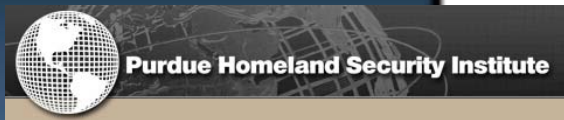




NSWC Crane: Indiana Consortium

INDIANA CONSORTIUM

Providing a Full-Immersion Training & Technology Capability



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NSWC Crane: Teaming With Industry and Academia

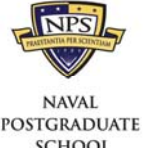


Booz | Allen | Hamilton



TOGETHER WE SUPPORT THE WARFIGHTER

- **Technology Transfer**
 - Partner funds Crane for services: Engineering, Repair, Testing, etc.
 - Approximately \$13M/yr is funded to Crane in support of Technology Transfer projects
- **Collaborative Research & Development Agreement (CRADA)**
 - Partner and Crane agree to collaborate with their own resources
 - 8 Active Agreements
- **Service Support Contracts**
 - \$364M in FY 07
- **Acquisition of Supplies and Hardware**
 - \$1.24BM in FY 07
- **Technology Development**
 - Crane contracts and pays for Technology Development
 - \$99M Leveraged for Technology Development in FY 07



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NSWC Crane: Technical Capabilities

Strategic Systems Hardware



Conventional Ammunition



Special Operations Hardware



Electronic Warfare Systems



Radar Systems



Energy & Power Systems



Acoustic Sensors



Microwave Technologies



Microelectronic Technologies



Infrared Countermeasures & Pyrotechnics



Defense Security Systems



Electronics Depot



Electro-Optic Systems



Obsolescence Management



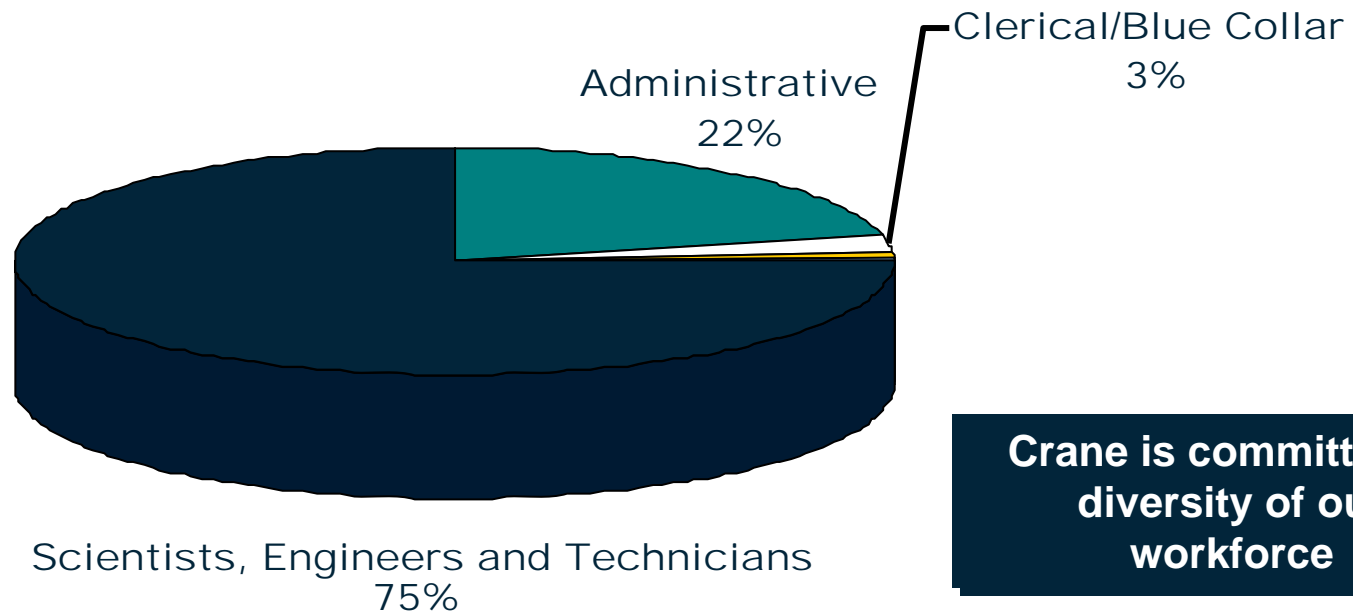


NSWC Crane: Intellectual Breadth and Depth

NSWC Crane's PhD Fellowship Program provides PhDs for future research efforts

20 US Patents were issued to NSWC Crane employees in the last 2 years

NSWC Crane's Masters Program Provides Advanced Degrees in a Range of Technical Engineering Disciplines



Crane is committed to diversity of our workforce



NSWC Crane: Portfolio

Crane has embarked on an aggressive campaign to concentrate its resources and technical capabilities in the three mission areas which best support the Warfighter, these are our FOCUS AREAS.



Crane Mission Focus Areas

Crane Resource Allocation





Product Expertise . . . SECOND TO NONE!

PRODUCTS

Crane's Product Focus is the foundation for our Mission Focus Areas

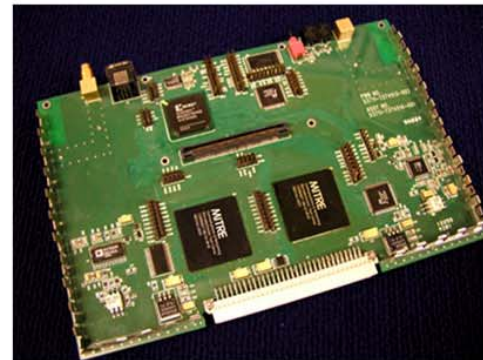
NSWC Crane: Product Focus



Crane provides cradle to grave power system engineering services for ship, air, land, and space based systems

Power Systems

Unique and comprehensive Printed Circuit Board development, manufacturing, test, and evaluation capabilities



Electronic Interconnect Technology



Crane is DoD's largest and most capable battery evaluation facility with a unique abusive test facility and extensive environmental capabilities

High Energy Test Facility

Last Navy Printed Circuit Board manufacturing facility and one of only two DoD Printed Circuit Board manufacturing facilities



Electrochemistry Eng Facility





FULL SPECTRUM Engineering & Analysis: SECURING GLOBAL PROTECTION

STRATEGIC



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NSWC Crane: Strategic Missions



Crane is the acquisition engineering & technical support agent for the Navy's Strategic Programs Office for fielding of the Integrated Nuclear Weapons Security System

Technology & Infrastructure Protection

Crane provides a broad range of systems engineering expertise for the sustainment and modernization of the Air Forces Ballistic Missile Early Warning Systems



Radar Systems

Crane supports systems engineering design, analysis, test and evaluation of flight systems for Strategic platforms



Flight Systems



Platform & Launch Systems

Crane provides high reliability product and subsystem engineering and logistics to the Navy's Strategic Systems Programs Strategic Weapons System and Attack Weapon Control System

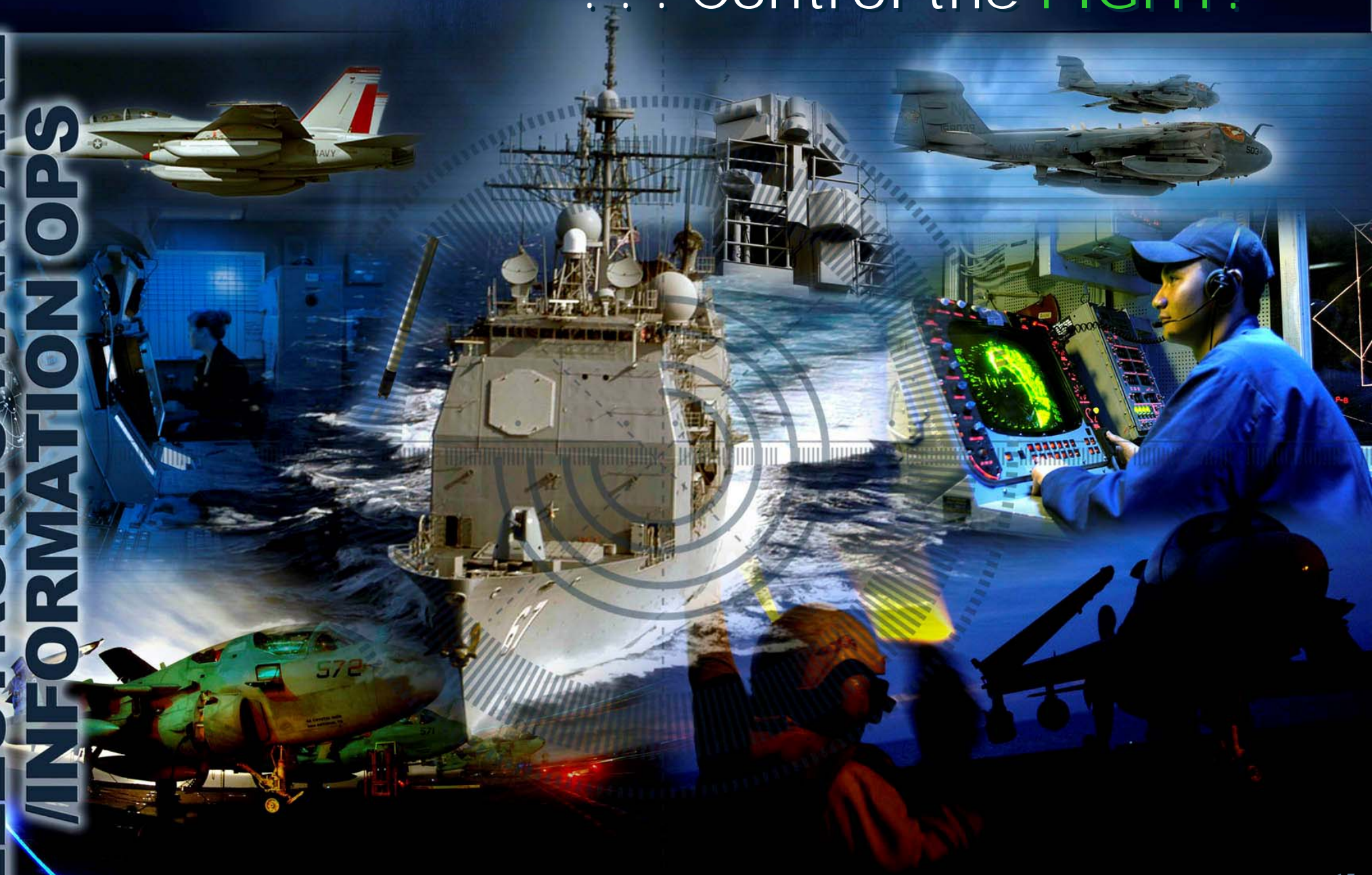
Power & Circuit Board Technologies



Control the **SPECTRUM**

... Control the **FIGHT!**

**ELECTRONIC WARFARE
/ INFORMATION OPS**



NSWC Crane: EW/IO



NSWC Crane is the Center of Excellence for EW & has worked the ALQ-99 TJS since it's conception

Crane develops & manufactures all infrared countermeasures for US Navy aircraft

Airborne



Crane is utilizing critical EW, DMS-MS, Engineering & T&E Knowledge, skills, & abilities to revolutionize support of Submarine EW Systems

Sub-Surface

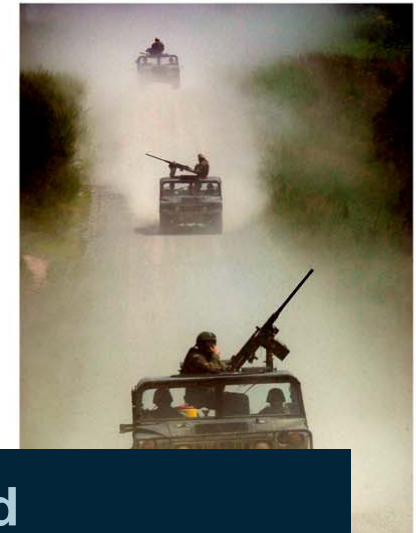
Crane developed and operates the only COMOPTEVFOR certified test facilities to support EW T&E events



Surface

Crane is

- Helping the Army stand up their Capabilities for Ground EW
- Leveraging Air, Surface, & Sub-Surface EW expertise for Ground



Ground





From Mission Needs to Fielded Solutions,
NO ONE is **FASTER** or **BETTER!**

SPECIAL



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NSWC Crane: Special Missions



Crane designed, built and fielded the first Counter-Sniper Enclosure for USAF Force Protection HMMWVs in 6 weeks

Mobility and Maneuverability

Crane is USSOCOM's PM for the development, acquisition, fielding and sustainment of the SOF Combat Assault Rifle (SCAR)



Special Munitions & Weapons



SOPMOD has surged more than \$60M in ground combat end items to Special Operations in the field during OIF/OEF

Sensors & Communications

Crane provided Small Arms operations & maintenance training to over 500 personnel in FY06



Training



Ordnance Test Capabilities

- **Ordnance/Energetic Materials Assessment Services**

- R&D Testing
- First Article Testing
- Lot Acceptance Testing
- Quality Evaluation/Surveillance Testing
- Failure Investigation/Analysis
- Insensitive Munitions Testing
- Hazard Classification Testing
- Demilitarization Technology "Proof Out"

- **Test Equipment Design/Build**
- **Engineering Analysis/Assessments**
- **Systems Safety/WSESRB Support Services**
- **Maintenance/Repair Services**



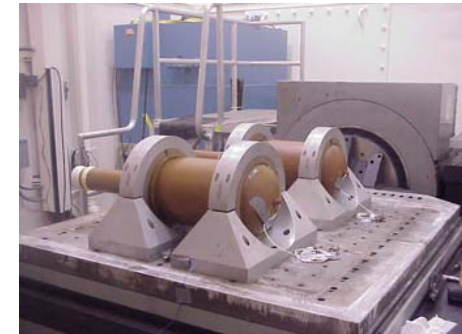
NAVSEA



NAVAIR



Ordnance Test Area



Environmental Simulation



Underwater Ordnance Evaluation



MARINES



SPECWAR



SSP

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Ordnance Products Tested

- Bombs and Components
- Countermeasures
- Aircraft Gun Ammunition
- Pyrotechnics
- Rocket Warheads
- Rocket Fuzes
- Demolition Devices
- Grenades
- Ship Gun Ammunition
Fuzes
- Air & Surface Missile
Components
 - Fuzes
 - S&A Devices
 - Target Detection Devices
 - Warheads
 - Boosters
 - Gyroscopes
 - Separation Charges
 - Thrusters
 - Detonators





Ordnance Test Facilities on Center

~ 135,000 sq ft

- **Engineering Project Offices**
- **Heat Flow Calorimetry Laboratory**
- **Gun Fuze T&E Facility**
- **Strategic Missile Component T&E Facility**
- **Explosive Sciences Laboratory**
- **Environmental Test Facility**
- **Radiographic / NDT Facility**
- **Missile Fuze T&E Facility**
- **Ordnance Test Area (OTA) - 88 acres**



- **Test Services**

- Research & Development Testing
- Comparative Testing
- First Article Testing (FAT)
- Lot Acceptance Testing (LAT)
- Quality Evaluation / Surveillance Testing
- Failure Investigation / Analysis

- **Engineering Services**

- Test & Data Analysis / Reporting
- Test Fixture Design
- Fabrication & Assessment



Environmental Test Capability Specifics

Climatic Testing

- Temperature / Shock
- Temperature / Humidity
- Temperature Cycle & Storage
- Altitude
- Salt Fog
- Icing



Dynamic Testing

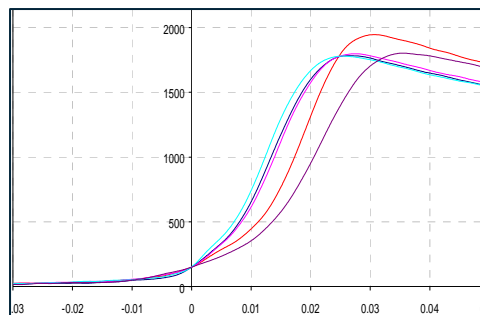
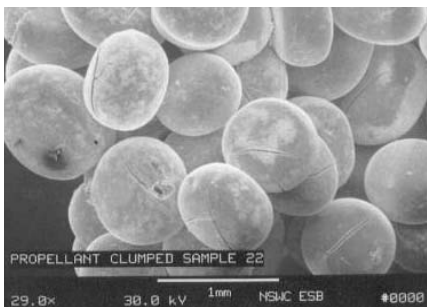
- Vibration
 - Sinusoidal
 - Random
 - Mixed Mode
- Shock
 - MIL-S -901 Shipboard
 - Shock Response Spectrum
 - High Impact
 - Classical
 - Jolt & Jumble



Materials Analysis Laboratory

- ISO-9001 certified analytical laboratory
- 10,000 ft² chemical, thermal, and microscopic laboratory
 - 1lb explosive limit
- 2500 ft² heat flow calorimetry laboratory
 - 50-pound explosive limit
- 1000 ft² metallurgical laboratory
 - 10 lb explosive limit
- 1000 ft² mechanical properties laboratory
 - 500 lb explosive limit
- Six explosive storage magazines (SRC-I and SRC-II)
 - ranging from 10 lb to 165,000 lb capacity.

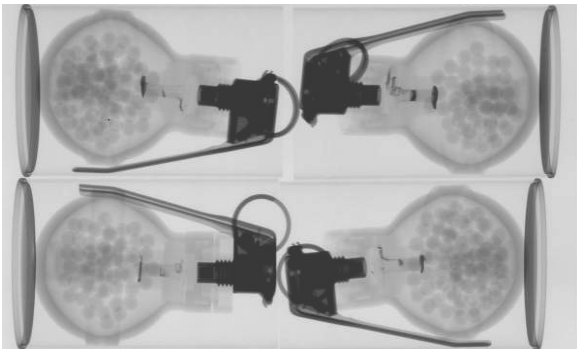
- Failure Analysis
- Material Identification
- Material selection/source identification
- Material compatibility
- Hazard classification
- Environmental compliance testing
- Shelf life determination/extension
- Qualification testing
- Product improvement initiatives
- Quality evaluation/surveillance
- First Article/Lot Acceptance Testing



Material Evaluation Specifics

Nondestructive Test Laboratory

- ISO-9001 certified NDT laboratory
- Three conventional radiographic test bays (160 KeV to 450 KeV)
 - Rated for NEQ of 75 lb 1.1
- One 2000 ft² high energy radiographic test bay
 - rated for NEW of 2000 lb 1.1 (10 MeV Linear Accelerator)
 - Penetrates over 15 inches of steel
 - Designed to accommodate tractor trailer inspection
- 2000 ft² NDT laboratory space to accommodate UT, ET, PT, and MT testing methods
 - NEW of 1000 lb 1.1



- Conventional and High Energy Radiography
- Laminographic Test System
- Computerized Axial Tomography
- Digital Radiography Imaging systems
- Reconfigurable cabinet x-ray systems
- Ultrasonic inspection
- Eddy current testing
- Penetrant testing
- Magnetic Particle Testing



Demil Test Facility

- Development and evaluation of new demilitarization technologies
- Adaptable to accommodate prototype systems
- 7.5 acres
- 500 lb remote operated test cell
- 50 lb remote operated test cell
- 1 lb remote operated test cell
- 500 lb ordnance handling area
- Remote located control room
- 2 Magazines: 150,000 lb 1.1 storage capacity
- Self-contained fire suppression



- Abrasive Waterjet
- Induction Heating
- Fuze Aging
- Propellant Sampling
- Sensitivity Testing
- Process water waste identification
- Chemical analysis/characterization

Lake Glendora Test Facility

- Facility Footprint 450 acres
- Lake Footprint 100 acres
- Max depth 110 feet
- 1 mile length from North to South
- $\frac{3}{4}$ mile width from East to West
- 3 independent water ranges
- Underwater and surface detonation and burn approval
- Water to air launch and drop approval
- East Range NEW 100 lbs 1.1 & 1.2



Lake Glendora Test Facility

- **Ordnance Support Building**
- **Fabrication/Repair Shop on-site**
- **Boat House**
- **Acoustic Monitoring Barges**
- **Multiple Watercraft**
- **Floating Test Platforms**
- **Marine Rail Launch System**
- **6 ton Lift Capabilities**



- **Weather Monitor System**
- **HDTV Screens for Playback**
- **Climate controlled observation room**
- **U/W and Surface Video Monitoring and DVD Recording for all ranges**



Camp Atterbury

Ammunition Testing Facility

- **Direct Fire Range with back blast berm for Recoilless Rifle firing**
- **No established NEW (Provided in Standard Operating Procedure for weapon undergoing test)**
- **Impact area has targets positioned at 500 to 1600 meters. 5000 meter range capability.**
- **1 operating building for 20mm, 25mm, 30mm ammunition testing**



- **Memorandum of Understanding (MOU) signed 5 July 2000**
- **Long Term Strategic Partnership signed 19 March 2004**
- **Allowed access to 33,132 acres containing 37 direct fire ranges and 19 mortar firing points**

Ordnance Test Area (OTA)

- Encompasses 88 acres
- 5 pound NEW (Class 1.1) (Self-Imposed, 20 pound NEW with restrictions)
- 4 operating and 2 support buildings
- Army Surveillance Function Test Range
- Baseline Environmental Assessment
- Air Quality Modeling Assessment

Ordnance Tested

- Hand Held
- Hand Tossed
- Pistol/Projector Fired
- Countermeasures
- Target Illuminating
- Target Screening
- Demolition Materials



Special Areas / Capabilities

- Aerial Signal/Flare Test Ranges
- 300' Tower Illumination Range
- Demolition Material Ranges
- Grenade Launch Area
- Warhead Arena
- Forty Foot Drop Tower
- IM & Hazard Classification Test Areas
- Remote Ammunition Breakdown Facility
- Munitions
- Evaluation Facility
- Ready Service Magazines (15 total)

Special Equipment



Defuzing



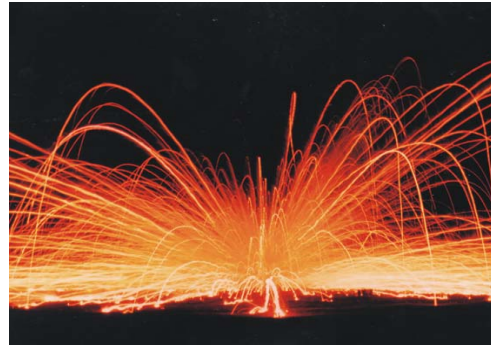
Milling



Bandsaw



Lathe



Final Hazard Classification/Insensitive Munitions Testing



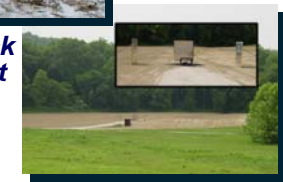
Slow Cook-Off



External Fire



Bullet Impact



Fast Cook-Off

Stack Test

Other Lab Capabilities



Leak Testing



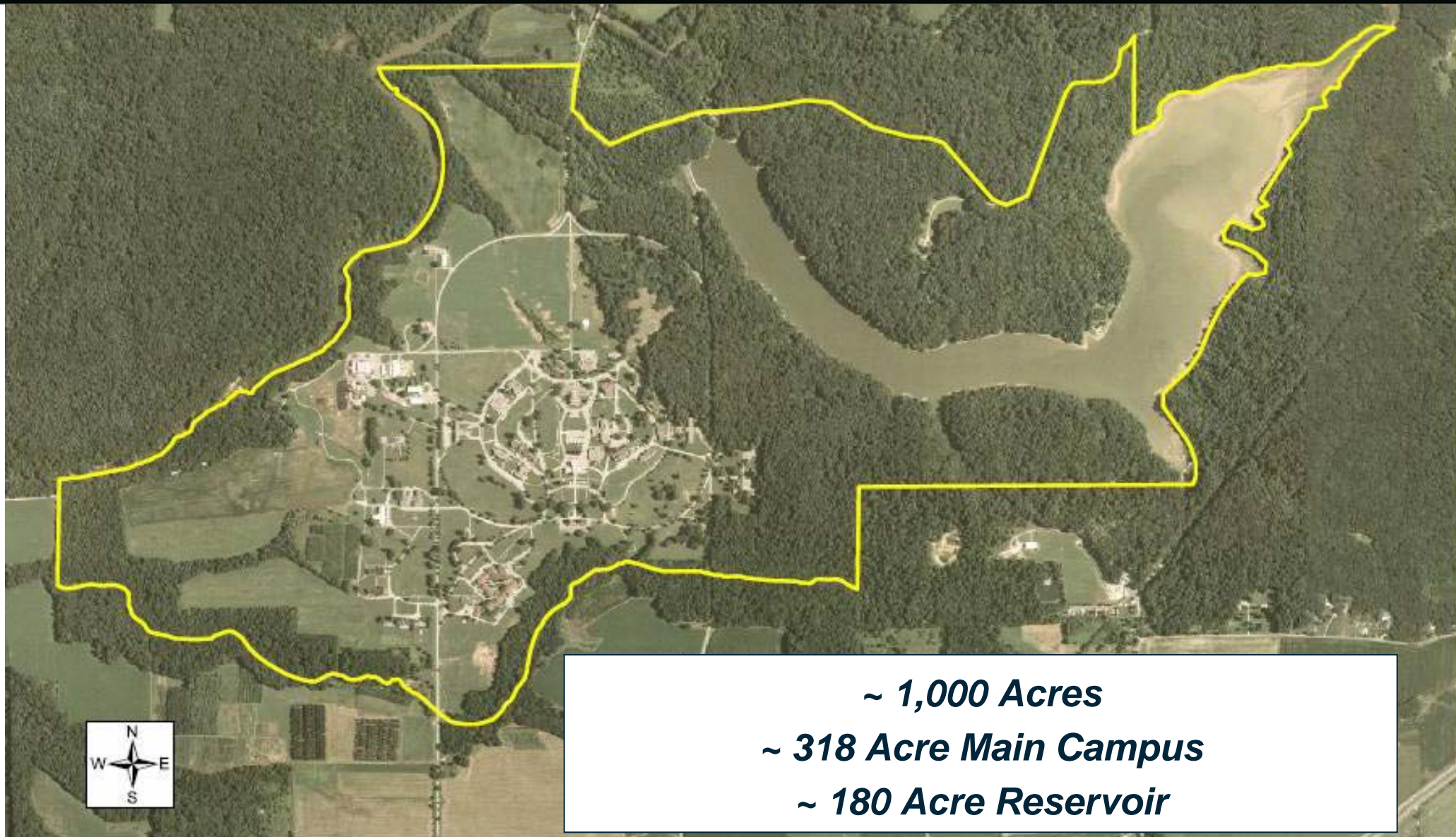
Hydrotank



Temperature Chambers



Muscatatuck Urban Training Center



~ 1,000 Acres
~ 318 Acre Main Campus
~ 180 Acre Reservoir



Muscatatuck Urban Training Center



68 Buildings With 851,031 Square Feet Under Roof
37 Buildings 2 to 5 Stories Tall
Operational Utilities
Over 9 Miles of Roads
Over 1 Mile of Tunnels

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- **Experience**
 - 4 person team with 64 years of combined experience in the Safety Field
- **Services**
 - Serve as single POC between WESRB and NSWC Crane
 - Provide Project Managers and Project Engineers with assistance in the planning and execution of a Weapon System Safety Program
 - Act as the “Principal for Safety” for NSWC Crane executed projects
- **Products**
 - System Safety Program Plan (comply w/NAVSEAINST 8020.6 & MIL-STD-882)
 - Safety Analyses
 - Safety Assessment Report
 - Test Plans
 - Insensitive Munitions
 - Hazard Classification
 - Safety
 - Final (Type) Qualification
 - Shipboard Shock
 - Test Reports (for all of the above)
 - WESRB Technical Data Packages
 - Supporting Initial Operational Capability (IOC)
 - Limited Release
 - User Evaluation
 - WESRB Presentation Packages



- ***Providing assessment and analysis so customers can make "proactive" decisions!***
- ***Assuring Ordnance Products are Safe & Effective for the Warfighter through Innovative Ordnance Assessment***

Summary

- We provide **FULL LIFE-CYCLE SERVICES** and support for our three areas of expertise: **Strategic Missions, Electronic Warfare/Information Operations and Special Missions**
- Our military solutions are highly practical - developed by the **BRIGHTEST SCIENTIFIC MINDS** employing the latest technology and equipment
- We are **HIGHLY EFFICIENT** and **COST EFFECTIVE**, and we practice continuous improvement every day





Crane Division *Naval Surface Warfare Center*

...deter... defend... defeat