Department of the Navy
IAT

DCN 8374

INFRASTRUCTURE ANALYSIS TEAM
ODASN (IS&A), 2221 South Clark Street, Suite 900, Arlington, VA 22202

(703)-602-6500

MM-0216
IAT/MMC
01 Oct 2004

MEMORANDUM

Subj: 29 SEPTEMBER 2004 MEETING WITH REPRESENTATIVES FROM INDIANA

Encl: (1) "The Navy and Army Complex at Crane, Indiana - Electronics, Electronic Warfare, and Ordnance for 21st Century War" Brief
(2) White Paper on The Navy and Army Complex at Crane, Indiana
(3) "Warfighter Solutions" September 2004 magazine

1. Mr. Wayne Arny, Acting ASN (I&E) met with 3 members of the subject group in Room 4D573 at 1100 on 29 Sep 2004. The attendees from Indiana were Lieutenant Governor Kathryn Davis, Mr. Birch Bye and Mr. Bill Cassidy. CAPT James Heffernan, USN Executive Assistant for Mr. Arny and Commander Margaret Carlson, JAGC, USN, of DASN (IS&A) office were also present.

2. The members discussed synergistic joint opportunities at Crane. They highlighted their close relationship with the area universities and the fact that they had no encroachment issues. The complex has the capacity to do more and is working hard to meet the final selection criteria. They are particularly proud of their electronic warfare achievements.

3. Mr. Arny highlighted that the Navy has learned a lot in the prior rounds of BRAC implementation and will use those lessons learned for any BRAC 2005 recommendations' implementation. He noted that in past implementation property transfers, "no cost" did not necessarily mean "free" to the communities in terms of responsibilities for the property.

4. The meeting concluded at approximately 1130.

M. M. Carlson
M. M. CARLSON
CDR, JAGC, USN
Recorder

The Navy and Army Complex at Crane, Indiana

Electronics, Electronic Warfare, and Ordnance for 21st Century War

ENCLOSURE (1)

21st Century

Summary

- Contributes materially to Transformation for 21st century warfare
- Positioned to be DoD's leading Technical Center in the war against terror
- Can accommodate additional missions, programs and activities on its extensive property
- Has no encroachment of any kind
- Boasts outstanding technical workforce in Joint Navy/Army activities
- Access to intellectual capital at academic institutions
- Supports all of the Services and the Department of Homeland Defense
- Responds rapidly to changing Defense and Homeland Security requirements

Ideal Defense Center for Electronics, Electronic Warfare, and Ordnance for the 21st century

21st Century

Geographic Description

NSA Crane

- 3rd largest Navy base in area
  - 100 square miles—63,000 acres
- Located in sparsely populated area of Southern Indiana
  - No encroachment of any kind
- Ready access to Railroads, Airports, and Interstates
  - Benefits from recently approved I-69
- Robust infrastructure
  - Power, natural gas, and water
  - Dedicated and Secure Broadband will be installed alongside I-69

Activities

21st Century

NSA Crane

2 major tenants

Naval Surface Warfare Center Crane Division (NSWC Crane Division)

Missions

- ← Electronics
- ← Electronic warfare
- ← Ordnance →

Crane Army Ammunition Activity (CAAA)

21st Century

Personnel

3700 Civilian Employees 700

- 1,000 Engineers and Scientists
- 1,000 Electronic, Mechanical, and Chemical Technicians
- 1,200 Artisans
- 1,200 Administrative and Support Personnel

2 Campuses

21st Century

Functionally Integrated

Electronic Campus		Ordnance Campus	
■	sophisticated electronic labs	■	munitions production lines
■	electronic warfare labs	■	storage and distribution
■	test and maintenance shops	■	demilitarization expertise
■	microwave test ranges	■ ■	pyrotechnic production lines
■	material and failure analysis laboratory	■	pyrotechnic R&D, testing and engineering
		■ ■	conventional ammunition engineering,production, and demilitarization
		■ ■	joint ordnance engineering
		■ ■	pyrotechnic and small arms ranges

■ *NSWC Crane* ■ *CAAA*

21st Century

Crane's Economic Impact

Navy and Army activities SUBSTANTIALLY impact Indiana

- Direct employment of 4,522* on the base
- Total employment impact of 8,089
- Corresponding wage impact is $368 million
- Contracts with Indiana companies amount to $101 million in 2003

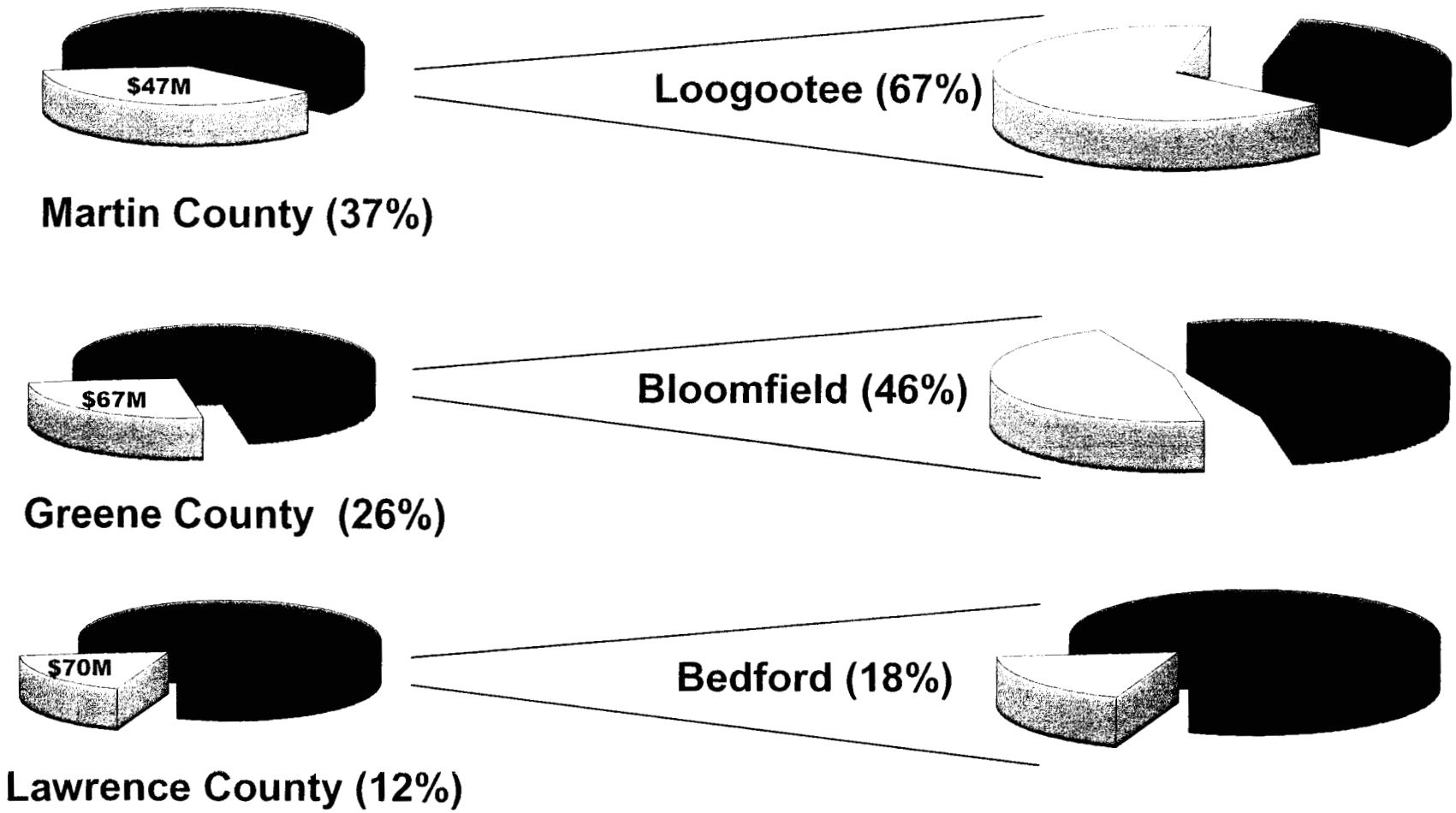
Annual economic impact on the State is $469 million

**includes all tenants*

In 2003, companies in all 50 states had contracts with Navy and Army activities at Crane.

Local County Impact

21st Century



Proportion of all wages dependent on Crane

21st Century

Crane's Military Value

- Conducts mission vital to Nation's security without constraints imposed on other installations
- NSWC Crane and CAAA are joint activities
  - NSWC Crane: engineering, testing, and evaluation
  - CAAA: production, storage, distribution, and demilitarization
- Provides modern technical facilities, test ranges and laboratories

HIGH

MILITARY VALUE

NSWC Crane

21st Century

- Largest and most diverse Navy Technical Center
  - 21st Century Warfare specialists
- Steward for industrial base of critical military components
  - Microwave tubes
  - Radiation-tolerant Micro-electronics
  - Pyrotechnics
  - Military-unique batteries
  - Printed wiring board technology
- Component of NAVSEA's Naval Surface Warfare Center
- Unrivaled expertise

Engineering
Maintenance
Logistics

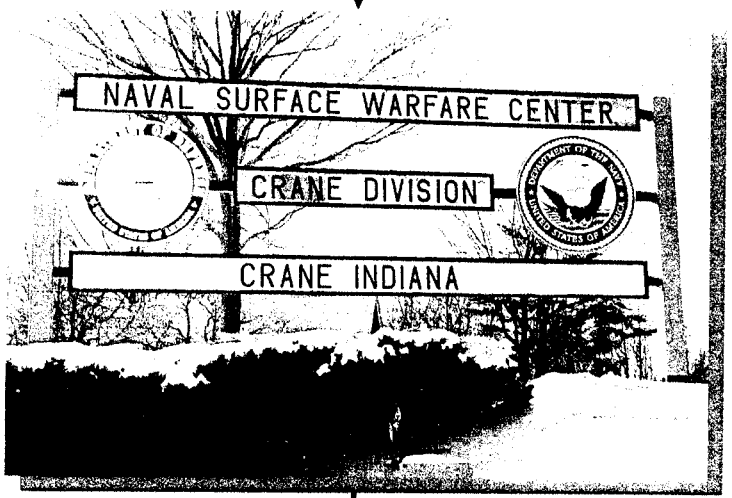
Electronic warfare
Anti-terrorism and Force Protection
Electronics
Ordnance

NSWC Crane Customers

21st Century

Engineering, maintenance, logistical requirements

- ✓ Navy
- ✓ Marine Corps
- ✓ Army
- ✓ Air Force
- ✓ National Guard
- ✓ U.S. Special Operations Command
- ✓ Coast Guard
- ✓ Department of Homeland Security
- ✓ Other Federal agencies
- ✓ State and local governments



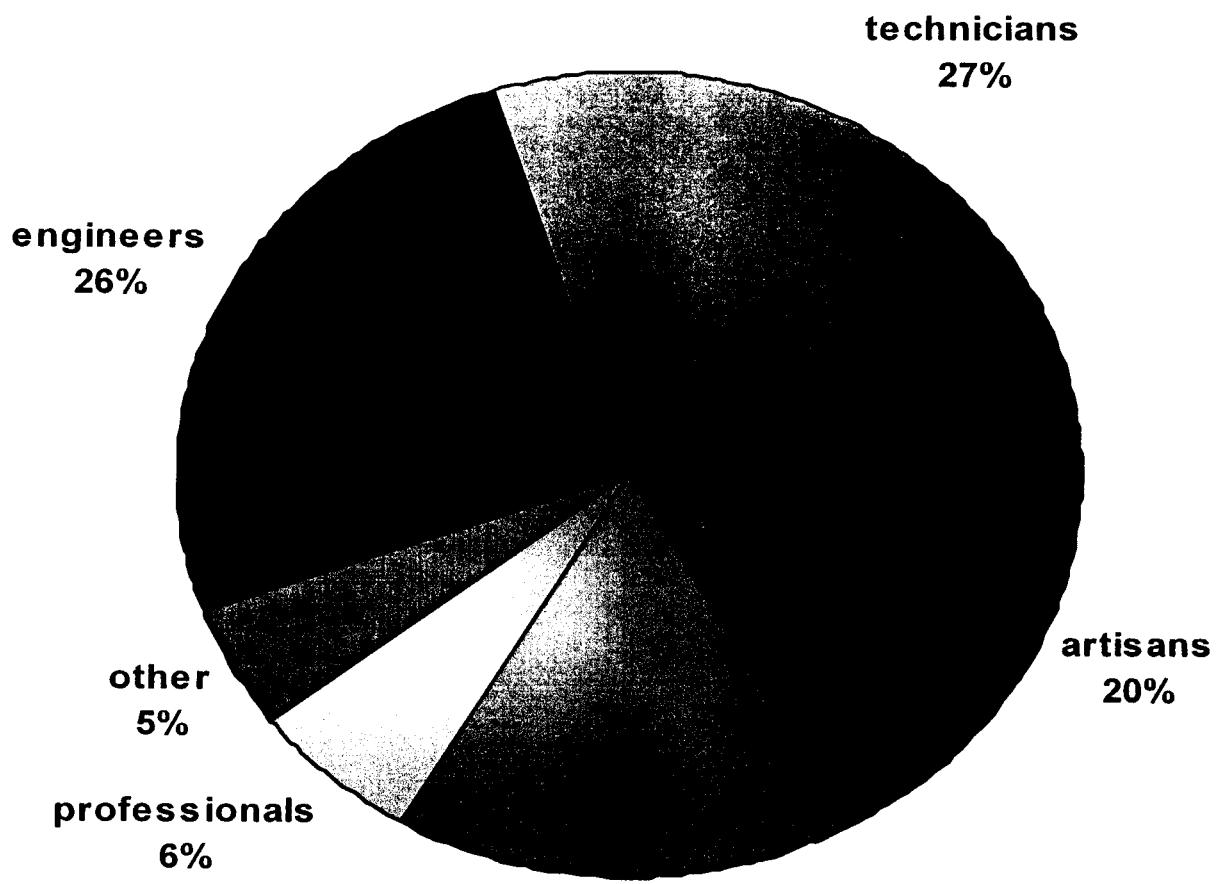
Model Defense Installation

Quick, efficient, cost-effective solutions

NSWC Crane Workforce

21st Century

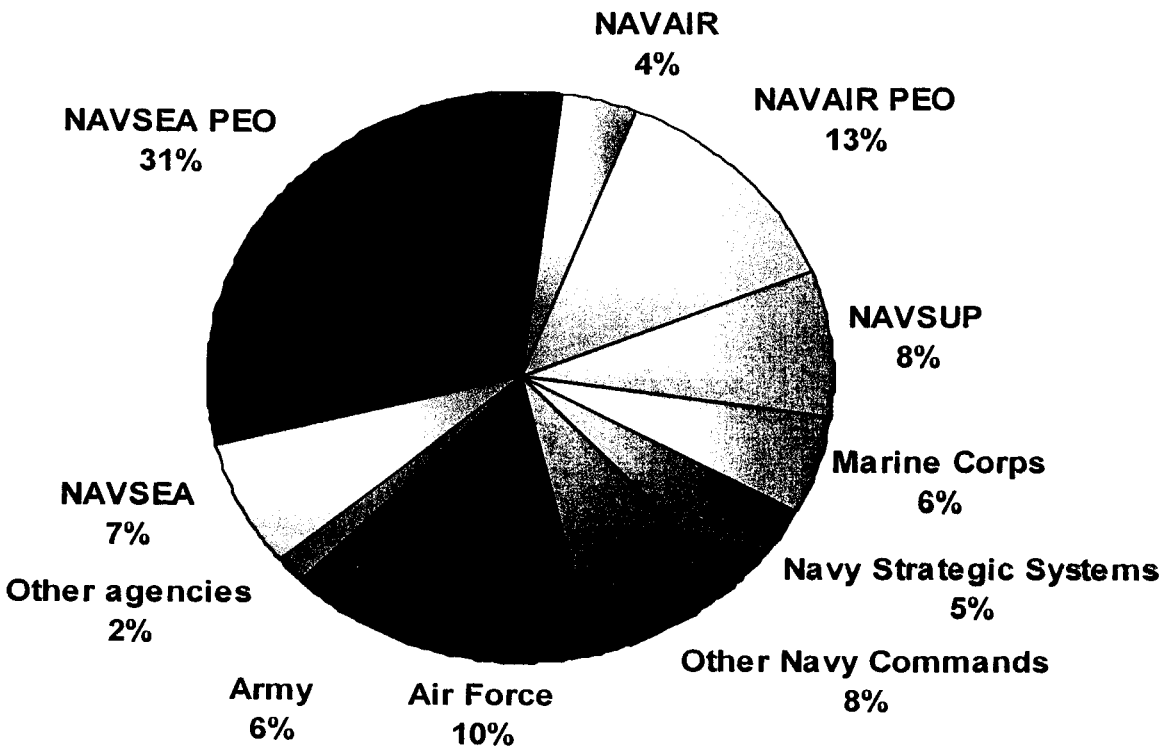
NSWC Crane employs about 3,700 civilians



NSWC Crane Workload

21st Century

2003: $1.3 billion



21st Century

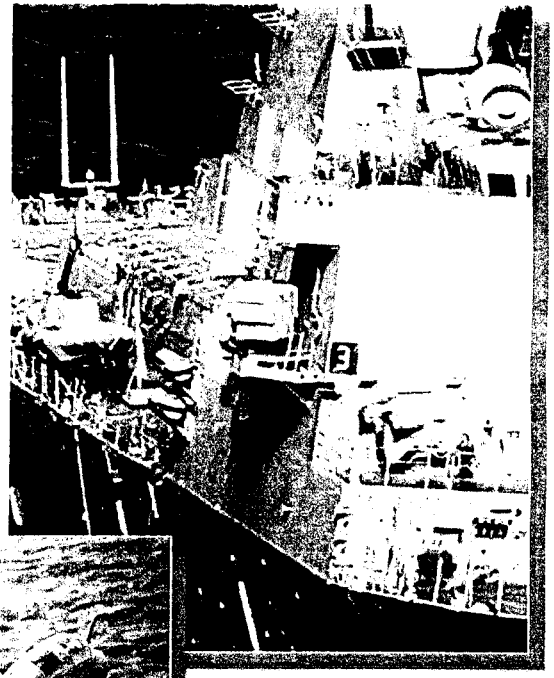
Crane's Areas of Expertise

- Electronic Warfare
- Radar
- Microwave Components
- Anti-terrorism and Force Protection
- Electronics
- Power Systems
- Ordnance
- Fleet Maintenance and Modernization

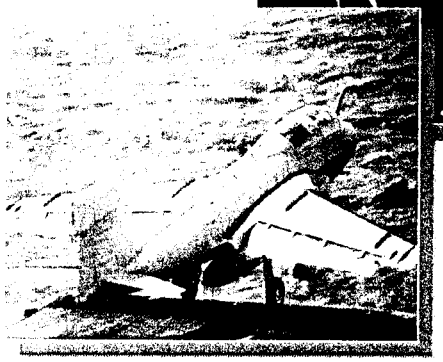
21st Century

Electronic Warfare

- Designs, develops, tests, evaluates, certifies, procures, maintains, improves, and supplies systems and products for operational forces
  - Airborne and shipboard electronic warfare systems
    - EA-6B Prowler; P-3 Orion; EP-3E; F/A-18G Growler
    - Unmanned aerial vehicles
    - Navy surface ships
    - All electronic, microwave, and antenna subsystems
    - ALQ-99 Airborne EW System (Navy/Air Force)
    - SLQ-32 EW System (primary system on all Navy combatants)



Combatant surface ships



EA-6B Prowler

21st Century

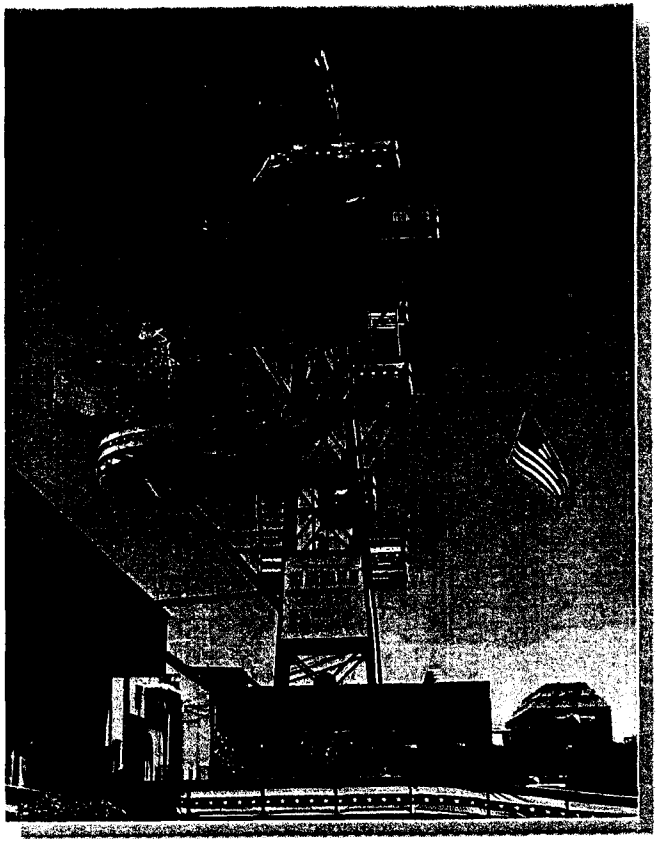
Electronic Warfare Leader

- DoD's most comprehensive Electronic Warfare Center
- Deputy Program Manager for Surface Electronic Warfare Systems and decoys
- Depot Maintenance Activity for Surface Electronic Warfare Systems and decoys
- Software Support Activity for Surface Electronic Warfare Systems and decoys

21st Century

Radar

- Provides total radar system design services to the Fleet
- Manages the configuration of radars
- Performs acceptance testing
- Conducts failure analyses
- Provides logistical support
- Conducts onsite training for shipboard crews
- Performs Depot maintenance



21st Century

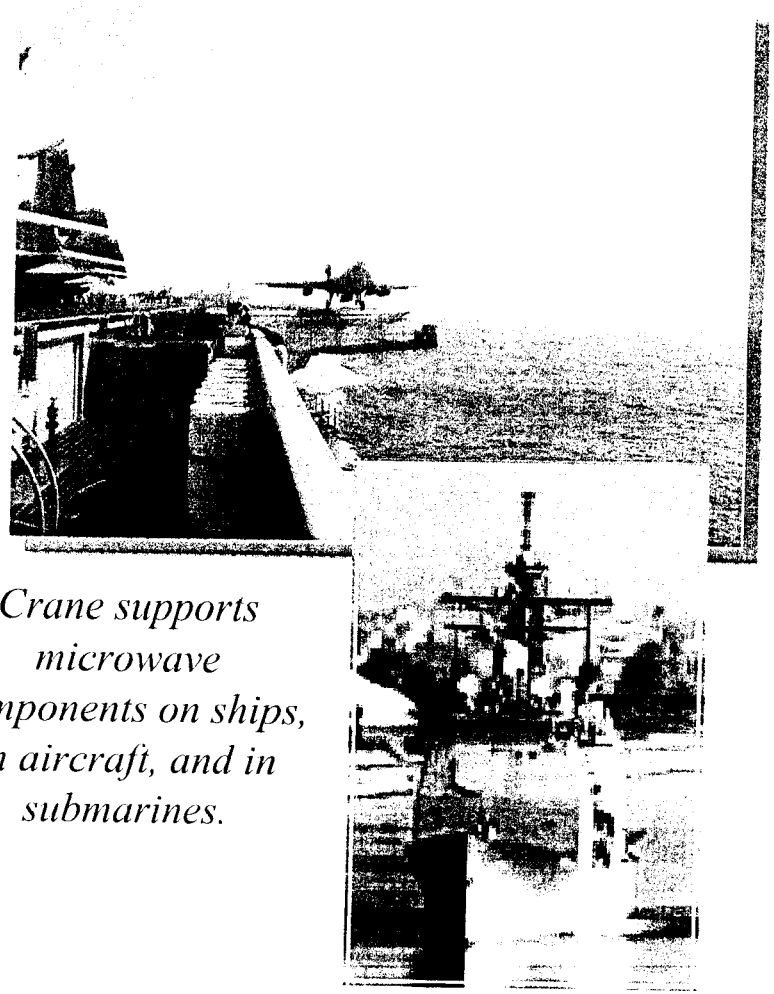
Radar Leader

- Depot Maintenance Activity for all Radars on Cruisers, Destroyers, and Frigates
- Acquisition Agent for Radar Systems
- Deputy Program Manager for Radar Systems
- Program Manager for Navy's Radar Restoration Program
- Navy's ISEA for shipboard training systems that rely on radar, e.g., Battle Force Tactical Trainer
- Marine Corps ISEA for AN/TPS-63B radar system

21st Century

Microwave Components

- Repairs and rebuilds microwave vacuum tube devices
- Provides expertise for ships
  - Phased Array Radars, Shipboard Detection and Fire Control Radars, and Navigation Radars
- Provides expertise for Navy, Marine Corps, and Air Force aircraft
  - Airborne fire control systems
  - Airborne jamming radars
- Provides expertise for detection radar systems used by Marine Corps



Crane supports microwave components on ships, in aircraft, and in submarines.

21st Century

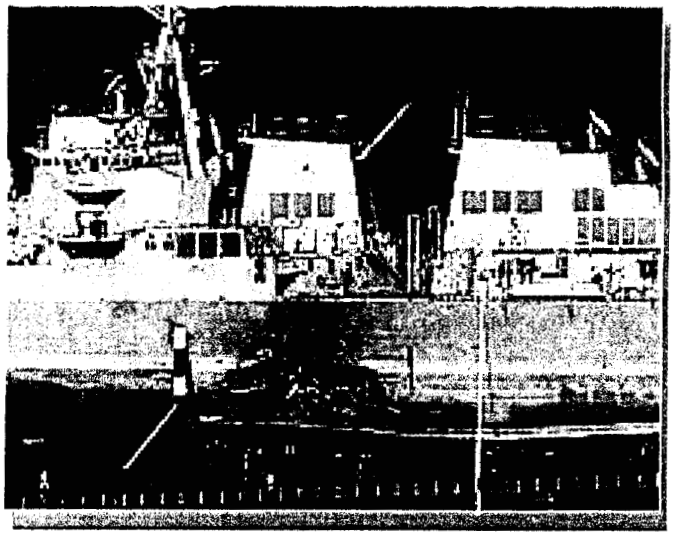
Microwave Components Leader

- DoD's Technical and Acquisition Engineering Resource for microwave vacuum devices used in radar systems
- Steward for Microwave Vacuum Tube Devices
  - Ensures availability within the industrial base of the U.S.

21st Century

Anti-terrorism/Force Protection

- Navy high-security locks and keys acquisition, engineering, and installation support
  - "Locksmith of the Navy"
- Security systems design and development
- Force Protection engineering
- Night Vision and Electro-Optic devices
  - Only DoD Activity to provide full life cycle support
- Laser safety systems evaluation and certification
- IROS3
  - First fully integrated surveillance and protection system



17 American Sailors on the USS Cole were killed in the 2000 terrorist attack.

Crane developed IROS3 to prevent such catastrophic loss in the future

Anti-terrorism/Force Protection Leader

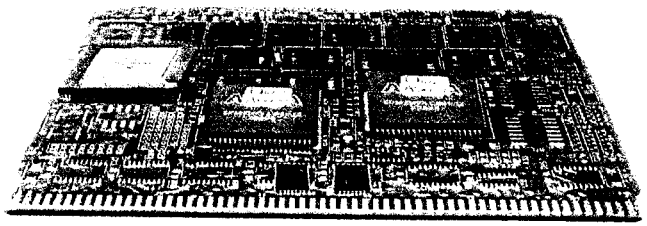
21st Century

- DoD System Integrator for the 10-year renovation of the Pentagon
- Navy's Acquisition Agent for Night-Vision equipment used by Special Warfare Forces
- Acquisition Agent for Navy's Forward-Looking Infrared Systems
- Navy's Depot Maintenance Activity for Chemical and Biological Warfare Detection Systems
- DoD Center of Expertise for Badging
- Navy's Engineering Agent for Badging and Access Control Systems

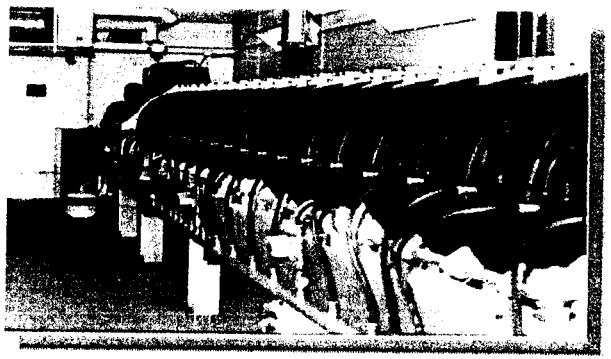
21st Century

Electronics

- Developed Expeditionary Warfare Systems for the Marine Corps
- Developed a Mobile Command Operations Center currently used by the Marines in Iraq
- Provides Design Modeling and Simulation services for Tactical and Strategic systems
- Designs highly reliable Microelectronics
- Leads in developing Radiation-Tolerant Electronics for Strategic Systems
- Leads in integrating COTS into Navy Tactical and Strategic Systems
- DoD's most comprehensive component test and analysis capability



Only Navy printed wiring board manufacturing and engineering facility



Highest Dose-Rate Linear Accelerator in the U.S. Can simulate effects of a nuclear blast

21st Century

Electronics Leader

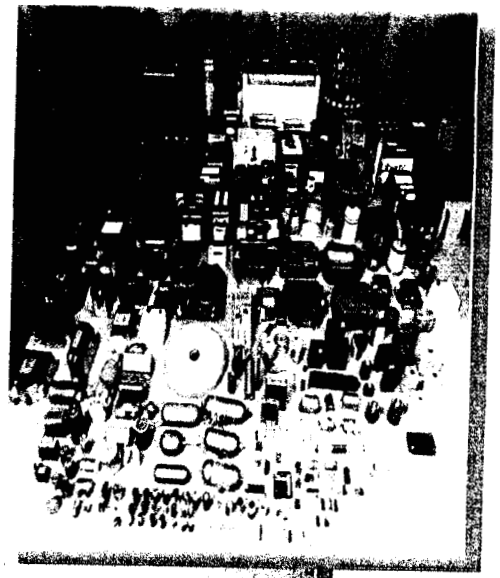
- ISEA for Marine Corps' AN/MSQ-124 and AN/TSQ-207 Communications Systems and AN/TWQ-1 Avenger/Stinger Air Defense Systems
- Design agent for the Marine Corps' Combat ID System, Communications Data Link System, and Direct Air Support Central Airborne System
- Production Engineering Agent for the Navy's Cooperative Engagement Capability
- Government's lead on the LPD-17 Amphibious Ship Commercial Technology Management Group
- Steward of Printed Wiring Boards and Radiation-Tolerant Microelectronics

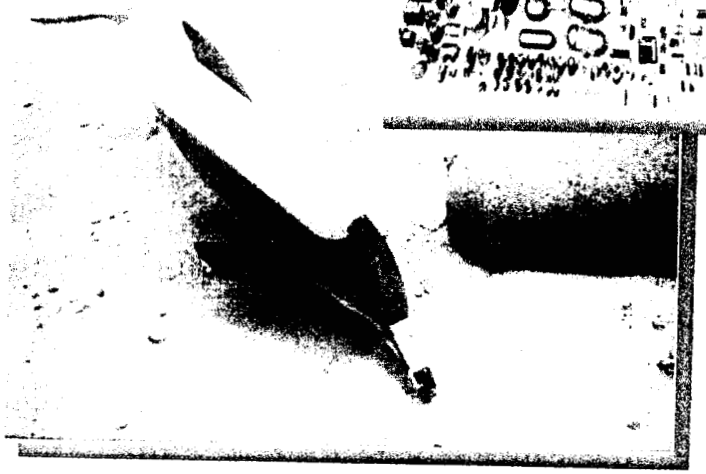
21st Century

Power Systems

- Provides expertise in batteries, fuel cells, chargers, and power supplies
- Provides power systems for submarines, submersible vehicles, shipboard systems, underwater systems, aircraft and avionics systems, tactical and strategic missiles, satellites, and space-based systems
- Provides engineering and acquisition support for batteries used by the MK-7 Marine Mammal System
- Steward for military-unique batteries

Expertise for a huge diversity of battery types and technologies





In the MK-7 Marine Mammal program, dolphins locate and tag underwater mines.

21st Century

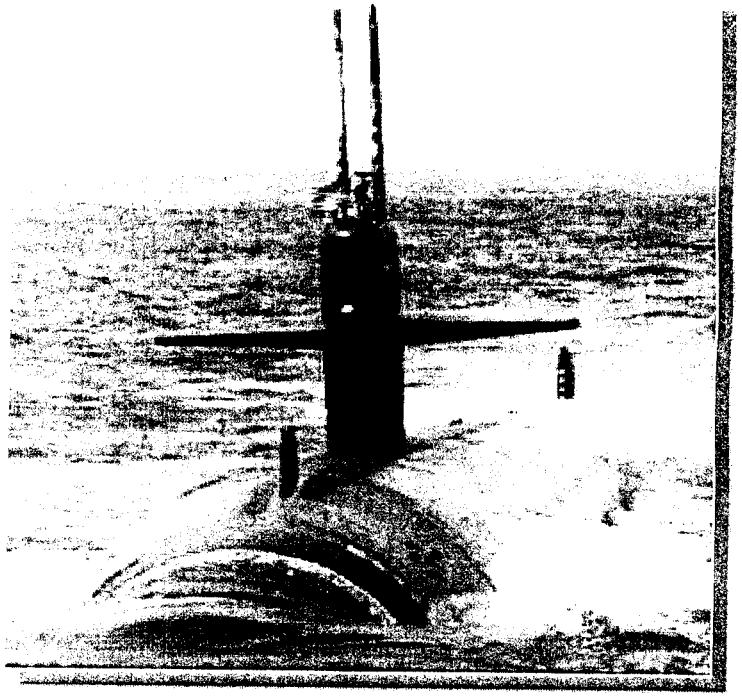
Power Systems Leader

- DoD's largest power systems activity
- Navy's Acquisition and ISEA for the main storage batteries used on submarines and in submersibles
- Technical Direction Agent for STANDARD missile batteries and for batteries used by Special Warfare Forces
- Navy's ISEA for batteries used by the SEAL delivery vehicle, the Swimmer Delivery Vehicle, and the Advanced SEAL Delivery System

21st Century

Antisubmarine Warfare Systems

- Procures all of the Navy's sonobuoys and acoustic devices used to track submarines
- Provides engineering and technical services support to air-launched antisubmarine devices, sonar systems, acoustic sensors, and the antisubmarine warfare systems used on Navy surface ships
- Has 450-acre Lake Glendora, a deep, quiet lake
  - Acoustic testing
  - Underwater explosive testing
- Has acoustic device prototype capability



Crane's expertise provides added security to U.S. submarines

Antisubmarine Warfare Systems Leader

21st Century

- ISEA for the acoustic countermeasures employed on all Navy submarines
- ISEA for Sonar Dome Rubber Windows, the WQC-2/2A and WQC-6 Underwater Communications Systems, the UYS-2/2A Navy signal processors, and the UQN-4 fathometer
- Production Sonobuoy Assistant Program Manager for Logistics
- Production Configuration Management Agent for the AN/SSQ-89(v) System

21st Century

Fleet Maintenance and Modernization

- Innovator in Distant Support Technology
- Provides expertise
  - circuit boards and power devices test and repair
  - test program sets
  - printed wiring boards
  - microelectronic components repair
  - electronic subsystems repair
  - equipment calibration and metrology
  - shipboard maintenance and support
  - component construction and failure analysis

Crane places "virtual" expert scientists, engineers, and technicians onboard ships to assist Sailors in operating, maintaining, upgrading, and repairing shipboard systems.

21st Century

Fleet Maintenance and Modernization Leader

- ISEA, Acquisition Agent, Technical Direction Agent, and Certification Agent for the Navy's Micro-miniature Electronic Repair Program
- ISEA and Post-production support manager for Navy Tactical Data Computer System

21st Century

Ordnance

- Conventional ammunition
  - Large caliber (5-inch) gun engineering and production (CAAA)
  - Small- and medium-caliber engineering and testing
- Special warfare systems

Crane is involved in small arms design, development, and testing

- Small arms
  - Pistols, rifles, sniper rifles, machine guns, anti-armor weapons
  - Maintains all Navy small arms
  - Secures and accounts for all Navy small arms
  - Overhauls, sights, test-fires, and certifies

21st Century

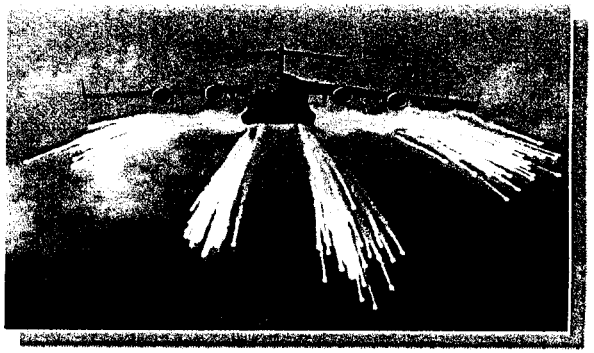
Ordnance Leader

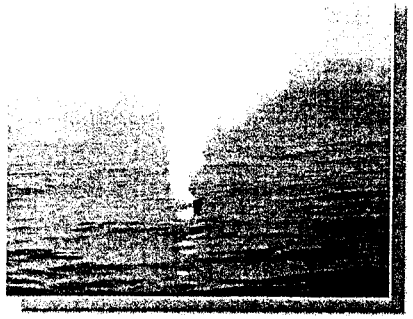
- Unique center of Ordnance expertise
  - Co-location of NAVSEA's Program Manager and ISEA for surface conventional ammunition and CAAA
- Manages NAVSEA's conventional ammunition program
  - Acquisition Agent
  - ISEA
- Hosts NAVSEA's Program Manager for Surface Conventional Ammunition
- Supplies engineering, prototyping, and acquisition expertise for special weapons requirements of U.S. Special Operations Command

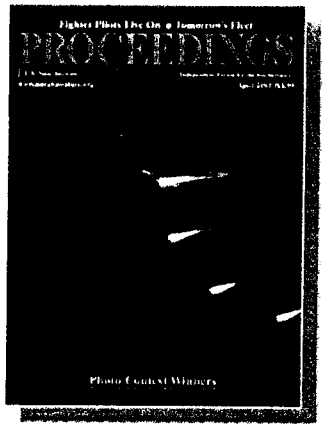
21st Century

Pyrotechnics

- Research, development, test, and evaluation (NSWC); production (CAAA)
- Designs, develops, models and simulates pyrotechnics
  - Developed EVERY infrared countermeasure in the Navy's inventory with CAAA as the manufacturer
  - Assists the Air Force in developing and acquiring infrared countermeasure devices
- Develops Navy signaling and illuminating flares







Every IR Countermeasure Device in the Fleet was developed by Crane

Pyrotechnics Leader

21st Century

- Navy's Lead Laboratory
- NAVSEA Program Manager
- NAVAIR Deputy Assistant
- NAVSEA and NAVAIR Design Agent
- DoD's designated Center for Pyrotechnics with CAAA

21st Century

High-Profile Products

ALQ-99 Airborne Electronic Warfare Systems	Used by Navy and Air Force
SLQ-32 Electronic Warfare Systems	Primary Electronic Warfare System used on all Navy combatant ships
Pyrotechnics	Essential to protecting U.S. aircraft from enemy missiles
IROS3	first automated anti-terrorism and force protection surveillance system; integrates all phases of intruder attack, from detection to engagement
Special Operations Small and Minor Caliber weapons and accessories, and AN/PVS Night Vision Goggles	Used during Private Jessica Lynch's rescue from captivity in Iraq
Radiation-tolerant electronic components	Developed by Crane and used in the Navy's strategic systems
Marine Corps Mobile Command and Control Center	Developed within 60 days for the Marines to use in Iraq from Kuwait to Baghdad
Distant Support Technology	"Virtual" maintenance assistance for ships

21st Century

Facilities at Crane

- $3.3 billion value
- $137 million invested in facilities in past 20 years
- 4 million square feet of space in operating buildings
- 10 million square feet of supply storage space
- 4.8 million square feet of storage space for explosives
- $400 million in equipment value
- Major electronics, microwave, and ordnance facilities
- Outdoor test ranges
  - Near- and far-field high-power microwave ranges
  - Above-ground, below-ground weapons test ranges
  - Pyrotechnic low-yield explosive range
  - Ordnance explosive range
- Hydro-acoustic test facilities
  - Huge pressure/temperature tanks
  - 450-acre, extremely quiet, deep lake

21st Century

Partnering with Education

- Indiana University
- Rose-Hulman Institute of Technology
- Purdue University
- University of Notre Dame
- Vincennes University
- Ivy Tech State College
- IUPUI
- Vanderbilt University
- Pennsylvania State University
- University of Missouri
- Carnegie Mellon University

Crane and higher education combine extensive resources.

21st Century

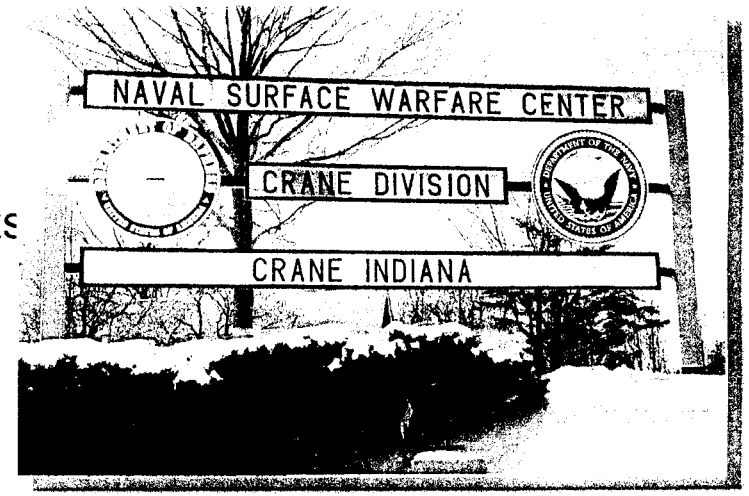
Ongoing Studies

- Enhanced Distant Support Technology (Indiana and Purdue Universities)
- Advanced state-of-the-art manufacturing for printed board circuits (Rose-Hulman)
- New fuel cell technology (Notre Dame)
- Verification of electronics reliability in high-radiation environment (IU)
- Enhanced high bandwidth video transmissions in a military environment (Purdue)
- Improved evaluations for radiation-tolerant microelectronics (Vanderbilt)
- Objective industry standard for automated testing of image tubes (Penn State)
- Optimized water jet system that cuts and demilitarizes munitions (University of Missouri)
- R&D on automated and robotic systems (Carnegie Mellon)

21st Century

Crane's Military Value [1]

- Expertise in solving technological problems of 21st Century Warfare
- Quality of workforce
- Broad-range of vital systems and products
- Speed in responding to operational requirements
- Diverse customer base
- DoD's Installation of the Year - 2002
- DoD's Valve Engineering Award - 2004
- No encroachment issues of any kind
- Lowest cost technical center
- Joint Service Tenancy and support for all Services
- Exceptional facilities and physical size



Model Defense Installation

21st Century

Crane's Military Value [2]

- Cutting-edge systems and products
  - Infrared countermeasure aircraft decoys
  - Marine Corps Mobile Command Operations Center
  - IROS3
  - Distant Support Technology
- Stewardship of critical military technologies

AEGIS Cruisers are usually the first ships on the scene during battle. Each one costs about $1 billion.
Crane's stewardship of microwave tubes results in **$6 million savings annually** *for each Cruiser.*

21st Century

CAAA

- Ordnance expert
  - Produces, maintains, renovates, stores, distributes, and demilitarizes conventional ordnance
  - Manages and processes conventional ammunition for DoD
  - Casts and presses explosive loads for ammunition, bombs, and warheads
  - Manufactures a broad range of products from small detonators and initiating devices to 40,000-pound explosive loaded with shock test charges
- 1 of only 4 Tier One Depots
  - Supplies "First Strike" ordnance for the first 30 days of any conflict
- War Reserve Ordnance supplier

A CAAA 5-inch shell

CAAA produces, renovates, distributes and demilitarizes conventional ordnance at the Crane facility.

CAAA Customers

21st Century

ordnance requirements

- ✓ Army
- ✓ Navy
- ✓ Marine Corps
- ✓ Air Force
- ✓ Coast Guard
- ✓ Department of Homeland Security

CAAA

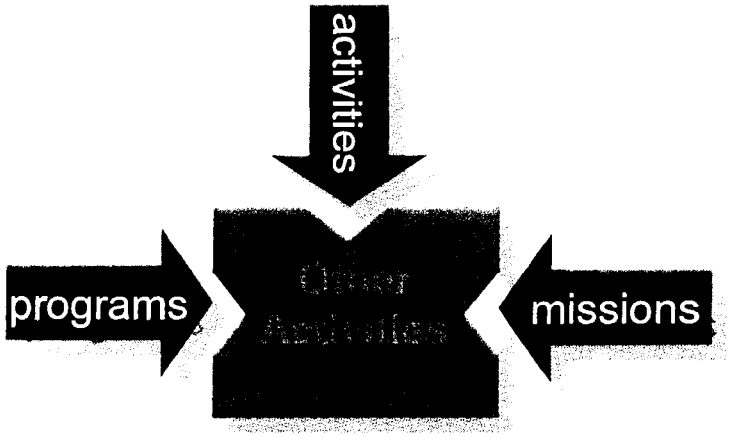
Production
Maintenance
Renovation
Storage
Distribution
Demilitarization
of conventional ordnance

Ordnance Solutions

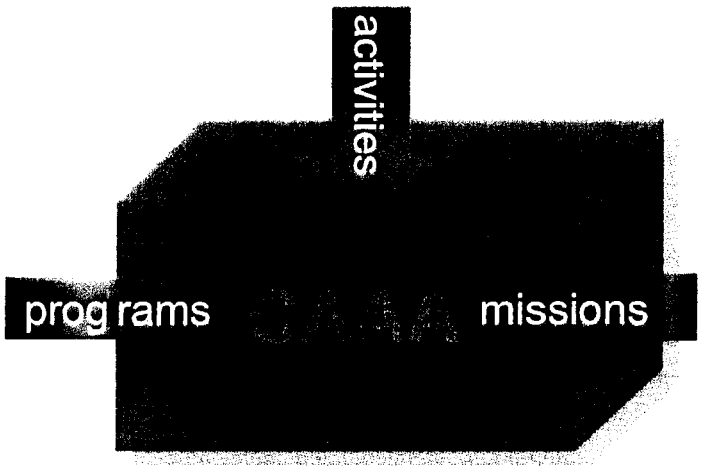
21st Century

CAAA's Military Value

- Production and distribution capabilities
  - Shipped 23,000 tons of ammo to U.S. forces in Afghanistan and Iraq
- Explosives and Pyrotechnic capabilities
- Storage Capacity
- Demilitarization expertise
- Armor survival kits manufacturing
  - Used by Coalition forces in Iraq on Humvees
- Location and size
  - Can accommodate additional missions, programs, and activities



Size and unique location enable CAAA to absorb additional missions, programs, and activities without encroachment.



21st Century

Summary

- Contributes materially to Transformation for 21st century warfare
- Positioned to be DoD's leading Technical Center in the war against terror
- Can accommodate additional missions, programs and activities on its extensive property
- Has no encroachment of any kind
- Boasts outstanding technical workforce in Joint Navy/Army activities
- Access to intellectual capital at academic institutions
- Supports all of the Services and the Department of Homeland Defense
- Responds rapidly to changing Defense and Homeland Security requirements

Ideal Defense Center for Electronics, Electronic Warfare, and Ordnance for the 21st century

THE NAVY AND ARMY COMPLEX AT CRANE, INDIANA

NAVAL SUPPORT ACTIVITY CRANE, INDIANA
NAVAL SURFACE WARFARE CENTER, CRANE DIVISION
CRANE ARMY AMMUNITION ACTIVITY

ELECTRONICS, ELECTRONIC WARFARE AND ORDNANCE
FOR TWENTY-FIRST CENTURY WAR

ENCLOSURE (2)

TABLE OF CONTENTS

NAVAL SUPPORT ACTIVITY CRANE, INDIANA 1

Introduction 1

Workforce, Workload and Facilities 1

Economic Impact of NSA Crane on Southern Indiana 2

NSA Crane's Military Value 4

NAVAL SURFACE WARFARE CENTER, CRANE DIVISION 4

Introduction 4

NSWC Crane's Workforce 6

NSWC Crane's Workload 6

NSWC Crane's Electronic Warfare Expertise 7

NSWC Crane's Radar Expertise 9

NSWC Crane's Expertise in Microwave Components 9

NSWC Crane's Expertise in Anti-Terrorism and Force Protection Technologies, Systems and Products 10

NSWC Crane's Expertise in Electronics 13

NSWC Crane's Expertise in Power Systems 15

NSWC Crane's Expertise in Antisubmarine Warfare Systems 16

NSWC Crane's Expertise in Fleet Maintenance and Modernization 17

NSWC Crane's Expertise in Ordnance 18

High Profile Systems and Products 21

Facilities at Crane 22

NSWC Crane's Partnerships with Universities 25

NSWC Crane's Military Value 27

CRANE ARMY AMMUNITION ACTIVITY 29

Introduction 29

CAAA's Workforce 30

CAAA's Workload 30

CAAA's Military Value 31

CONCLUSION 31

THE NAVY AND ARMY COMPLEX AT CRANE, INDIANA

NAVAL SUPPORT ACTIVITY CRANE, INDIANA
NAVAL SURFACE WARFARE CENTER, CRANE DIVISION
CRANE ARMY AMMUNITION ACTIVITY

ELECTRONICS, ELECTRONIC WARFARE AND ORDNANCE FOR TWENTY-FIRST CENTURY WAR

NAVAL SUPPORT ACTIVITY CRANE, INDIANA

Introduction

Naval Support Activity Crane, Indiana ("Crane"), occupies about 100 square miles of land in south central Indiana. As a result, it is the Department of the Navy's third largest base. There is no encroachment of any kind at Crane, and there are no restrictions imposed by residential, urban, industrial or commercial activities. Additionally, Crane is well-served by airports, railroad lines and highways, and will in the future be served by Interstate Highway 69, which was recently approved by the Federal Highway Administration. This highway will provide direct access to Crane as part of an intercontinental highway from Mexico to Canada that will also give Crane increased access to east-west highways. Consequently, Crane has virtually unlimited potential to expand its workload and operations.

Crane hosts two important activities: Naval Surface Warfare Center, Crane Division, a component of the Naval Surface Warfare Center and the Naval Sea Systems Command based at The Washington Navy Yard in Washington, D.C. ("NSWC Crane"); and Crane Army Ammunition Activity, a component of the Department of the Army's Joint Munitions Command, based in Rock Island, Illinois ("CAAA"). About 3,700 Navy civilians and 700 Army civilians are employed at Crane. There are three central missions carried out by these activities: electronics, electronic warfare, and ordnance.

Workforce, Workload and Facilities

There are about 1,000 engineers and scientists, 1,000 electronic, mechanical and chemical technicians, 1,200

artisans, and 1,200 administrative and support personnel on the base. In addition, several hundred contract engineering support personnel and personnel from the fourteen universities with which NSWC Crane has relationships work at the base.

There are, in effect, two functionally integrated "campuses" at Crane. There is an "electronic campus" comprising the activities of NSWC Crane and characterized by sophisticated electronic and electronic warfare laboratories and test and maintenance shops and ranges. And there is an "ordnance campus" comprising the activities of NSWC Crane and CAAA, composed of engineering and test and evaluation facilities, traditional ordnance production lines, distribution facilities, and storage facilities. This mix of electronics and ordnance expertise and facilities has made Crane a unique resource for integrating technology in modern "smart weapons."

Nearly 2,000 scientists, engineers and technicians work on the base, most of them at NSWC Crane. Thus, Crane hosts one of the State of Indiana's largest high technology employers. With the addition of about 2,400 other civilian and military personnel, Crane hosts the twelfth largest single-site employer in the State.

Crane supplies this technical workforce with modern facilities for their state of the art test equipment and with extensive test ranges. In addition, Crane provides its tenants with about 10 million square feet of storage space. The Army Ammunition Activity uses another 4.8 million square feet of explosive storage space at Crane to store ordnance, about 20 per cent of the entire ordnance storage capacity of the Department of Defense. This broad range of expertise, technologies, facilities, and capabilities makes Crane truly a Joint Service "Product Center" for critical military products that are essential to the warfighter.

The Economic Impact of Crane on Southern Indiana

Crane and its tenants are the second largest employers in southern Indiana in terms of the number of employees who work on the base. In terms of income, they are the largest employers in southern Indiana. Crane offers prospective employees a wide range of careers and a comparatively high wage rate for the region. Thus, it attracts people from

more than 30 counties from Indianapolis to the Ohio River. Crane is the major engineering center in Indiana and plays a leading role in transforming Indiana's economy from a manufacturing base to a knowledge-based economy.

Crane is located in a low-population area of southern Indiana. As a result, it has a very substantial and even disproportionate economic impact on the region. In addition to the direct employment of 4,522 civilians on the base, there is indirect employment of 3,567 and, thus, a total of 8,089 jobs with wages of $368 Million that depend upon Crane. Furthermore, Crane has contracts with Indiana firms that amount to about $101 Million. Crane's daily economic impact on the State of Indiana is $1.3 Million, and its annual economic impact on the State is $475 Million.

The dominant economic importance of Crane to southern Indiana is evident in the proportion of wages that depend upon Crane. In Martin County, 37 per cent of all wages in the county ($47 Million) are derived from activities at Crane. In Green County, 26 per cent of all wages in the county ($67 Million) are derived from activities at Crane. In Davies County, 14 per cent of all wages in the county ($47 Million) are derived from activities at Crane. In Lawrence County, 12 per cent of all wages in the county ($70 Million) are derived from activities at Crane.

Without these wages from activities at Crane, the cities and towns near the base would be devastated. For example, 67 per cent of the wages in Loogootee are derived from activities at Crane; 46 per cent of the wages in Bloomfield are derived from activities at Crane; and 18 per cent of the wages in Bedford are derived from activities at Crane.

The activities at Crane also have an impact throughout the Nation. In 2003, companies in all fifty states had contracts with the activities at Crane. The highest concentrations of these contracts were with companies in Indiana, Virginia, California, Florida, Pennsylvania, New York and Massachusetts. There were also a significant number of contracts with companies located in Ohio, Illinois, Texas and Arizona.

NSA Crane's Military Value

Crane's location in a low-population area of southern Indiana that is well-served by air, rail and highways and its physical asset of 63,000 acres of land with virtually unlimited water and sewer capacity, electric power, and natural gas resources create a unique environment within which the Department of the Navy and the Department of the Army can conduct activities that are vital to the Nation's security without the constraints that many other locations would impose on these important military missions. This factor alone endows NSA Crane with high military value.

NAVAL SURFACE WARFARE CENTER, CRANE DIVISION

Introduction

Naval Surface Warfare Center, Crane Division, a component of the Naval Surface Warfare Center and, in turn, the Naval Sea Systems Command, both based at The Washington Navy Yard, is the Department of the Navy's largest Technical Center. Its broad-ranging capabilities and expertise in electronic warfare, electronics and ordnance and the depth of its experience in developing systems and products tailored specifically for the operational forces make NSWC Crane the most diverse of the Department's Technical Centers.

NSWC Crane maintains unrivaled expertise in electronic warfare, anti-terrorism and force protection technologies and products, electronics, and ordnance. Its customers are the United States Navy, the United States Marine Corps, the United States Army, the United States Air Force, the United States Special Operations Command, the National Guard, civilian agencies within the Department of Defense, the Department of Homeland Defense, other Federal agencies, and State and local law enforcement agencies.

NSWC Crane supplies an extraordinary range of facilities and test ranges that provide its scientists, engineers and technicians with the widest range of opportunities to evaluate technology, design military applications for it or adapt it for military uses, and then test those applications in realistic environments created on the Crane property in southern Indiana.

These facilities include anechoic chambers that can accommodate complete radar and electronic warfare systems, with their antennas; acoustic test facilities with high pressure tanks; an extremely quiet 450-acre, deep water lake with underwater explosive test capabilities; a wind tunnel to test airborne electronic warfare equipment; complete environmental facilities that permit testing for the effects on equipment of vibration, shock, altitude, temperature, humidity, salt fog, dust and acceleration; extensive laboratories for conducting chemical analyses, materials analyses, and mechanical component analyses of electronic equipment and ordnance; a linear accelerator to test and verify radiation-hardened electronic components; the most comprehensive and modern printed circuit board facility in the Department of Defense; laboratories for developing, testing, certifying and repairing chemical and biological warfare detection equipment; a facility, including Class 100 clean rooms, for working on and calibrating night vision devices and electro-optic equipment; and a unique facility for high-power density battery stress testing that will contain an explosion of ten pounds of TNT-equivalent explosive force.

NSWC Crane's test ranges include pyrotechnic ranges for testing signals, markers and flares; microwave near and far field test ranges for testing radars and electronic warfare equipment; and small and minor caliber weapons test ranges.

In addition to the facilities and ranges on site at Crane, NSWC Crane and the Indiana National Guard at nearby Camp Atterbury in central Indiana entered into a Memorandum Of Understanding ("MOU") that allows each to use the other's facilities and ranges. This MOU supplies NSWC Crane with additional explosives ranges to test pyrotechnic countermeasure equipment and airborne weapons systems. Similarly, it provides Camp Atterbury with a much larger area within which it can conduct training exercises.

NSWC Crane designs, develops, manufactures, acquires, tests, evaluates, maintains, repairs, and, upon the expiration of their service lives, disposes of a broad range of products that are essential to the operational forces of the Defense Department and to the Department of Homeland Security. NSWC Crane carries out these missions by providing engineering, maintenance and logistics expertise and acquisition support to its customers.

Additionally, it serves as a steward of the Nation's industrial base, ensuring that critical military equipment such as microwave components for radars, pyrotechnics, batteries, radiation-hardened electronics, airborne and shipboard electronic warfare equipment, and printed circuit boards remain available in the absence of a commercial demand for them.

NSWC Crane's Workforce

Naval Surface Warfare Crane employs about 3,700 civilians. About 25 per cent are scientists and engineers. They design, develop, analyze and provide solutions to technological problems confronted by the operational forces. About 26 per cent are electronic, mechanical and chemical technicians who test and maintain NSWC Crane's systems and products around the world. About 20 per cent of its workers are artisans who either manufacture and repair systems and products or are engaged in base operating support activities.

About 16 per cent are administrative personnel. About 6 per cent are professionals such as lawyers, physicians, contract specialists and environmental managers. About 3 per cent are logistics specialists, and about 5 per cent fall into other categories of activity.

NSWC Crane's Workload

Naval Surface Warfare Center Crane's 2003 workload amounted to about $1.3 Billion. About 30 per cent of that work ($391.3 Million) originated from Program Executive Offices ("PEO") associated with the Naval Sea Systems Command. About 7 per cent of its work (($92.3 Million) originated from the Naval Sea Systems Command itself.

About 12.7 per cent of its work ($165.7 Million) originated from PEO's associated with the Naval Air Systems Command. About 3.8 per cent of its work ($48.8 Million) originated from the Naval Air Systems Command itself.

About 8 per cent of its work ($105.3 Million) originated from the Naval Supply Systems Command. About 5.4 per cent of its work ($70.2 Million) originated from the Marine Corps. About 5 per cent of its work ($65 Million) originated from Navy Strategic Systems. And about 8.6 per cent of its work ($111.8 Million) originated from

other Navy commands such as the Office of Naval Research, the Naval Facilities Engineering Command, and Fleet units.

NSWC Crane also performed work in 2003, for agencies outside the Department of the Navy. About 10 per cent of its work in 2003 ($130 Million), originated from the Department of the Air Force. About 5.6 per cent of its work that year ($72.8 Million) originated from the Department of the Army. Other Federal agencies, State Government agencies, and private parties accounted for the remaining 1.7 per cent ($22 Million) of NSWC Crane's workload in 2003.

The following sections describe NSWC Crane's workload in terms of the particular areas of expertise that are present at the Center.

NSWC Crane's Electronic Warfare Expertise

Naval Surface Warfare Center, Crane Division, is the Department of Defense's most comprehensive electronic warfare center. NSWC Crane supplies DoD with the complete capability to design, develop, test and evaluate, certify, acquire, maintain, improve and supply to operational forces airborne and shipboard electronic warfare systems ("EW"). Its expertise covers all aspects of EW systems, including their electronic, microwave and antenna subsystems.

NSWC Crane supports the airborne electronic warfare systems on board Navy and Marine Corps aircraft, such as the AN/ALQ-99, in a variety of ways. It maintains, repairs and overhauls the electronic components of EW systems employed on these aircraft. It develops automated test equipment and test program sets for these systems. It provides in-service engineering to aviation units with EW systems on board their aircraft. It develops interactive technical manuals for the operation, maintenance and repair of EW systems. It designs, tests and evaluates software for the electronic and mechanical components of EW systems. It manages obsolescence of these systems. And it supplies on-site EW system support at Navy and Marine Corps air stations throughout the world.

The Navy and Marine Corps aircraft that carry EW systems and thus depend upon NSWC Crane's expertise and resources are the EA-6B Prowler, whose mission is to jam enemy radar facilities before Attack and Fighter aircraft

enter the theater; the P-3 Orion aircraft and its electronic variant, the EP-3E, whose missions are to conduct surveillance and reconnaissance; the F/A-18 Hornet, the primary Fighter and Attack aircraft of the Navy and the Marine Corps; and the F/A-18G Growler aircraft, which will replace the EA-6B as the primary EW aircraft to be used by the Navy and the Marine Corps in the future.

NSWC Crane also provides the primary EW support for the EA-6B EW system equipment that the Air Force employs in its electronic warfare aircraft. Additionally, it provides support for the EW systems on board the Unmanned Aerial Vehicles ("UAV") such as Pioneer and Global Hawk that will be deployed increasingly in modern warfare and Broad Area Maritime Surveillance operations.

Similarly, NSWC Crane supports the electronic warfare systems on board Navy Cruisers, Destroyers and Frigates. It performs acceptance testing of shipboard EW systems. It develops technical data packages for these EW systems and improvements to them. It manages the configuration of EW systems on board these surface ships. It provides logistics support for these systems. It initiates changes and upgrades to these systems. It provides software improvements to the EW systems. It conducts failure analyses of these systems. It restores EW systems for use on board new ships. And it provides on-site training and technical assistance for shipboard crews in the operation, maintenance and repair of EW systems.

The surface ship electronic warfare systems that NSWC Crane supports include the AN/SLQ-32(V) Surface Electronic Warfare System; the AN/WLR-1H(V) Electronic Surveillance System; the AN/SSQ-82(V) Electronic Emissions Control System; the AN/SLA-10B Blanking System; the AN/ULM-4 Surface Electronic Warfare System; the NULKA Electronic Decoy; the GIANT Infrared Decoy; the AN/SLQ-49 RUBBER DUCK Decoy; and the NATO Seagnat Super Rapid Blooming Offboard Chaff System and Training Decoys.

NSWC Crane serves as the Department of the Navy's representative to the Surface Ship Electronic Warfare Improvement Program and as Deputy Program Manager for Surface Electronic Warfare Systems and Decoys. It is also the Navy's Depot Maintenance Activity and Software Support Activity for Surface Electronic Warfare Systems and Decoys.

NSWC Crane's Radar Expertise

Naval Surface Warfare Center Crane is the Department of the Navy's Depot Maintenance Activity for all of the radars on board all Navy Cruisers, Destroyers and Frigates. These include the air search radars, the surface search radars, and the navigation radars on board these warships.

NSWC Crane develops and reviews specifications for shipboard radars and their related technical data packages and provides total radar system design services. It performs acceptance testing of radar equipment and it manages the configuration of radar equipment on board surface combatant ships. It provides logistical support for the radar systems on board these ships and it repairs radars, antennas, radar simulation and radar stimulator equipment. It conducts failure analyses of radar systems, and it provides "end of life" manufacturing for radar equipment. NSWC Crane also conducts on-site training for shipboard crews in the operation, maintenance and repair of radar systems.

NSWC Crane is the Department of the Navy's Acquisition Agent for Radar Systems and serves as Deputy Program Manager for Radar Systems and Program Manager for the Navy's Radar Restoration Program. It also serves as the Lead for the Navy's Source Selection Team for New Navy Radar Development.

NSWC Crane is also the Navy's In-Service Engineering Agent for shipboard training systems that rely upon radars. These include the Battle Force Tactical Trainer, the Virtual At Sea Trainer, the Navigator Simulator, and the Training Stimulator Simulator System. It also provides in-service engineering for the Marine Corps' AN/TPS-63B Radar.

NSWC Crane's Expertise in Microwave Components

Naval Surface Warfare Center Crane is the technical and acquisition engineering resource for the Department of the Navy, which is DoD's Executive Agent for the Microwave Vacuum Devices that are used in Radar and Electronic Warfare systems. NSWC Crane is also responsible for ensuring that these devices remain available within the industrial base of the United States.

NSWC Crane repairs and rebuilds microwave vacuum devices. It tests and evaluates these devices and it qualifies and certifies them. It also converts low power vacuum amplifiers to solid state devices. It supplies in-service engineering and acquisition engineering services. It performs reliability and failure analyses and implements corrective actions. And it develops new products.

The radar systems that rely upon NSWC Crane's expertise in microwave components include the phased array radars on board ships; the shipboard detection and fire control radars; the navigation radars on ships; the airborne fire control systems; the airborne jamming radars used by the Air Force; the detection radar systems used by the Marine Corps; and land-based communications radars.

NSWC Crane provides in-service engineering for the microwave tubes used in the AEGIS System on board combatant ships and in-service engineering acquisition expertise for the microwave components of the Navy's surface search radars. NSWC Crane hosts the Tri-Service Cathode Ray Life Test Facility and was designated as the Overhaul Point for microwave components by the Navy Inventory Control Point.

NSWC Crane's Expertise in Anti-Terrorism and Force Protection Technologies, Systems and Products

Naval Surface Warfare Center Crane is a leader in the Department of the Navy's efforts to develop technologies, systems and products to counter terrorism and to protect its forces. Many of the technologies and products that NSWC Crane employs in military applications can be transferred to systems that protect commercial ships, ports, shore facilities and personnel from terrorist attacks. Although developed initially for use in traditional military operations, they are readily adaptable for use against terrorist operations against commercial interests.

These NSWC Crane products include commercial and military radar systems; sonar systems; optical systems; infrared systems and night vision systems that can detect the presence of intruders. They also include pyrotechnic flares, search lights and sound systems that can illuminate, identify and warn intruders. They include systems that detect the presence of chemical, biological, explosive and metal agents by analyzing materials and

vapors emitted by those materials. And they include small caliber and minor caliber weapons, hard and stabilized weapons mounts, and fire control systems for engaging intruders.

NSWC Crane is expert in Defense Security Systems. Thus, the Department of Defense selected NSWC Crane as the System Integrator for its ten-year renovation of the Pentagon. And NSWC Crane is known as the "locksmith of the Navy" because it acquires, issues and provides engineering and installation support for all of the Navy's high-security locks and keys. These are the locks and keys used to maintain the security of arms, ammunition and explosives at Navy installations and on Navy ships around the world.

NSWC Crane designs and develops security systems and specializes in force protection engineering, including the standardization and interoperability of these systems. It develops modeling and simulation of security systems; acquires and installs security systems; maintains and repairs high-security locking systems; and provides on-site training and assistance in the operation and maintenance of these systems. The security systems consist of electronic bollards and gates; closed circuit television systems; biometric systems; badging systems; personnel alerting systems; high-security locking devices; wireless voice and data communications systems; access control systems; intrusion detection systems; weapons storage systems, including portable armories; shipboard security systems; and command, control and communications systems.

NSWC Crane is the Department of Defense's Center of Expertise for Badging and the Department of the Navy's Engineering Agent for Badging and Access Control Systems. NSWC Crane is also the Department of the Navy's Acquisition and In-Service Engineering Agent for Shipboard Wireless Communications.

NSWC Crane is also expert in night vision devices and electro-optics devices. Indeed, it is the only DoD activity that provides full life-cycle support for night vision and electro-optics devices.

NSWC Crane provides engineering and acquisition expertise in the various applications of electro-optics. It provides contract expertise for particular products, components and services. It has substantial experience

integrating and installing electro-optics systems. It performs acceptance testing of electro-optics systems, failure analyses of these systems, and repair and upgrading of electro-optics systems and it provides in-service engineering and full life-cycle support for electro-optics systems. It also evaluates the safety of laser systems and certifies those systems.

NSWC Crane provides similar services for the night vision goggles used in aircraft, night vision devices and lasers used by special warfare forces, night vision devices used on board ships, remote surveillance systems, multi-sensor systems used on aircraft, laser systems used on aircraft, Army avionics systems, and man portable thermal imagers.

NSWC Crane is the Navy's Program Manager for Man Portable Night Vision Electro-Optic Equipment. It is the Depot Maintenance Activity for tactical night vision goggles, laser markers used by Special Operations Forces, Navy Special Warfare night vision devices, the night vision devices on board Navy ships, and the console display system employed on the Army's OH-58D Kiowa helicopter.

NSWC Crane is the Navy's Acquisition Engineering Agent for the Night Vision Equipment used by Navy Special Warfare Forces and for the Navy's Forward Looking Infrared Systems. It is also the Navy's In-Service Engineering Agent for night vision devices, for Special Warfare Forces' night vision equipment, for night vision sights mounted on the masts of Navy ships, and for the Ground Weapons Night Vision Equipment used by the Marine Corps.

NSWC Crane is also expert in systems that detect the presence of chemical and biological warfare agents and it serves as the Navy's life-cycle manager for chemical and biological warfare detection systems. Thus, NSWC Crane is engaged in the development and improvement of technologies that detect the presence of chemical and biological agents.

NSWC Crane develops and reviews specifications for chemical and biological detection systems. It prepares technical data packages and performs acceptance testing of these systems. It provides contracting expertise for acquisition of the systems and installs and manages them. It initiates and implements engineering changes to chemical and biological detection systems and provides logistical

support for them. It also conducts failure analyses of these systems and installs new technologies in existing systems. NSWC Crane provides on-site training for shipboard personnel in the operation and maintenance of chemical and biological detection systems and supplies an Alteration and Installation Team for all chemical and biological detection systems on board Navy ships. It also tracks equipment that requires a radioactive material permit.

NSWC Crane is the Navy's Depot Maintenance Activity for its chemical and biological detection systems. It also serves as the Navy's representative on DoD's Joint Service Chemical/Biological Warfare Detection Integrated Product Team.

A recent example of NSWC Crane's innovative approach to countering terrorism is the IROS3 System. Drawing upon its expertise in radar, night vision devices, electro-optics and weapons, NSWC Crane developed the Integrated Radar, Optical, Surveillance, and Sighting System, known by the acronyms IROSSS or IROS3. This system substantially enhances the force protection measures available to Navy ships while they are in port. It enables ships to detect, identify and engage threats to the safety of the ship through the use of radar, night vision devices, electro-optics and weapons systems and is currently being installed on Navy ships. Developed in response to the terrorist attack on the USS Cole in Yemen in the fall of 2000, this system is also adaptable for use in protecting commercial ships and ports against terrorist attacks. Thus, IROS3 is a striking example of the contribution that NSWC Crane can make to Homeland Security as well as to National Security.

Many of the systems and products developed at NSWC Crane to counter terrorist threats to U.S. military forces are readily adaptable for use in Homeland Defense missions. Consequently, NSWC Crane's expertise can also serve to inform the Department of Homeland Defense as it considers technologies, systems and products for deployment in the defense of the United States against terrorist attacks.

NSWC Crane's Expertise in Electronics

The scientists, engineers and technicians at Naval Surface Warfare Center Crane are engaged in a broad array

of systems and products that highlight the Center's expertise in electronics.

The most recent example of NSWC Crane's expertise in electronics is its development of an Expeditionary Warfare System for the Marine Corps. This ground-based mobile electronics system consists of command, control and communications systems integrated on a mobile platform that is currently being used by the Marine Corps in Iraq.

For the Expeditionary Warfare Systems, NSWC Crane developed specifications and technical data packages for the ground-based systems; provided contracting expertise for acquiring electronic products; established communications and data links; installed the systems and provided field support for them, including the development of engineering modifications to the systems; developed and maintained the software associated with these systems; and ensured the interoperability of the various systems.

NSWC Crane does additional work for the Marine Corps. It is the In-Service Engineering Activity for the Marine Corps AN/MSQ-124 and AN/TSQ-207 Communications Systems and for its AN/TWQ-1 Avenger/Stinger Air Defense Weapons Systems. NSWC Crane is also the Design Agent for the Marine Corps' Combat Identification System, Communications Data Link System, and Direct Air Support Central Airborne System.

NSWC Crane is the Navy's expert on the application of "Commercial Off-The-Shelf" electronic technology ("COTS") for use on board ships. Thus, NSWC Crane has advised the Navy on the use of COTS in electronics systems as diverse as the AEGIS Combat System, the Cooperative Engagement Capability, Shipboard Defense Systems, Close Quarters Combat Range Training Systems, Circuit Cards, Local Area Networks, and Workstations.

In particular, NSWC Crane supplies design and integration engineering services, cost modeling and estimation services, product engineering, open system engineering and life-cycle management for commercial products adaptable for use in military applications, including commercial information technology. It develops specifications and technical data packages; assembles commercial electronic technologies for use on board Navy ships; and manages their obsolescence. Through the use of application engineering and refreshing and inserting new

technologies, NSWC Crane plans and manages the use of COTS technologies on Navy ships.

As a result of its expertise in electronics, NSWC Crane is the Production Engineering Agent for the Navy's Cooperative Engagement Capability and is the Government's Lead on the LPD-17 Amphibious Ship Commercial Technology Management Group. It is the Design and In-Service Agent for the Close Quarters Combat Range Training Systems and it chairs the Naval Sea Systems Command's COTS Steering Board. NSWC Crane is the Center of Technical Expertise for Diminishing Manufacturing Sources and serves as the United States representative to NATO's Standardization and Electronic Engineering Group. NSWC Crane also serves as Chair of the Ships Advanced Technology Team.

NSWC Crane is also engaged with systems, products and materials that are used in the Navy's strategic systems and, thus, require a high degree of reliability. These strategic systems include guidance systems, missile systems, fire control systems, navigation systems, and GPS systems that require electronic components that can tolerate radiation.

NSWC Crane provides design modeling and simulation services for strategic systems, including the design of radiation-resistant electronics. It also designs highly reliable microelectronics. Additionally, it applies and integrates COTS technologies for use in strategic systems. NSWC Crane's expertise in strategic systems extends to systems engineering, inertial sensors, testing of the electronics on board satellites and missiles for their tolerance to radiation, verification of radiation-hardened components, failure and material analyses, analysis of destroyed components, and the integration of GPS receivers into various other electronics systems.

NSWC Crane is a leader in developing radiation-tolerant electronics and integrating COTS into strategic systems. As a result, the Navy's Strategic Systems Project Office calls NSWC Crane when it has a problem with electronics.

NSWC Crane's Expertise in Power Systems

Naval Surface Warfare Center Crane is the Department of Defense's largest power systems activity, providing

expertise in batteries, fuel cells, chargers and power supplies. These power systems are used in submarines, submersible systems such as unmanned undersea vehicles, underwater systems, shipboard systems, aircraft and avionics systems, tactical and strategic missiles, satellites and space-based systems, special warfare equipment, land and sea mines, torpedoes, electric and hybrid vehicles, smart munitions, navigation systems, communications systems, life support and survival systems, surveillance and intelligence systems, ground support equipment, and power generation systems.

NSWC Crane defines requirements and, through applied research, ensures that the power system products satisfy those requirements. It moves the power system products from design to production and ensures standardization of these products. NSWC Crane then serves as the Acquisition and Source Selection/Evaluation Authority for Power Systems. In particular, it evaluates battery technologies for suitability in military applications. Thus, NSWC Crane tests and evaluates power systems and provides production engineering as well as in-service engineering services for power systems. It also supplies logistical support for power systems and maintains and repairs those systems. Additionally, NSWC Crane demilitarizes power systems when required.

NSWC Crane is the Navy's Acquisition and In-Service Engineering Agent for the Main Storage Batteries used on submarines and submersibles. It also serves as the Technical Direction Agent for the STANDARD Missile batteries and for batteries used by Special Warfare Forces. NSWC Crane is the Navy's In-Service Engineering Agent for batteries used by the SEAL Delivery Vehicle, the Swimmer Delivery Vehicle, and the Advanced SEAL Delivery System. It also provides engineering and acquisition support for the batteries used by the MK-7 Marine Mammal System and the MK-98 Mine Neutralization Charge that was used successfully in recent mine clearing operations in Umm Qasr, Iraq.

NSWC Crane's Expertise in Antisubmarine Warfare Systems

Naval Surface Warfare Center Crane is responsible for procuring all of the Navy's sonobuoys, the acoustic devices that are used to track enemy submarines. It also provides engineering and technical services that support air-

launched antisubmarine warfare ("ASW") devices, sonar systems, acoustic sensors, and the antisubmarine warfare systems employed on board the Navy's surface vessels.

In particular, NSWC Crane develops specifications and technical data packages; provides contracting expertise for acquiring ASW products and services; conducts acceptance testing of new ASW systems; repairs acoustic devices; and initiates and implements engineering modifications to ASW systems. It also supplies logistical support for ASW systems and provides on-site training and assistance for the crews of Navy ships. When required, NSWC Crane performs failure analyses of ASW products. NSWC Crane is also one of the few facilities capable of manufacturing cables and harnesses and evaluating their capability to function reliably at great ocean depths.

NSWC Crane is the Navy's In-Service Engineering Agent for the Acoustic Countermeasures employed on board all of the Navy's submarines. It is also the In-Service Engineering Agent for Sonar Dome Rubber Windows, for the WQC-2/2A and WQC-6 Underwater Communications Systems, for the UYS-2/2A Navy Signal Processors, and for the UQN-4 Fathometer. Additionally, NSWC Crane serves as the Production Sonobuoy Assistant Program Manager for Logistics and as the Production Baseline Configuration Management Agent for the AN/SSQ-89(V) System.

NSWC Crane has extraordinary hydro-acoustic test facilities that consist of huge pressure/temperature tanks and a 450-acre, quiet lake. Lake Glendora supplies NSWC Crane with the capability to perform explosive tests underwater, and there is no public access to this lake.

NSWC Crane's Expertise in Fleet Maintenance and Modernization

Naval Surface Warfare Center Crane is known as the innovator in "Distant Support Technology." This technology places scientists, engineers and technicians "virtually" at the side of Navy Sailors engaged in operating, maintaining, repairing and upgrading electronic and other equipment on board their ships.

NSWC Crane provides expertise on testing and repairing circuit boards and power devices; test program set development; the design and manufacture of printed wiring

boards; reverse engineering of circuit boards; automated test and isolation of faults; repair of microelectronic components; maintenance of support equipment; calibration and metrology of equipment; assessment of the condition of equipment and its interoperability; reutilization of products; and shipboard maintenance and support.

NSWC Crane is the Navy's In-Service Engineering Agent, Acquisition Agent, Technical Direction Agent, and Certification Agent for the Navy's Micro-Miniature Electronic Repair Program, which is used by all Navy ships to repair electronics systems at sea. It is also the Navy's Post-Production Support Manager and In-Service Engineering Agent for the Navy Tactical Data Computer Systems.

As discussed above, NSWC Crane is the Navy's Distant Support Innovation Laboratory and a leader among the Military Departments in bringing this technology to the battlefield. NSWC Crane has demonstrated that substantial savings in time and money can be achieved by "virtually" positioning technical experts from the shore-based laboratories and Technical Centers next to Navy technicians on board ships and aircraft around the world. And it continues to pursue improvements in this vital capability through research and development partnerships with Purdue University and Indiana University.

NSWC Crane's Expertise in Ordnance

Naval Surface Warfare Center Crane has unparalleled expertise in the conventional ammunition employed on board surface vessels; in small arms; and in the pyrotechnics that are used on ships for signaling and on aircraft as infrared countermeasures against missiles fired at them. Moreover, NSWC Crane hosts the Navy's Program Manager for Surface Conventional Ammunition and the Army's Crane Army Ammunition Activity, making Crane a unique joint center of ordnance expertise.

In addition to hosting the Navy's Program Manager for Surface Conventional Ammunition, NSWC Crane serves as the Naval Sea Systems Command's ("NAVSEA") Acquisition and In-Service Engineering Agent for Surface Conventional Ammunition.

NSWC Crane is engaged in the design, development, modeling and simulation of surface conventional ammunition. It evaluates the quality of this ammunition, assesses various products, determines requirements, provides logistical support, investigates malfunctions, and analyzes safety issues. It also supplies demilitarization services and disposes of ammunition, explosives and other dangerous items.

NSWC Crane's work in conventional ordnance supports the surface ships of the Navy and conventional ordnance launched from Navy and Marine Corps aircraft. It also supports Marine Corps ammunition and Navy and Marine Corps Special Warfare Systems. NSWC Crane provides similar services for the Marine Corps' Air Defense and Anti-Armor Missiles and Land Mine Countermeasures Systems.

NSWC Crane also plays a central role in the Navy's small arms program, which has become even more important in light of the threat of terrorist attacks against U.S. forces. In response to that threat, the Navy now requires all shipboard personnel to train in the use of small arms.

All of the Navy's small arms are overhauled, sighted, test-fired, and certified by NSWC Crane. Additionally, it secures and accounts for all of the Navy's small arms. These consist of pistols, rifles, sniper rifles, special applications sniper rifles, machine guns, crew-served weapons, anti-armor weapons, weapon accessories components, and small arms ammunition.

NSWC Crane is engaged in the design and modeling of small arms. It develops and reviews specifications and technical data packages for small arms. It fabricates prototypes and limited production small arms. It conducts functional and environmental testing of small arms. It certifies the safety of small arms. It repairs and modifies small arms. It supplies inventory and logistical management for small arms. And it disposes of small arms.

NSWC Crane serves as the Navy's Program Manager for the M4 Carbine Accessories Kit, the Advanced Lightweight Grenade Launcher, the Special Operations Peculiar Modification, and Special Operations Forces Weapons. It is also the Navy's In-Service Engineering Agent for Small Arms. NSWC Crane is the Navy's Intermediate and Depot Maintenance Activity for Small Arms.

NSWC Crane also provides services to the United States Special Operations Command based at Mac Dill Air Force Base in Tampa, Florida. In particular, NSWC Crane supplies engineering, prototyping, and acquisition expertise for the special weapons requirements of that Command. For example, NSWC Crane provides accessories that enhance the efficacy and survivability of special operations forces through increased weapons performance, better target acquisition, precision aiming, and noise and flash suppression.

A detachment of United States Coast Guard personnel is also resident at NSWC Crane. With technical oversight and facilities provided by Crane, this Detachment repairs the Coast Guard's small arms.

NSWC Crane is the Navy's expert in pyrotechnics, which are used on board all Navy and Marine Corps aircraft and on all Navy ships and submarines. NSWC Crane designs and develops pyrotechnics. It models and simulates pyrotechnics. It assesses pyrotechnic products and provides field support for military units that employ pyrotechnic products.

The Navy and the Marine Corps use pyrotechnics in several ways. They are used as infrared countermeasures to distract missiles fired by enemies at U.S. aircraft. They are used as smokes and obscurants. They are used as signals and markers. And they are used as submarine signals.

Every expendable infrared countermeasure in the Navy's inventory was developed at NSWC Crane, and it is now helping the Air Force develop and acquire infrared countermeasure devices. After NSWC develops these countermeasures, they are produced at Crane by the Army Ammunition Activity. These countermeasure devices were critical to the defense of U.S. aircraft in the recent conflicts in Afghanistan and Iraq.

NSWC Crane is the Navy's Lead Laboratory for Pyrotechnics and the Program Manager for the Naval Sea Systems Command. It is the Deputy Assistant Program Manager for the Naval Air Systems Command's (NAVAIR) Pyrotechnics Activities. Both NAVSEA and NAVAIR have designated NSWC Crane as the Design Agent for Pyrotechnics. In addition, NSWC Crane is the Navy's Acquisition Engineering Agent for Pyrotechnics and its In-Service

Engineering Agent for Pyrotechnics. It also serves as NAVAIR's Cognizant Field Activity for Pyrotechnics. NSWC Crane and the Crane Army Ammunition Activity are being designated as the Department of Defense's Center for Pyrotechnics.

High Profile Systems and Products

Naval Surface Warfare Center Crane has produced systems and products that have significantly enhanced the efficacy of the Armed Forces in recent years. It also contains unique facilities that supply the environment within which creative scientists, engineers and technicians can develop, test and evaluate ideas that, if successful, become these products and systems. Several examples of each are discussed below.

The ALQ-99 airborne electronic warfare system is used by both the Navy and the Air Force.

The SLQ-32 electronic warfare system is the primary EW system used on board all Navy Cruisers, Destroyers and Frigates.

The IROS3 is the first automated anti-terrorism and force protection system that integrates all phases of an attack by an intruder from detection to engagement. It is a major asset for Navy ships at anchor, at piers, and in restricted waterways.

The Special Operations small and minor caliber weapons and accessories such as the UNS Universal Night Sight Weapons-Mounted Clip-On and the AN/PVS Night Vision Goggles used in the rescue of U.S. Army Private Jessica Lynch from captivity in Iraq were developed or furnished by NSWC Crane.

Night Vision Devices, Electro-Optics, Night Vision Goggles, Shipboard Thermal Imaging and Multi-Sensor Systems furnished and maintained by NSWC Crane were used extensively during the recent conflicts in Afghanistan and Iraq.

Radiation-hardened electronic components that are vital to the Navy's strategic systems are evaluated and assured for radiation-tolerance at NSWC Crane.

The Distant Support Technology that places on board each Navy ship "virtual" scientists, engineers and technicians who are experts on shipboard systems was developed at NSWC Crane.

The research, development, test and evaluation, and production of pyrotechnics that are essential to protecting Navy and Marine Corps aircraft from missile attacks are conducted at NSWC Crane.

Facilities at Crane

The facilities at Crane are outstanding and they are in excellent condition. A sound military construction program over the last twenty years has kept Crane's infrastructure current with its mission-focus on electronics, electronic warfare and ordnance. This "MILCON" program has invested $137 Million in the facilities at Crane and added one million square feet of space to Crane.

These military construction projects have built the following facilities at Crane: the Microwave Devices Engineering Facility ($9.1 Million), the Microwave Components Center ($5.8 Million), the Fleet Microwave Support Center ($5.2 Million), the Airborne Electronic Warfare Facility ($11 Million), the Electronics Countermeasures Center ($8.1 Million), the Electronics Communications Maintenance Shop ($6.7 Million), the Electronics Systems Evaluation Laboratory ($1 Million), the Electro-Optics Center ($7 Million), the Chemical/Biological Warfare Detection Facility ($4.1 Million), the Lithium Battery Test Facility ($3.9 Million), the Rechargeable Battery Evaluation Facility ($4.2 Million), the Component Finishing and Corrosion Control Facility ($7.4 Million), the Surveillance Function Test Range ($1.9 Million), the Strategic Weapons Engineering Facility ($7.3 Million), the Special Warfare Munitions Engineering Facility ($5.8 Million), the Hydro-Acoustics Test Facility ($2.8 Million), the Ordnance Environmental Test Facility ($8 Million), the Weapons Development and Test Facility ($1.8 Million), the Demilitarization, Test, Engineering and Evaluation Facility ($1.6 Million), the Projectile Loading Facility ($950,000), and the Ammunition Surveillance Facility ($3.6 Million).

As a result, the current value of Crane's facilities is $3.3 Billion. There are 4 Million square feet of space

in the operational buildings; 4.8 Million square feet of space for storage of explosive ordnance, and 10 Million square feet of space for storage of inert ordnance. The equipment in the buildings at Crane adds another $400 Million to that value.

Furthermore, additional military construction projects are underway and in planning stages. These include: the Electro-Chemistry Engineering Facility ($11 Million), the Commercial Off-The-Shelf Technology Product Assurance and Technology Management Facility ($12.4 Million), the Joint Navy-Army Ordnance Management and Engineering Facility ($12.6 Million), the Ordnance Test and Evaluation Complex ($4.8 Million), and the Weapons Engineering Facility ($5.5 Million).

The major electronic facilities consist of state of the art engineering, modeling and simulation laboratories and test and analysis laboratories. The Department of the Navy's only printed circuit board facility is located at Crane. There are electrochemical power source test and maintenance laboratories, and there is a unique, high-power battery stress facility that includes totally contained cell test blocks. Additionally, there are system and subsystem maintenance and repair shops.

The major microwave facilities consist of state of the art engineering facilities, test and analysis laboratories, and maintenance and repair shops for radars, electronic warfare systems and antennas. There are anechoic chambers for use in testing EW systems, radar systems and radar antennas; and there is a corrosion control plating facility for treating equipment to be mounted on the decks of ships. There is a microwave tube repair facility that has the capacity to repair glass envelopes. There are specialized high-power microwave tube test stations. And there is a hybrid microwave component repair and test facility. These facilities are vital to the Nation's security. The Navy is one of the largest users of high-power microwave tubes, which are essential to its radars and electronic countermeasures equipment, and the commercial microwave tube industry is small and fragile.

The major ordnance facilities consist of buildings where the production of pyrotechnics and explosive ordnance by CAAA takes place and where demilitarization of ordnance is performed. The ordnance buildings feature operating

cells to contain accidental explosions. And there are related engineering and quality control facilities.

There are also test and analysis buildings for handling explosive and pyrotechnic components. There are facilities for prototyping pyrotechnics and explosives that contain explosive cells. There are engineering, modeling and simulation facilities, and there are repair and maintenance shops. There is a robotic test facility used to certify pyrotechnics. There is a huge XRAY facility with several exposure cells, including one large enough to accommodate a truckload of ordnance without having to unload the truck. And there is a complete environmental and shock test facility that is used for explosive systems, inert systems, subsystems and components.

There is also warehouse capacity of 10 million square feet, the third largest supply storage capacity in the Navy's inventory. Additionally, there is storage capacity at Crane for 4.8 million square feet of explosive ordnance.

Crane's physical assets also include outdoor test ranges that, because of the location and size of the base, are not constrained by any form of encroachment. As discussed below, these include: Near and Far Field High-Power Microwave Test Ranges for testing, analyzing and certifying radar, electronic warfare equipment, and antennas; the Pyrotechnic Low Yield Explosive Range for testing illuminating and signal flares and explosive devices; the Ordnance Explosive Range for testing munitions and for demilitarizing outdated ordnance; and Above Ground and Below Ground Weapons Test Ranges that are well-instrumented and support the development, testing, evaluation, analysis and certification of weapons. In addition, Crane owns the nearby Lake Glendora, an extremely quiet, 450-acre body of water that is used to test underwater explosive capabilities and acoustic devices.

Thus, Crane provides a host of laboratories, facilities and ranges for conducting a wide range of research, development, test and evaluation. For example, at the Environmental Test Laboratory, vibration, shock, acceleration, temperature, humidity, altitude, dust, salt fog and fungus can be introduced for testing. At the Electronics Test Laboratories, electronic and semiconductor components can be tested. The unique Microwave Component and System Test Facilities include Anechoic Chambers, Near

and Far Field Test Ranges, High-Power Microwave Tube Test Facilities, and Radar and Electronic Warfare Antenna Test and Repair Facilities. The comprehensive XRAY Facility can examine ordnance and inert items, including truckloads of bombs and shells. And the Wind Tunnel tests airborne electronic warfare pods and related air stream-driven generators.

NSWC Crane's Small Arms Ranges are fully instrumented. These are outdoor and underground test ranges that can be used to qualify personnel on the use of weapons as well as to test and certify weapons.

NSWC Crane's Long Range Optic and Laser Ranges are fully instrumented and calibrated outdoor ranges that permit alignment and calibration of laser designators and laser rangefinders.

NSWC Crane's Explosive and Pyrotechnic Test Ranges test flares and explosives. Crane also has outdoor ranges, containment structures, and wind stream test capability to simulate airborne conditions for testing pyrotechnics.

NSWC Crane's Linear Accelerator, Cobalt 60 sources, and other radiation simulation sources are used to test materials for their tolerance of radiation.

NSWC Crane's comprehensive acoustic test facilities for use with sonar and sonobuoys consist of open tanks, temperature and pressure tanks, and the 450-acre quiet, deep-water Lake Glendora that can be used for acoustic testing and for testing explosives under water.

These facilities demonstrate that the range capacity at Crane is unparalleled. And there is plenty of land for expansion to accommodate new missions, programs and activities.

NSWC Crane's Partnerships with Universities

Naval Surface Warfare Center Crane has entered into partnerships, embodied in Memoranda Of Understandings ("MOU"), Cooperative Research And Development Agreements ("CRADA"), and contracts, with major universities in the State of Indiana. These academic institutions include Indiana University, Rose-Hulman Institute of Technology, Purdue University, the University of Notre Dame, Vincennes

University, Ivy Tech State College, and Indiana University/Purdue University, Indianapolis. NSWC Crane has also entered into partnerships with universities outside Indiana that have specialized programs of interest to it.

The MOU's with universities typically provide for a Master Agreement that covers joint research and development activities, sponsored research, relationships among scientists, engineers and faculty members, training programs, opportunities for NSWC Crane employees to gain advanced degrees, and other matters of mutual interest.

In particular, NSWC Crane is collaborating with Indiana University and Purdue University to develop new information technology that would enhance the Distant Support Technology initiative. NSWC Crane is collaborating with Rose-Hulman Institute of Technology on research that would advance the state of the art for manufacturing printed wiring boards by improving design, development, and manufacturing processes. NSWC Crane is collaborating with the University of Notre Dame to develop and introduce new fuel cell technology.

NSWC Crane is collaborating with Purdue University on several projects. It is working with Purdue to develop techniques for handling high bandwidth video transmissions in a military environment. In concert with Purdue, it is also developing enhanced technologies to detect hazardous materials. And it is working with Purdue to develop a linear ion trap for analyzing hazardous materials.

NSWC Crane is also collaborating with Indiana University's Cyclotron Facility. They are developing the capability to verify the reliability of electronics operating in a high radiation environment.

NSWC Crane is also working with universities outside Indiana. It is collaborating with Vanderbilt University's School of Engineering to develop design, processing and verification techniques for evaluating radiation-hardened microelectronics. It is collaborating with the Applied Research Laboratory at Pennsylvania State University to develop a machine-vision specification that will result in an objective industry standard for automated testing of image tubes. It is working with the University of Missouri to optimize a water-jet system that would cut and demilitarize munitions. And it is collaborating with

Carnegie Mellon University on research and development of automated and robotic systems.

NSWC Crane's Military Value

Naval Surface Warfare Center Crane's high military value is clearly evident in the quality of its workforce; the broad range of vital systems and products that it develops for the operational forces; the speed with which it can respond to operational requirements for new systems and products; and the diversity of its customer base.

NSWC Crane is, of course serving the Navy and the Marine Corps with cutting edge systems and products such as airborne and shipboard electronic warfare systems, chemical and biological warfare detection systems, the IROS3 surveillance and sighting system for Navy ships, the infrared countermeasure aircraft decoy flares that allowed Navy and Marine Corps aircraft to survive more than 200 missile attacks (with no hits) during Operation Enduring Freedom, and Expeditionary Warfare Systems such as the Mobile Command Operations Center that NSWC Crane developed in less than 60 days for the Marine Corps to use in Operation Iraqi Freedom. But it also serves the Air Force and the Army with electronic warfare equipment and pyrotechnics.

The IROS3 will protect U.S. Navy ships from terrorist attacks like that inflicted on the USS Cole in 2000, and the Mobile Command Operations Center that accompanied Marine Corps units from Kuwait to Baghdad will enhance the Marine Corps' ability to coordinate its operations in Iraq and Afghanistan. But NSWC Crane has developed other systems and products that are markedly improving the operations of the Navy and the Marine Corps.

The Distant Support Technology that NSWC Crane developed for ships at sea is an example. Using commercial internet technology, NSWC Crane provided the Fleet with "virtual" experts on every ship that enable Sailors to go online and visualize, diagnose and solve maintenance and repair problems. This capability significantly reduced downtime and the costs of repairing equipment. There was a 67 per cent increase in the productivity associated with technical assistance actions and a 49 per cent decrease in travel costs associated with repairing equipment on board ships.

The Marine Corps Data Analysis Facility ("MCDAF") developed by NSWC Crane is another example. Designed for the analysis of complex system performance, this system represents a quantum leap in technology. MCDAF is contained in 8 foot by 20 foot shelter, mounted on a trailer pulled by a HUMVEE. Two MCDAF's can be placed two kilometers apart and maintain a one gigabit network. NSWC Crane designed and fielded the MCDAF in less than four months for less than $700,000. It now serves as the standard for future Marine Corps data systems. In fact, at the recent Joint Combat Identification Evaluation Team ("JCIET") exercise, the Marine Corps Tactical Systems Support Activity ("MCTSSA") was able to complete a full day's data reduction in six minutes rather than the 24 hours it previously required.

Similarly, NSWC Crane's stewardship of the microwave tube industry is essential to the Nation's security. As a result of the large number of radars and electronic countermeasure systems on board Navy ships, the Department of the Navy is one of the largest consumers of high-power microwave tubes. Yet the high-power microwave tube industry is small, fragile and possessed of limited resources for development. Thus, NSWC Crane has worked closely with that industry for twenty years to increase the reliability of these tubes and to lower their costs, saving hundreds of millions of Federal dollars in the process. To put the issue in shipboard terms, each AEGIS Cruiser in the Fleet saves $6 Million annually as a result of NSWC Crane's work with that industry. And this stewardship not only saves money for the Navy, it substantially reduces the risk of operational failure of these essential electronic systems.

NSWC Crane's systems and products also contributed materially to the success of other U.S. forces in the conflicts in Afghanistan and Iraq. For example, twelve products that NSWC Crane either developed or furnished were used in the rescue of U.S. Army Private Jessica Lynch from captivity in Iraq.

There is another asset NSWC Crane possesses that is in very short supply in the Nation. That asset is its property, which is not constrained by any form of encroachment. NSWC Crane is situated on 100 square miles of unobstructed land with excellent air, rail and highway access. That land contains facilities and test ranges

where electronics systems can be tested and evaluated and where munitions can be produced, distributed, stored, detonated and demilitarized. There is also a sufficient amount of land available to accommodate additional missions, programs and activities.

NSWC Crane is also a leader in establishing and maintaining efficient and cost-effective business practices. As a result of its process and business re-engineering program, NSWC Crane saved tens of millions of dollars annually and achieved the lowest labor rates among the Department of the Navy's laboratories and Technical Centers. In 2002, the Department of Defense awarded NSWC Crane "Installation of the Year" honors. As a result of the efficiencies and reduced costs gained from NSWC Crane's "lean manufacturing" program, the Department of Defense gave NSWC Crane its "Value Engineering" award in 2004, and the Naval Sea Systems Command asked NSWC Crane to convey its practices to other NAVSEA laboratories and Technical Centers.

NSWC Crane also has excellent access to the intellectual capital resident in the outstanding engineering and technical schools that are located in Indiana and nearby Kentucky. These include Purdue University, Rose-Hulman Institute of Technology, Ivy Tech State College, Vincennes University, and the University of Louisville's Speed School of Engineering. As a consequence of prevailing economic conditions, the quality of life in southern Indiana, and the challenging work offered by NSWC Crane, it has been able to hire all of the engineers and technicians it needs and has negligible turnover.

CRANE ARMY AMMUNITION ACTIVITY

Introduction

Crane Army Ammunition Activity produces, maintains, renovates, stores, distributes and demilitarizes conventional ordnance for the Army, the Navy, the Marine Corps, the Air Force and the Coast Guard. CAAA is a Tier One depot that supplies ordnance for the first thirty days of any conflict, and it is one of only four Tier One depots in the Nation. Thus, CAAA supplies both "first strike" ordnance and war reserve ordnance. There are 1,600 explosive ordnance storage magazines and 800 inert ordnance storage magazines at Crane.

CAAA has about 700 employees who apply their engineering, manufacturing, storage, distribution and demilitarization expertise to a variety of munitions and energetics that are employed by all of the Services and the Coast Guard. They also work closely with their counterparts at NSWC Crane to manufacture pyrotechnics developed by the NSWC, such as the infrared countermeasures that distract surface to air heat-seeking missiles fired at U.S. aircraft and illuminating and signal devices.

CAAA'S Workforce

Crane Army Ammunition Activity's workforce of 700 is composed of engineers, technicians, production workers, and administrative personnel. About 5 per cent are engineers and technicians. About 80 per cent are production workers, and about 15 per cent are administrative personnel. About 500 of these employees are permanent civil servants, and about 200 are intermittent employees. CAAA's payroll amounts to about $26 Million annually.

CAAA'S Workload

Crane Army Ammunition Activity manages conventional ammunition for the Department of Defense. Its work originates from the Department of the Army's Joint Munitions Command ("JMC") in Illinois and the associated Program Executive Officer for Ammunition. The requirements of the three Military Departments and the Coast Guard are integrated by JMC and the PEO and then provided to CAAA.

In particular, CAAA casts and presses explosive loads for ammunition, bombs and warheads. It manufactures large caliber Navy gun ammunition (5 inch gun ammunition), for which NSWC Crane provides Acquisition Engineering and In-Service Engineering services. It also manufactures pyrotechnics, such as aircraft decoy flares, that are developed by NSWC Crane. It manufactures C-4 demolition charges and insensitive munitions that are loaded with plastic bonded explosive. It reworks bomb fuzes and laser-guided bomb kits. It manufactures pyrotechnic candles for illuminating gun and mortar rounds. It disposes of munitions and ordnance by conducting open detonation and open burning, and it is the only DoD facility that can demilitarize white phosphorous and yellow D munitions.

CAAA is capable of manufacturing a broad range of products from small detonators and initiating devices to 40,000 pound explosive loaded shock test charges. And it provides demilitarization of munitions and ordnance for all of the Services.

CAAA'S Military Value

Its production and distribution capabilities, its storage capacity, and its demilitarization expertise make CAAA a vital facility. Its location and available property make CAAA suitable for additional missions, programs and activities.

During the conflicts in Afghanistan and Iraq, CAAA shipped more than 23,000 tons of munitions to support U.S. forces. And CAAA is now manufacturing HUMVEE armor survival kits that are vital to the Coalition Forces in Iraq.

CONCLUSION

Naval Support Activity Crane's two tenants, NSWC Crane and CAAA, are contributing materially to transformation of the Armed Forces for Twenty-First Century warfare in both products and process. The combination of electronics and ordnance expertise allows the integration of electronics and ordnance for modern warfare. The development of anti-terrorism and force protection technologies, systems and products is central to the safety of the Armed Forces and has applicability to Homeland Defense missions as well.

The broad range of expertise, technologies, facilities and capabilities at Crane creates a truly Joint Service "Product Center" for critical military products that are essential to warfighters. As a result, NSWC Crane and CAAA are well-positioned to be DoD's leading Technical Center in the war against terror. And, by virtue of its expansive property, NSA Crane can readily accommodate additional missions, programs and activities.

NSWC Crane and CAAA can use that extensive property to conduct a variety of additional activities, because there is no encroachment of any kind. The technical workforce is outstanding. And there is ready access to intellectual capital at academic institutions in Indiana and Kentucky.

The presence at Crane of both Navy and Army experts in ordnance and electronics engineering, production and demilitarization makes Crane a Joint Center of Weapons, Munitions and Pyrotechnics for twenty-first century warfare, capable of integrating electronics and ordnance. They are joint activities that share facilities, experience and expertise. Their workforce, systems and products support all of the Services and the Department of Homeland Defense. Their experience and expertise in electronics, electronic warfare, ordnance and anti-terrorism and force protection is sufficiently wide-ranging that NSWC Crane and CAAA can respond rapidly to the diverse requirements of national security and homeland security.

Examples of these attributes demonstrate their high military value to all of the Services. NSWC Crane's ALQ-99 electronic warfare system and other electronics are employed in both Navy and Air Force aircraft. The infrared countermeasure flares developed by NSWC Crane and manufactured by CAAA are employed by Navy, Marine Corps and Air Force aircraft to defend against missile attacks. The ammunition manufactured and stored by CAAA is used by all of the Services, which also depend upon its demilitarization expertise for disposal of outdated ordnance. The special weapons, ordnance, night vision and electro-optics that NSWC develops are used by the Special Warfare components of each of the Services. By serving as the steward for the microwave tube industry that is critical to the Nation's defense industrial base and by specializing in printed circuit boards, special microelectronics, pyrotechnics, and electro-chemical power sources, NSWC Crane is responsible for components that are essential to nearly every defense system that our Nation deploys.

By maintaining the ability to respond quickly to the needs of operational forces and by integrating its resources with those at CAAA, NSWC Crane is a full-service source for electronics, electronic warfare, ordnance and anti-terrorism and force protection requirements. Its expertise in requirements analysis, application of commercial and military technology, prototyping, test and evaluation, production, acquisition, training and field support make NSWC Crane an indispensable part of the transformed Department of Defense.

NSWC Crane and CAAA have the ability to respond rapidly to changing national security requirements. CAAA demonstrated this during the recent conflicts in Southwest Asia as its ordnance production, distribution, and storage capabilities served the Nation well. Both are flexible and agile organizations with technical resources guided by modern business practices that can marshal technology and develop systems and products for the operational forces of the Department of Defense effectively and economically.

Low operating costs, a readily available technical workforce guided by modern business practices and affiliated with universities, a location with no form of encroachment, a tradition of serving all of the Services, experience in a wide variety of technical areas, and a reputation for rapid response to operational requirements make the Navy and Army Complex at Crane the center for electronics, electronic warfare, ordnance, and anti-terrorism and force protection systems in the Twenty-First Century.