DCN 524

U. S. NAVY LABORATORIES

BOOK NUMBER 4 OF 8

J. Naval Surface Warfare Center, Crane, IN
K. Naval Surface Warfare Center, Dahlgren, VA

CLARIFICATION REQUEST OF 18 AUGUST 1994

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NSWC CRANE, IN

PAGES 17c R (7/21/94) and 17d R (7/21/94)

These pages provide data for CSF AirVehicles/Fixed/Avionics for question 3.4.1. However, it does not provide the replacement cost for the Equipment/Facilities listed. Are these separate facilities/equipment from the Electrochemical Power System Facility listed in the table page 17a? If so,The replacement cost needs to be provided.

PAGES 34 (13 June 94) and 36 (13 June 94)

Page 34 lists 1.2 workyears In-Service Engineering in Air Vehicle/Fixed/Flight Subsystems. Page 36 list "None" for In-Service Engineering Efforts for Air Vehicles/Fixed/Flight Subsystems. Which one is correct?

PAGES 78 (13 JUNE 94) and 80 (13 June 94)

Page 78 lists 0.9 workyears In-Service Engineering in Air Vehicle/RotaryFlight Subsystems. Page 80 list "None" for In-Service Engineering Efforts for Air Vehicles/Rotary/Flight Subsystems. Which one is correct?

PAGE 112R (7/21/94)

You state"**Missle Fuze Test Facility** provides for testing a wide variety of missle fuzing components...Approximately 25 missles are supported including STANDARD, TOMAHAWK, and SIDEWINDER." Does this indicate work in Weapons/Cruise Missle Common Support Function? If so, all questions in Section III must be answered for this CSF regardless of the funding level.

You state "**Fleet Ballistic Missle, Ordnance Components Test Facility** provides support to the Fleet Ballistic Missle Strategic Weapons System ordnance evaluation programs throughout the life cycle of the Trident I and II Missles". Does this indicate work in Weapons/ICBM & SLBM Common Support Function? If so, all questions in Section III must be answered for this CSF regardless of the funding level.

PAGES 108R, 109R, and 110R (all dated 7/21/94)

Pages 108R and 109R provides major facilities/ equipment utilized for Weapons/Conventional missles,Rockets CSF and the Replacement Costs. The table on page 110R provides percentage use for equipment/facilities. The Table on page 110R does not include all the equipment/facilities included on pages 108R and 109R. Replacement cost and percent shared must be provided for all major facilities/euipment, therefore the differences between the aforementioned pages must be rectified. If the facilities/equipment that are not listed on page 110R are utilized by the CSF 100% of the time, so state.

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PAGES 162R, 163R and 164R (all dated 7/21/94)

Pages 162R and 163R provides major facilities/ equipment utilized for Weapons/Guns and Ammunition CSF and the Replacement Costs. The table on page 164R provides percentage use for equipment/facilities. The Table on page 164R does not include all the equipment/facilities included on pages 162R and 163R. Replacement cost and percent shared must be provided for all major facilities/equipment, therefore the differences between the aforementioned pages must be rectified. If the facilities/equipment that are not listed on page 164R are utilized by the CSF 100% of the time, so state.

PAGE 238A R (7/21/94)

You indicate that the Radiation Effects Facility is utilized 70% of the time for Other Functions(*). The (*) footnote states "Other related functions for which this facility is used include strategic missle guidance and flight control systems, satellites and other space systems." Does this indicate work in Weapons/ICBM & SLBM Common Support Function? If so, all questions in Section III must be answered for this CSF regardless of the funding level. Additionally, this facility is not listed under the satellite CSF. These inconsistencies need to be rectified.

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Complete Revision

"LAB" JOINT CROSS-SERVICE GROUP GUIDANCE PACKAGE

CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
CRANE, INDIANA SITE

WC

SECTION II: CAPACITY OF DOD COMPONENTS

2.1 **Workload.** Use the following table to describe historic and projected workload at each activity in terms of funding and workyears. Assume previous BRAC closures and realignments are implemented on schedule. Projected funding will be derived from FY95 President's Budget Submission (Then year dollars). Past fiscal year data shall begin with FY86 or at the inception of the activity as it existed on 1 Oct 93. (BRAC Criteria I & IV)

Information Required	Fiscal Years											
	86	87	88	89	90	91	92	93	94	95	96	97
Total Funds Programmed ($M)	245.6	268.7	191.0	253.0	302.2	322.1	322.1	316.3	352.9	317.9	331.7	320.0
Total Actual Funds ($M)	232.3	255.8	282.2	277.0	295.8	347.6	382.3	402.7				
Programmed Workyears	3210	3505	3490	3708	3671	4002	3867	3648	3796	3609	3163	2973
Actual Workyears	4010	3785	3860	3997	4124	4298	4299	4178				

- Budgeted workyears are the selected indicator of the "lab" infrastructure's capacity at an aggregate level for each Military Department. They include both workyears funded directly by the Military Department and the workyears funded from organizations outside the Military Department.

Workyears = government personnel and on-site FFRDCs and SETAs

2.2 Excess "Lab" Capacity -- Measured at the DOD Component Level

- Excess "Lab" Capacity = Sum of the Peak Workyears - Sum of the Projected Workyears
  - -- Peak at each activity = Highest value between FY86 (or since inception of organization) and FY93
  - -- Projected at each activity = Estimated at FY97

AIR VEHICLES/FIXED/AVIONICS
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC's at the Crane Site.

* The mission related to this CSF is to perform the following tasks in the Electronic Warfare Technical Capability:

- In-Service Engineering for Airborne and Surface Ship Electronic Warfare

- Logistics Support for Airborne and Surface Electronic Warfare

- Depot Maintenance for Airborne and Surface Electronic Warfare

- Microwave Tube Test, Evaluation and Repair

- Failure Analysis Laboratory

- Materials Analysis Laboratory

- Solid State Devices Facility

- Printed Circuit Card Facility

- Electrochemical Power Systems Facility

- Electronic Module Test and Repair Facility

*The mission for the Electrochemical Power Systems Technical Capability is:

- To assure affordable, safe, and reliable Electrochemical Power sources (batteries).

-To meet current and future performance requirements in operational environments; for the Navy and Marine Corps, the Army and Air Force, and other government agencies.

-Provide a full spectrum of support for batteries and related equipments from Research and Development (R&D) through system retirement.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered
requirements for the accomplishment of the mission.

High Level Radiation Testing - This remote geographic location, with its low population density, has reduced FCC requirements and regulations for radiation of energy. Our "Blue Sky" facility, located in a valley and directed straight into space (thus the facility name "Blue Sky") has a restricted fly zone that provides the free space that high power microwave radiation testing requires. The valley location, surrounded by large indeciduous trees, minimizes outside interference and blocks horizontal radiation. In addition, large available acreage allows adaptability for all DoD antenna range requirements.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

20 $\overline{?}$ 12 Aug 94 Transmittal #1

3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various
Air Vehicle	EA-6B/A-6E	Universities/Colleges	100 Miles	0.5	0.5

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

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ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

Purdue University, Indiana University, University of Louisville, Notre Dame plus several others universities are located nearby and provide critical technical support. Example of this type of activity is the support provided by Purdue University for design and development of a wind tunnel to test critical design elements of an airborne EW system.

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort.

(BRAC Criteria I)

CSF- AIR VEHICLES/FIXED/AVIONICS

Types of personnel	Number of Personnel				
	Government		On-Site FFRDC	On-Site SETA	
	Civilian	Military			
Technical	75R	0	0	0	R
Management (Supv)	5	0	0	0	
Other	0R	0	0	0	R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	33	0	0
Associates	10	1	0
Bachelor	32R	4	0R
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

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3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	41R	22R	5	7
Management	0	2	0	0	3
Other	0	0R	0R	0	0
Total	0	43	22	5	10

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3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Air Vehicles/ Fixed/ Avionics	2 R	Reducing Aircraft Battery Maintenance Costs in the U.S. Navy[1] The Lithium Battery[2]

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[1]IEEE Spectrum, 1992
[2]American Society of Naval Engineers Publication, August 1992

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

AIR VEHICLE/FIXED/AVIONICS

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.35	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	65.0 R	0	0	0

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3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None
Other	2	0.2	26K	F-14D[1] EA-6B[1]

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[1]This project functions as Cognizant Field Activity (CFA) for all technical matters pertaining to the basic design engineering, production engineering, maintenance engineering, acquisition, in-service use engineering and logistic management of all NAVAIRSYSCOM electrochemical power source systems and associated equipment for all aircraft types.

Also performs as Participating Field Activity (PFA) to provide technical assistance to activities have CFA responsibilities for specific hardware items such as engine starters, auxiliary power units (APU), etc., which contain electrochemical power devices.

This type of work is battery system development for all U.S. Navy and U. S. Marine Corps aircraft applications.

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Air Vehicles/ Fixed/Avionics	Engr Investigations	5,917K	42.3	AN/ALQ-99 AN/ASQ-155
Air Vehicles/ Fixed Avionics	Integrated Logistics Support	5,699K	22.5	AN/SLQ-99 AN/ASQ-155
Air Vehicles/ Fixed/Avionics	ILS, Production Engr Support, Engr Investigations, Lifecycle Support	16.5K	.2	A-6, C-130, F-14, F/A-18A/D, P-3, T-2, T-38, T-45, AV-8B

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3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Fixed/Avionics	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Fixed/ Avionics	5,821K	7,486K	8,347K	8,735K

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CRANE

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Air Vehicles/ Fixed/ Avionics	Electrochemical Power Systems Facility			X	35,000K
Air Vehicles/ Fixed/ Avionics	Bldg 41 Airborne EW Depot				920.4K
Air Vehicles/ Fixed/ Avionics	Bldg 40 Airborne EW Depot				374.8K
Air Vehicles/ Fixed/ Avionics	Microwave Tube Test Facility				111.8K

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Air Vehicles/ Fixed/ Avionics	Corrosion Control Facility				394.2K
Air Vehicles/ Fixed/ Avionics	RF Test Range, RF Anechoic Test Chamber				79.2K
Air Vehicles/ Fixed/ Avionics	Failure Analysis Laboratory				21.3K
Air Vehicles/ Fixed/ Avionics	Materials Analysis Laboratory				21.3K
Air Vehicles/ Fixed/ Avionics	Wind Tunnel Test Facility				86.2K
Air Vehicles/ Fixed/ Avionics	Metal Parts Fabrication				24.9K
Air Vehicles/ Fixed/ Avionics	Cable Fabrication				5.9K
Air Vehicles/ Fixed/ Avionics	Printed Circuit Card Fabrication				27.2K

The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries*. Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart*, avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

ELECTROCHEMICAL POWER SYSTEMS FACILITY	
FUNCTION	**PERCENTAGE UTILIZATION**
Air Vehicles, Fixed Wing, Avionics	0.5 %
Air Vehicles, Fixed Wing, Flight Subsystems	5.2 %
Air Vehicles, Rotary Wing, Avionics	0.7 %
Air Vehicles, Rotary Wing, Flight Subsystems	3.8 %
Weapons, Conventional Missiles/Rockets	1.5 %
Space Systems, Satellites	4.4 %
C4I Systems, Airborne C4I	0.5 %
Other Functions *	83.4 %

* The Electrochemical Power Systems Facility at Crane is a national asset providing a full spectrum of support for electrochemical power systems (batteries), including RDT&E, engineering, acquisition, depot rework, manufacturing, fleet support and system retirement. Programs and projects supported include missiles and weapons, aircraft, ground support equipment, shipboard and underwater, special warfare, satellites and other space-based equipment, transportation and various other systems. This facility provides support for a wide variety of batteries incorporated within systems and platforms of the Department of the Navy (NAVSEA, NAVAIR, NSWC, NAWC, NUWC, SSPO, SPECWAR, ONR, SOCOM, SPCC & NELO), United States Marine Corps. (USMC), the Department of the Army, the Department of the Air Force, the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), Special Operations Command, Advanced Research Projects Agency (ARPA), Defense General Supply Command (DGSC), the Federal Aviation Administration (FAA), Coast Guard, Foreign Military Sales (FMA), and Private Industry.

12 Aug 94
Transmittal

The Electronic Warfare Technical Capability has the following major equipment and facilities to support this CSF:

Crane Division provides an unduplicated combination of state-of-the-art equipment and facilities and highly specialized expertise. Over 150,000 sq ft of modern facilities and $120M of specialized test equipment are integrated and dedicated to Electronic Warfare (EW) support. These resources are utilized in all facets of EW support such as test and evaluation, specification verification, engineering analysis, maintenance/overhaul, logistic support, design and development. Resident at Crane are an outdoor antenna range, RF anechoic chambers, EMI/RFI chambers, Ram Air Turbine wind tunnel test facility, high and low power RF/Digital/Analog/High voltage test and measurement equipment, Automatic Test Equipment software development facility, EW system test beds and a new $7.5M environmentally safe corrosion control and physical repair facility. The facilities and equipment are adequate to support present and future projected EW In-Service Engineering requirements.

12 Aug 94
Transmittal

This portrays the Electronic Warfare equipment and facilities showing the interconnectivity to other functions and the percentages:

Equipment/Facility	**Function Sharing and Percentages**
Specialized System Test Equipment	Airborne EW Depot (45% this CSF) (55% other)
Microwave Tube Test Facility	Microwave Tube Test, Surface EW Engineering Surface EW Depot Surface Radar Engineering Surface Radar Depot (2% this CSF) (98% other)
Corrosion Control Facility	Surface EW Engineering Surface EW Depot Surface Radar Engineering Surface Radar Depot (5% this CSF) (95% other)
RF Test Range, RF Anechoic Test Chamber	Airborne EW Depot Surface EW Depot Surface EW Engineering Surface Radar Depot Surface Radar Engineering (10% this CSF) (90% other)
Failure Analysis Laboratory	All Electronic Functions in the Crane Division (1% this CSF) (99% other)
Materials Analysis Laboratory	All Technical Functions in the Crane Division (1% this CSF) (99% other)

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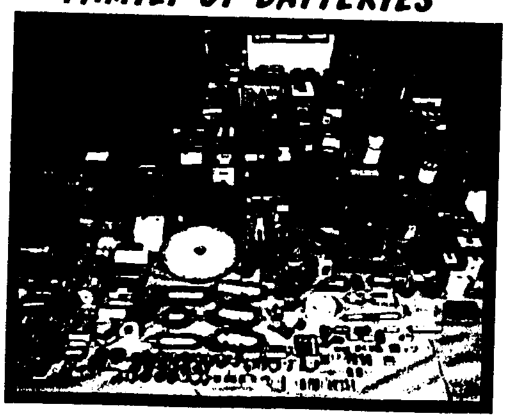
Wind Tunnel Test Facility	Airborne EW Depot (20% this CSF) (80% other)
Metal Parts Fabrication	All Technical Functions in the Crane Division (1% this CSF) (99% other)
Cable Fabrication	All technical Functions in the Crane Division (1% this CSF) (99% other)
Printed Circuit Card Fabrication	All Technical Functions in the Crane Division (1% this CSF) (99% other)

ELECTROCHEMICAL POWER SYSTEMS FACILITY
NSWC CRANE DIVISION

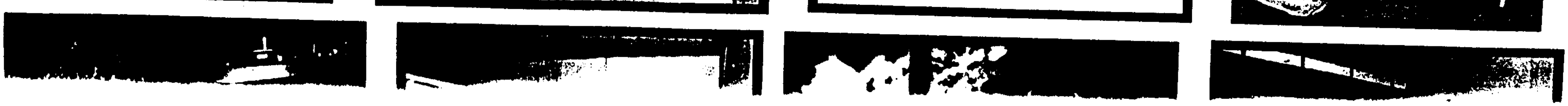
FAILURE ANALYSIS

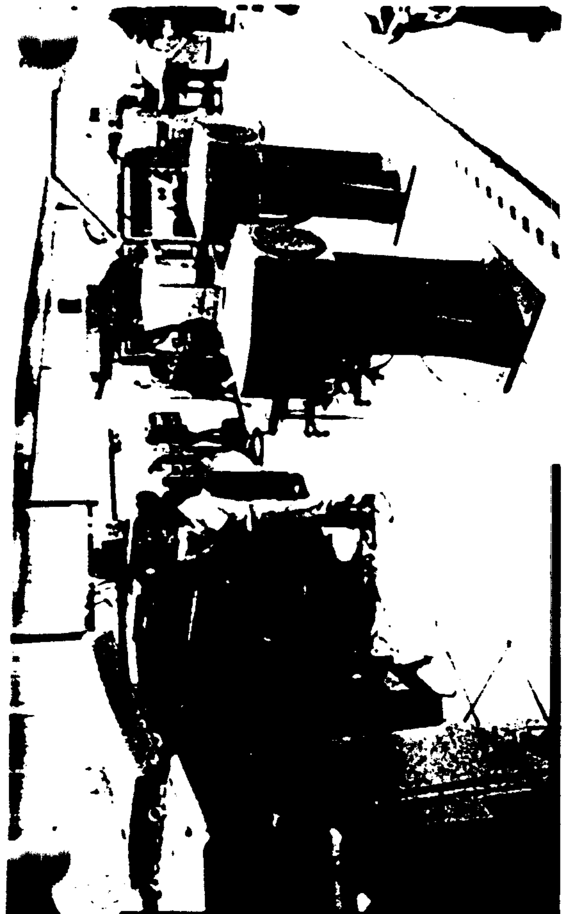
FAMILY OF BATTERIES

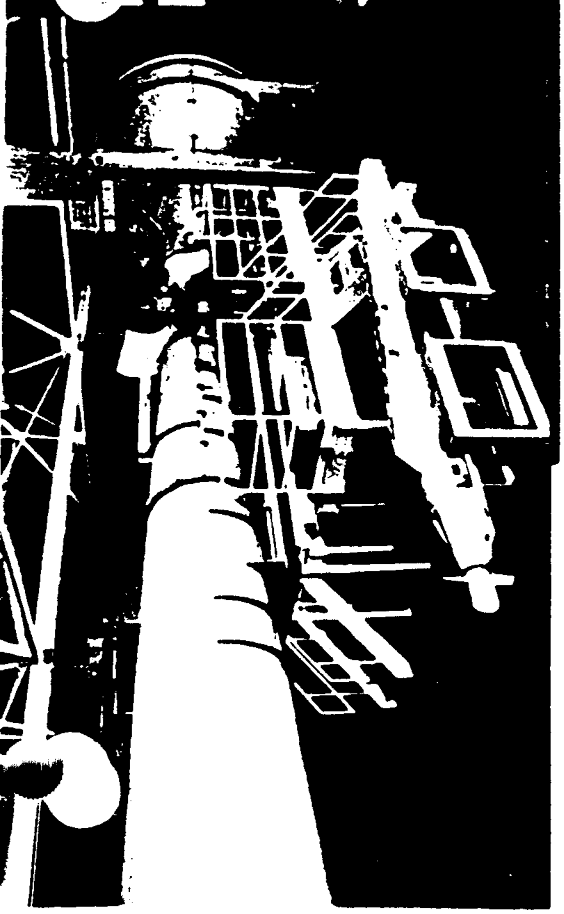


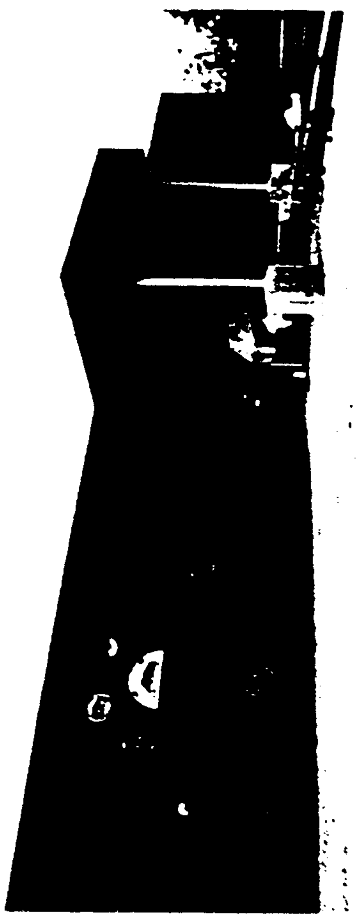
TEST CELLS

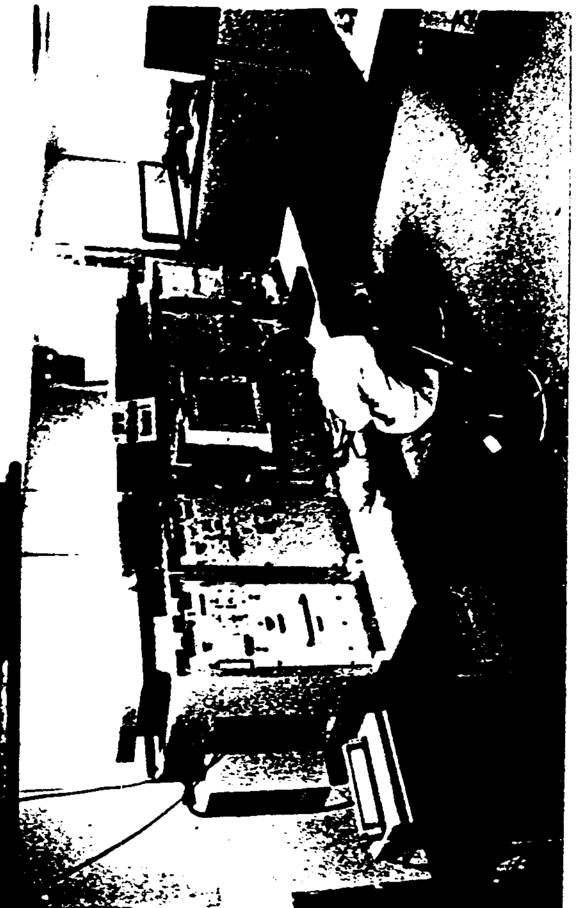
ENVIRONMENTAL











3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Air Vehicle/ Fixed/ Avionics	Bldg 34	Technical	33.6	33.6	0
Air Vehicle/ Fixed/ Avionics	Bldg 38	Technical	18.1	18.1	0
Air Vehicle/ Fixed/ Avionics	Bldg 3235	Technical	27.4	27.4	0
Air Vehicle/ Fixed/ Avionics	Bldg 369	Storage	5.4	5.4	0
Air Vehicle/ Fixed/ Avionics	Bldg 2919	Technical	3.8	3.8	0
Air Vehicle/ Fixed/ Avionics	Bldg 2949	Technical	5.1	5.1	0
Air Vehicle/ Fixed/ Avionics	Bldg 355	Storage	.7	.7	0
Air Vehicle/ Fixed/ Avionics	Bldg 650	Storage	.6	.6	0

Air Vehicle/ Fixed/ Avionics	Bldg 652	Storage	.6	.6	.6
Air Vehicle/ Fixed/ Avionics	Bldg 916	Storage	1.1	1.1	0
Air Vehicle/ Fixed/ Avionics	Bldg 917	Storage	1.1	1.1	1.1
Air Vehicle/ Fixed/ Avionics	Bldg 157	Storage	2.1	2.1	0
Air Vehicle/ Fixed/ Avionics	Bldg 181	Technical	1.7	1.7	1.7
Air Vehicle/ Fixed/ Avionics	Bldg 301	Storage	5.4	5.4	0
Air Vehicle/ Fixed Avionics	Bldg 41	Technical	19.2	19.2	0
Air Vehicle/ Fixed/ Avionics	Bldg 40	Technical	3.7	3.7	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electrochemical Power Sources - The Electrochemical Power Sources facility has a flexible facility to allow for considerable workload expansion. These include state-of-the-art equipments designed with the foresight to accommodate a wide variety of batteries, capable of multiple use, and easily upgradable. Also available are environmental equipments capable of simulating field conditions and material analysis capabilities required by each of the three services.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

AIR VEHICLES/FIXED/FLIGHT SUBSYSTEMS COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC'S at the Crane Site.

*The mission for the Electrochemical Power Systems Technical Capability is:

- To assure affordable, safe, and reliable Electrochemical Power sources (batteries).

-To meet current and future performance requirements in operational environments; for the Navy and Marine Corps, the Army and Air Force, and other government agencies.

-Provide a full spectrum of support for batteries and related equipments from Research and Development (R&D) through system retirement.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

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3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity	
All CSF's	CraneTC's	Technical support	Co-located	Various	Various	
Air Veh Fixed Wing,FlSubsys	Vitro Corp	Private Industry	30 miles	5.7	1.0	R
"	NAWC,IN	Government	90 miles	5.7	0.03	R
"	Cummins	Private Industry	60 miles	5.7	0.03	R

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical in accomplishing the mission of NSWC Crane Division. R

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ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

Finally, NAWC Indianapolis and private industry are relied upon very little and there nearby location is not considered critical to the mission. R

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort.

(BRAC Criteria I)

CSF- AIR VEHICLES/FIXED/FLIGHT SUBSYSTEMS

Types of personnel	Number of Personnel				
	Government		On-Site FFRDC	On-Site SETA	
	Civilian	Military			
Technical	7R	0	0	0	R
Management (Supv)	0	0	0	0	
Other	1R	0	0	0	R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	4	0	1
Associates	0	0	0
Bachelor	3R	0	0R
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

R

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	2R	1	0	4R
Management	0	0	0	0	0
Other	1	0R	0	0	0R
Total	1	2	1	0	4

R

R

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Air Vehicles/ Fixed/ Flight Subsystems	1 R	Reducing Aircraft Battery Maintenance Costs in the U.S. Navy[1]

R

[1]IEEE Spectrum, 1992

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

AIR VEHICLE/FIXED/FLIGHT SUBSYSTEMS

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.4	0	0	0
Engineering Development	4.1	0	0	0
In-Service Engineering	1.2	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None
Other	8	5.3	678K	F/A-18C-F[1] F-22[1] P-3[1] A-6[1] AV-8B[1] T-45[1] T-2[1] T-34[1]

[1]Program description on following page.

[1]This project functions as Cognizant Field Activity (CFA) for all technical matters pertaining to the basic design engineering, production engineering, maintenance engineering, acquisition, in-service use engineering and logistic management of _all_ NAVAIRSYSCOM electrochemical power source systems and associated equipment for _all_ aircraft types.

Also performs as Participating Field Activity (PFA) to provide technical assistance to activities have CFA responsibilities for specific hardware items such as engine starters, auxiliary power units (APU), etc., which contain electrochemical power devices.

This type of work is battery system development for all U.S. Navy and U. S. Marine Corps aircraft applications.

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Air Vehicles/ Fixed/Flight Subsystems	ILS, Prod Engr Support, Engr Investigations, Life Cycle Support	145.9K	1.2	A-6, C-130, F-14, F/H-18A/D, P-3, T-2, T-38, T-45, AV-8B

R

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Fixed/Flight Subsystems	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Fixed/ Flight Subsystems(1)	1016K	751K	768K	763K

Note (1) Some Fixed Wing and Rotary Wing Flight Subsystems projects share funding for common or similar applications

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	**Major Facility or Equipment Description**	**Unique To**			**Replacement Cost ($K)**
		DOD	**Federal Gov't**	**U. S.**	
Air Vehicles/ Fixed/ Avionics	Electrochemical Power Systems Facility			X	35,000K

x94.8 = 33.2

The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries*. Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart,* avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

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ELECTROCHEMICAL POWER SYSTEMS FACILITY	
FUNCTION	**PERCENTAGE UTILIZATION**
Air Vehicles, Fixed Wing, Avionics	0.5 %
Air Vehicles, Fixed Wing, Flight Subsystems	5.2 %
Air Vehicles, Rotary Wing, Avionics	0.7 %
Air Vehicles, Rotary Wing, Flight Subsystems	3.8 %
Weapons, Conventional Missiles/Rockets	1.5 %
Space Systems, Satellites	4.4 %
C4I Systems, Airborne C4I	0.5 %
Other Functions *	83.4 %

* The Electrochemical Power Systems Facility at Crane is a national asset providing a full spectrum of support for electrochemical power systems (batteries), including RDT&E, engineering, acquisition, depot rework, manufacturing, fleet support and system retirement. Programs and projects supported include missiles and weapons, aircraft, ground support equipment, shipboard and underwater, special warfare, satellites and other space-based equipment, transportation and various other systems. This facility provides support for a wide variety of batteries incorporated within systems and platforms of the Department of the Navy (NAVSEA, NAVAIR, NSWC, NAWC, NUWC, SSPO, SPECWAR, ONR, SOCOM, SPCC & NELO), United States Marine Corps. (USMC), the Department of the Army, the Department of the Air Force, the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), Special Operations Command, Advanced Research Projects Agency (ARPA), Defense General Supply Command (DGSC), the Federal Aviation Administration (FAA), Coast Guard, Foreign Military Sales (FMA), and Private Industry.

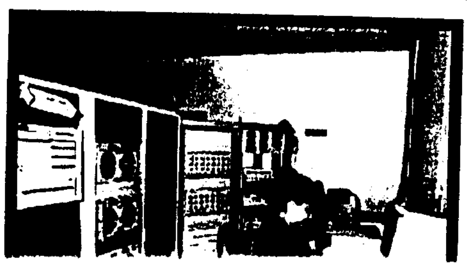
ELECTROCHEMICAL POWER SYSTEMS FACILITY
NSWC CRANE DIVISION

FAILURE ANALYSIS

FAMILY OF BATTERIES

TEST CELLS

ENVIRONMENTAL



3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Air Vehicle/ Fixed/ Flight Subsystems	Bldg 34	Technical	33.6	33.6	0
Air Vehicle/ Fixed/ Flight Subsystems	Bldg 38	Technical	18.1	18.1	0
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Air Vehicle/ Fixed/ Flight Subsystems	Bldg 2949	Technical	5.1	5.1	0

Air Vehicle/ Fixed/ Flight Subsystems	Bldg 355	Storage	.7	.7	0
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Air Vehicle/ Fixed/ Flight Subsystems	Bldg 916	Storage	1.1	1.1	0
Air Vehicle/ Fixed/ Flight Subsystems	Bldg 917	Storage	1.1	1.1	1.1
Air Vehicle/ Fixed/ Flight Subsystems	Bldg 157	Storage	2.1	2.1	0
Air Vehicle/ Fixed/ Flight Subsystems	Bldg 181	Technical	1.7	1.7	1.7
Air Vehicle/ Fixed/ Flight Subsystems	Bldg 301	Storage	5.4	5.4	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electrochemical Power Sources - The Electrochemical Power Sources facility has a flexible facility to allow for considerable workload expansion. These include state-of-the-art equipments designed with the foresight to accommodate a wide variety of batteries, capable of multiple use, and easily upgradable. Also available are environmental equipments capable of simulating field conditions and material analysis capabilities required by each of the three services.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

AIR VEHICLES\ROTARY\AVIONICS
COMMON SUPPORT FUNCTIONS

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC's at the Crane Site.

*The mission for the Electrochemical Power Systems Technical Capability is:

- To assure affordable, safe, and reliable Electrochemical Power sources (batteries).

-To meet current and future performance requirements in operational environments; for the Navy and Marine Corps, the Army and Air Force, and other government agencies.

-Provide a full spectrum of support for batteries and related equipments from Research and Development (R&D) through system retirement.

* The mission related to this CSF is to perform the following tasks in the Night Vision/Electro-Optic Technical Capability is:

- Specialized Thermal Imaging Test Equipment

- Proximity of Surface Navy Electro-Optics ISEA

- Proximity of Special Warfare Electro-Optics ISEA

- Engineering Investigation Procedures Established

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

Night Vision - An additional advantage of the rural location of this facility is the ability to test and evaluate Night Vision and Electro-Optics devices and systems **under true "natural" light conditions** at the outdoor test range. As no urban areas are near the facility, urban "back lighting" of the sky is not present to adversely affect testing to simulate operational conditions.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

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3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical in accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort.

(BRAC Criteria I)

CSF- Air Vehicles/Rotary/Avionics

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	3R	0	0	0
Management (Supv)	0	0	0	0
Other	0R	0	0	0

R

R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	2	0	0
Associates	0	0	0
Bachelor	1R	0	0R
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

R

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	1R	1	1	0
Management	0	0	0	0	0
Other	0	0R	0	0	0
Total	0	1	1	1	0

R

R

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Air Vehicles/ Rotary/ Avionics	2 R	Reducing Aircraft Battery Maintenance Costs in the U.S. Navy[1] The Lithium Battery[2]

R

[1]IEEE Spectrum, 1992
[2]American Society of Naval Engineers Publication, August 1992

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

AIR VEHICLE/ROTARY/AVIONICS

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.35	0	0	0
Engineering Development	0.20	0	0	0
In-Service Engineering	0.36	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None
Other	1	0.4	51K	SH-60[1]

[1]This project functions as Cognizant Field Activity (CFA) for all technical matters pertaining to the basic design engineering, production engineering, maintenance engineering, acquisition, in-service use engineering and logistic management of all NAVAIRSYSCOM electrochemical power source systems and associated equipment for all aircraft types.

Also performs as Participating Field Activity (PFA) to provide technical assistance to activities have CFA responsibilities for specific hardware items such as engine starters, auxiliary power units (APU), etc., which contain electrochemical power devices.

This type of work is battery system development for all U.S. Navy and U. S. Marine Corps aircraft applications.

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Air Vehicles/ Rotary/ Avionics	Night Eagle Flir Prod Engr Supp, ILS, Engr Investigations, Life Cycle Support	$56.5K R	.36 R	UH-1, AH-1W, H-2, H-3, H-46, H-53, H-60 R

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Rotary/Avionics	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Rotary/ Avionics	185K	235K	235K	235K

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3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)	
		DOD	Federal Gov't	U. S.		
Air Vehicles/ Rotary/ Avionics	Cleanroom				$250K	R
Air Vehicles/ Rotary/ Avionics	Office Area				$100K	
Air Vehicles/ Rotary/ Avionics	Test Equip			X	$1,500K	R
Air Vehicles/ Rotary/ Avionics	Electrochemical Power Systems Facility			X	$35,000K	

* The test equipment is used for the Catseye Night Vision Goggle System and does not exist anywhere else in the U.S.

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The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries*. Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart*, avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

The Night vision cleanroom and laboratory equipment is used 20% of the time for the Avionics CSF. The other 80% is utilized in support systems in the following functions: Ship Vulnerability and Survivability; Air and Surface Surveillance and Detection; Mine Countermeasures; Amphibious Warfare; and Special Warfare. R

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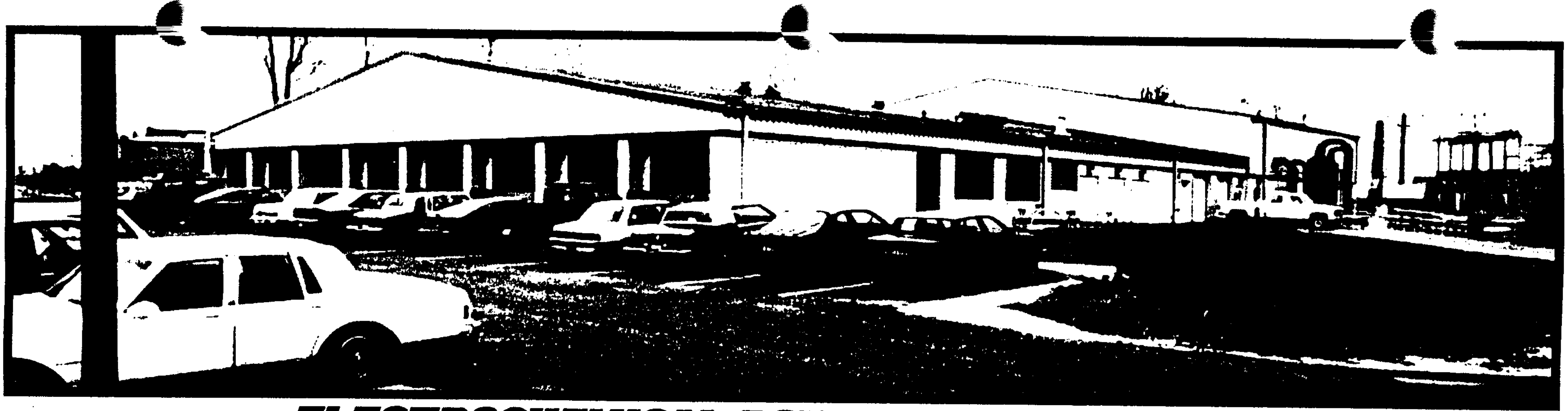
ELECTROCHEMICAL POWER SYSTEMS FACILITY	
FUNCTION	**PERCENTAGE UTILIZATION**
Air Vehicles, Fixed Wing, Avionics	0.5 %
Air Vehicles, Fixed Wing, Flight Subsystems	5.2 %
Air Vehicles, Rotary Wing, Avionics	0.7 %
Air Vehicles, Rotary Wing, Flight Subsystems	3.8 %
Weapons, Conventional Missiles/Rockets	1.5 %
Space Systems, Satellites	4.4 %
C4I Systems, Airborne C4I	0.5 %
Other Functions *	83.4 %

* The Electrochemical Power Systems Facility at Crane is a national asset providing a full spectrum of support for electrochemical power systems (batteries), including RDT&E, engineering, acquisition, depot rework, manufacturing, fleet support and system retirement. Programs and projects supported include missiles and weapons, aircraft, ground support equipment, shipboard and underwater, special warfare, satellites and other space-based equipment, transportation and various other systems. This facility provides support for a wide variety of batteries incorporated within systems and platforms of the Department of the Navy (NAVSEA, NAVAIR, NSWC, NAWC, NUWC, SSPO, SPECWAR, ONR, SOCOM, SPCC & NELO), United States Marine Corps. (USMC), the Department of the Army, the Department of the Air Force, the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), Special Operations Command, Advanced Research Projects Agency (ARPA), Defense General Supply Command (DGSC), the Federal Aviation Administration (FAA), Coast Guard, Foreign Military Sales (FMA), and Private Industry.

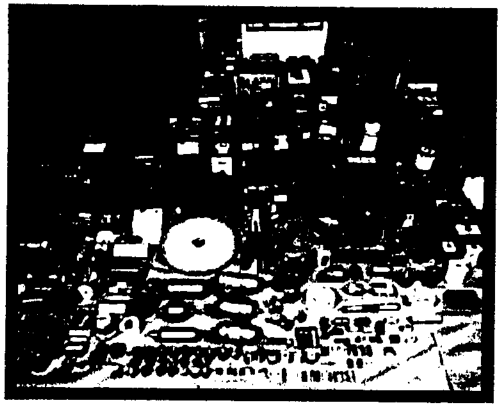


ELECTROCHEMICAL POWER SYSTEMS FACILITY

NSWC CRANE DIVISION

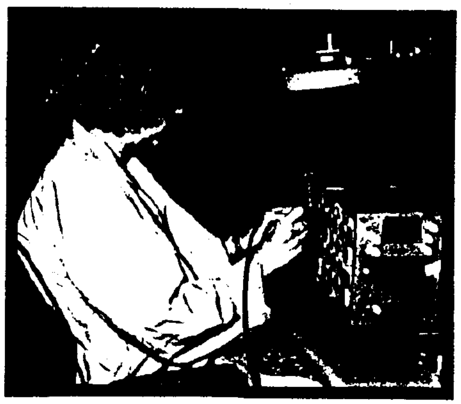
FAILURE ANALYSIS

FAMILY OF BATTERIES

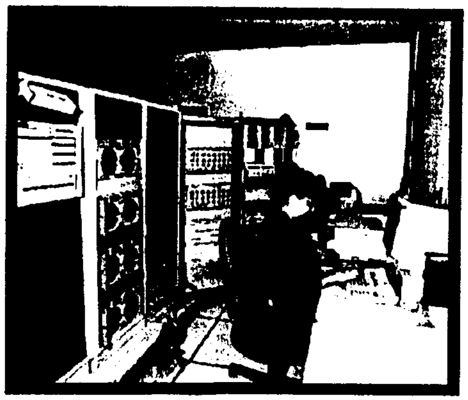


TEST CELLS

ENVIRONMENTAL

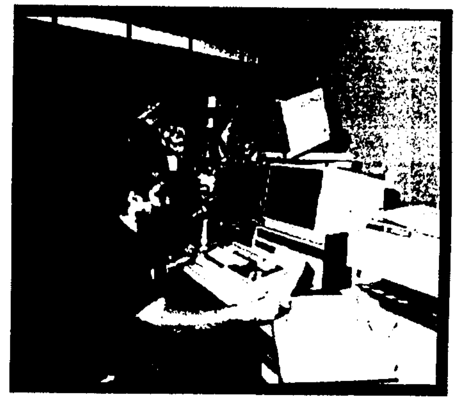


PROTOTYPE



PERFORMANCE EVALUATION

SAFETY EVALUATION



MATERIAL ANALYSIS

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Air Vehicle/ Rotary/ Avionics	Bldg 34	Technical	33.6	33.6	0
Air Vehicle/ Rotary/ Avionics	Bldg 38	Technical	18.1	18.1	0
Air Vehicle/ Rotary/ Avionics	Bldg 3235	Technical	27.4	27.4	0
Air Vehicle/ Rotary/ Avionics	Bldg 369	Storage	5.4	5.4	0
Air Vehicle/ Rotary/ Avionics	Bldg 2919	Technical	3.8	3.8	0
Air Vehicle/ Rotary/ Avionics	Bldg 2949	Technical	5.1	5.1	0
Air Vehicle/ Rotary/ Avionics	Bldg 355	Storage	.7	.7	0
Air Vehicle/ Rotary/ Avionics	Bldg 650	Storage	.6	.6	0

Air Vehicle/ Rotary/ Avionics	Bldg 652	Storage	.6	.6	.6
Air Vehicle/ Rotary/ Avionics	Bldg 916	Storage	1.1	1.1	0
Air Vehicle/ Rotary/ Avionics	Bldg 917	Storage	1.1	1.1	1.1
Air Vehicle/ Rotary/ Avionics	Bldg 157	Storage	2.1	2.1	0
Air Vehicle/ Rotary/ Avionics	Bldg 181	Technical	1.7	1.7	1.7
Air Vehicle/ Rotary/ Avionics	Bldg 301	Storage	5.4	5.4	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

AIR VEHICLES/ROTARY/FLIGHT SUBSYSTEMS
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC at the Crane Site.

*The mission for the Electrochemical Power Systems Technical Capability is:

- To assure affordable, safe, and reliable Electrochemical Power sources (batteries).

-To meet current and future performance requirements in operational environments; for the Navy and Marine Corps, the Army and Air Force, and other government agencies.

-Provide a full spectrum of support for batteries and related equipments from Research and Development (R&D) through system retirement.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered
requirements for the accomplishment of the mission.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

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3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity	
All CSF's	Crane TC's	Technical support	Co-located	Various	Various	
AirVeh,Rotary Wing,Flt Subsystem	Vitro Corp.	Private Industry	30 miles	4.2	0.2	R

These relationships are described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

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ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

Finally, the contribution of private industry is not considered critical to the mission. R

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort.

(BRAC Criteria I)

CSF- AIR VEHICLES/ROTARY/FLIGHT SUBSYSTEMS

Types of personnel	Number of Personnel				
	Government		On-Site FFRDC	On-Site SETA	
	Civilian	Military			
Technical	4R	0	0	0	R
Management (Supv)	1	0	0	0	
Other	0R	0	0	0	R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	1	0	0
Associates	1	0	0
Bachelor	2R	1	0R
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

R

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	2R	0	1R	1
Management	0	0	0	0	1
Other	0	0R	0	0R	0
Total	0	2	0	1	2

R

R

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Air Vehicles/ Rotary/ Flight Subsystems	1 R	Reducing Aircraft Battery Maintenance Costs in the U.S. Navy[1]

R

[1]IEEE Spectrum, 1992

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

AIR VEHICLE/ROTARY/FLIGHT SUBSYSTEMS

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.4	0	0	0
Engineering Development	2.9	0	0	0
In-Service Engineering	0.9	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None
Other	6	3.8	486K	V-22[1] SH-60[1] H-2[1] H-3[1] H-53[1] AH-1W[1]

[1]Program description on following page.

[1]This project functions as Cognizant Field Activity (CFA) for all technical matters pertaining to the basic design engineering, production engineering, maintenance engineering, acquisition, in-service use engineering and logistic management of <u>all</u> NAVAIRSYSCOM electrochemical power source systems and associated equipment for <u>all</u> aircraft types.

Also performs as Participating Field Activity (PFA) to provide technical assistance to activities have CFA responsibilities for specific hardware items such as engine starters, auxiliary power units (APU), etc., which contain electrochemical power devices.

This type of work is battery system development for all U.S. Navy and U. S. Marine Corps aircraft applications.

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Air Vehicles/ Rotary/Flight Subsystems	ILS, Prod Engr Support, Engr Investigations, Life Cycle Support	107.1K	0.9	UH-1, AH-1W, H-2, H-3, H-46, H-53, H-60

R

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Rotary/Flight Subsystems	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Air Vehicles/ Rotary/ Flight Subsystems(1)	569K	521K	509K	520K

Note (1) Some Fixed Wing and Rotary Wing Flight Subsystems projects share funding for common or similar applications

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Air Vehicles/ Rotary/ Avionics	Electrochemical Power Systems Facility			X	35,000K

96.2
= 33,67

The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries*. Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-

Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart*, avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

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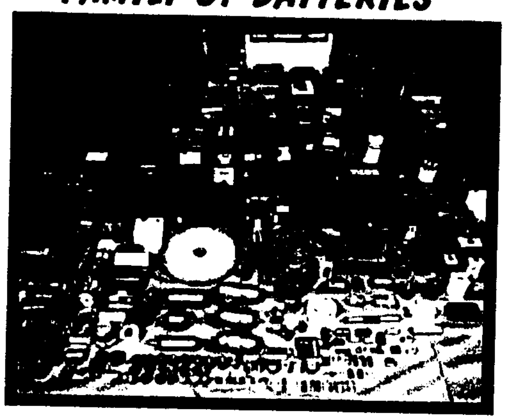
ELECTROCHEMICAL POWER SYSTEMS FACILITY	
FUNCTION	**PERCENTAGE UTILIZATION**
Air Vehicles, Fixed Wing, Avionics	0.5 %
Air Vehicles, Fixed Wing, Flight Subsystems	5.2 %
Air Vehicles, Rotary Wing, Avionics	0.7 %
Air Vehicles, Rotary Wing, Flight Subsystems	3.8 %
Weapons, Conventional Missiles/Rockets	1.5 %
Space Systems, Satellites	4.4 %
C4I Systems, Airborne C4I	0.5 %
Other Functions *	83.4 %

* The Electrochemical Power Systems Facility at Crane is a national asset providing a full spectrum of support for electrochemical power systems (batteries), including RDT&E, engineering, acquisition, depot rework, manufacturing, fleet support and system retirement. Programs and projects supported include missiles and weapons, aircraft, ground support equipment, shipboard and underwater, special warfare, satellites and other space-based equipment, transportation and various other systems. This facility provides support for a wide variety of batteries incorporated within systems and platforms of the Department of the Navy (NAVSEA, NAVAIR, NSWC, NAWC, NUWC, SSPO, SPECWAR, ONR, SOCOM, SPCC & NELO), United States Marine Corps. (USMC), the Department of the Army, the Department of the Air Force, the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), Special Operations Command, Advanced Research Projects Agency (ARPA), Defense General Supply Command (DGSC), the Federal Aviation Administration (FAA), Coast Guard, Foreign Military Sales (FMA), and Private Industry.

ELECTROCHEMICAL POWER SYSTEMS FACILITY
NSWC CRANE DIVISION

FAILURE ANALYSIS

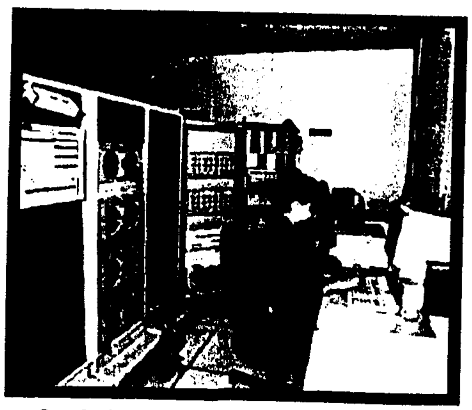
FAMILY OF BATTERIES



TEST CELLS

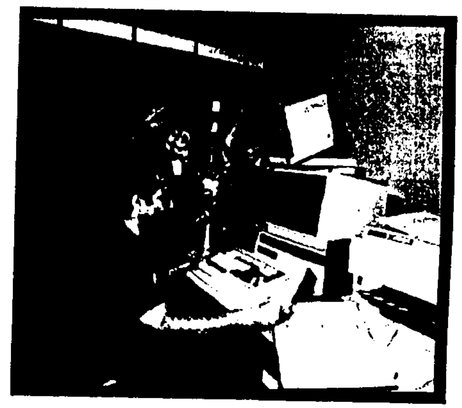
ENVIRONMENTAL

PROTOTYPE



PERFORMANCE EVALUATION

SAFETY EVALUATION



MATERIAL ANALYSIS

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 34	Technical	33.6	33.6	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 38	Technical	18.1	18.1	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 3235	Technical	27.4	27.4	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 369	Storage	5.4	5.4	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 2919	Technical	3.8	3.8	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 2949	Technical	5.1	5.1	0

Air Vehicle/ Rotary/ Flight Subsystems	Bldg 355	Storage	.7	.7	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 650	Storage	.6	.6	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 652	Storage	.6	.6	.6
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 916	Storage	1.1	1.1	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 917	Storage	1.1	1.1	1.1
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 157	Storage	2.1	2.1	0
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 181	Technical	1.7	1.7	1.7
Air Vehicle/ Rotary/ Flight Subsystems	Bldg 301	Storage	5.4	5.4	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electrochemical Power Sources - The Electrochemical Power Sources facility has a flexible facility to allow for considerable workload expansion. These include state-of-the-art equipments designed with the foresight to accommodate a wide variety of batteries, capable of multiple use, and easily upgradable. Also available are environmental equipments capable of simulating field conditions and material analysis capabilities required by each of the three services.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
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2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

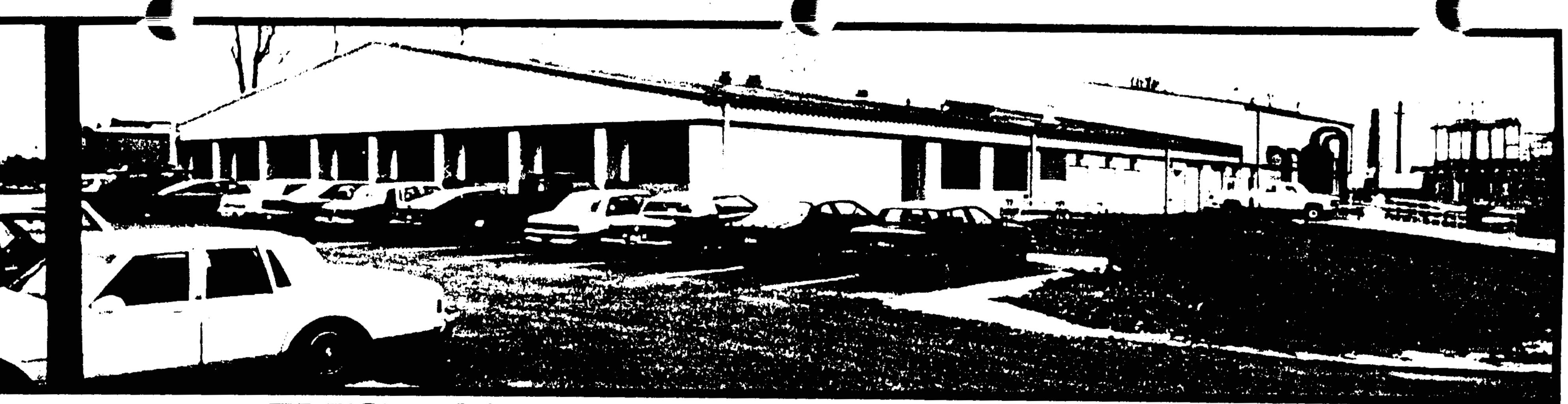
* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

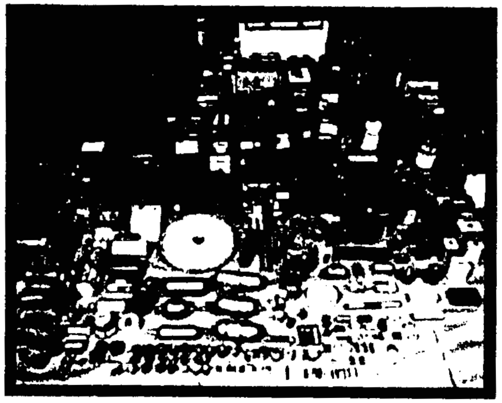


ELECTROCHEMICAL POWER SYSTEMS FACILITY

NSWC CRANE DIVISION

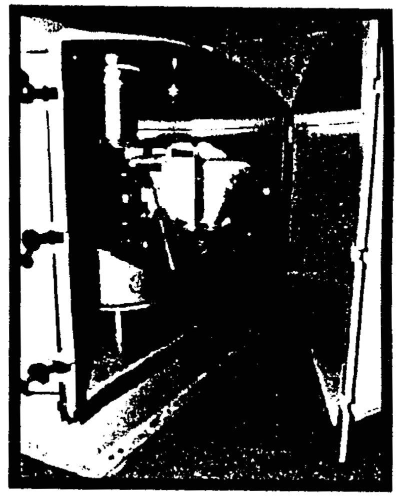
FAILURE ANALYSIS

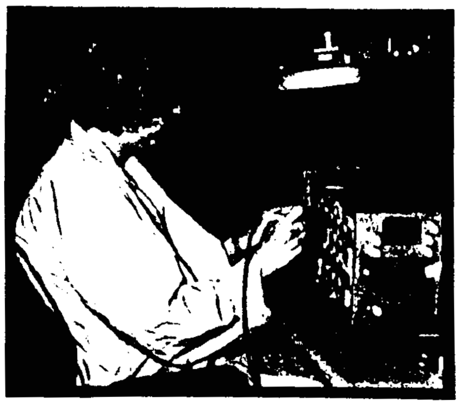
FAMILY OF BATTERIES



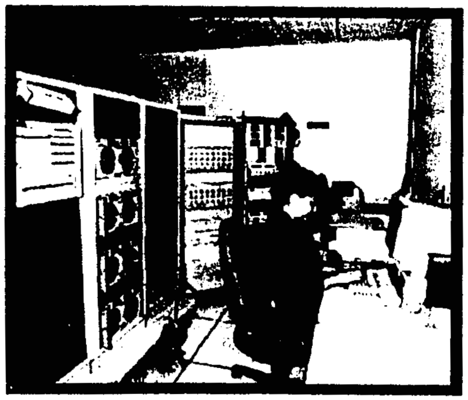
TEST CELLS

ENVIRONMENTAL



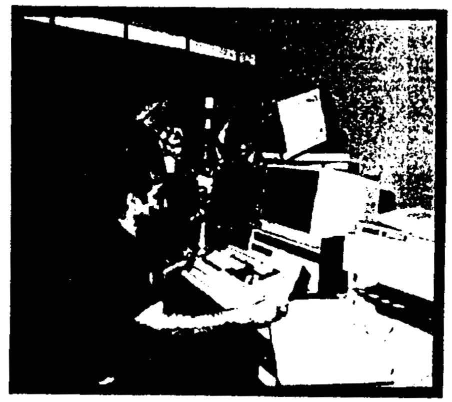


PROTOTYPE

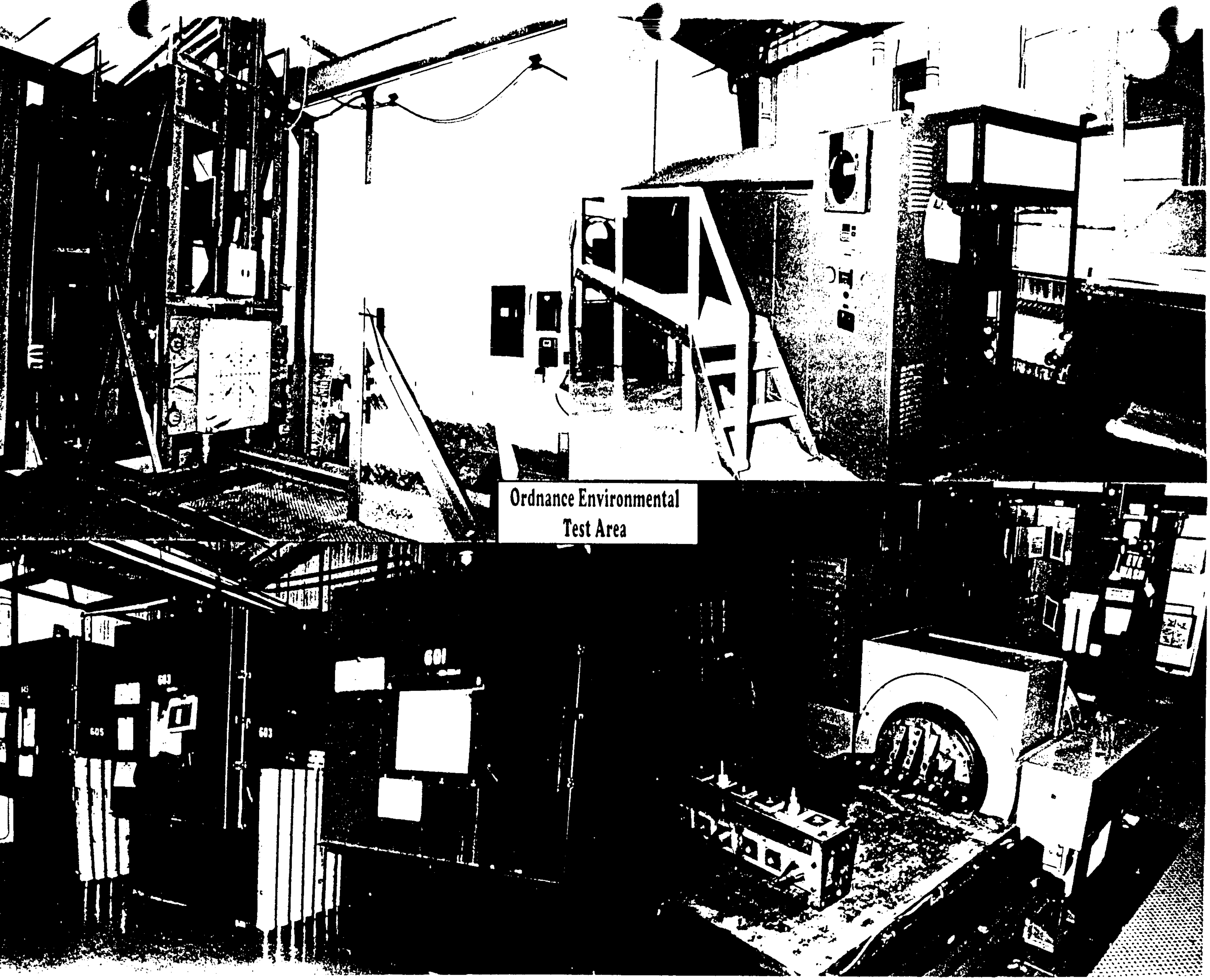


PERFORMANCE EVALUATION

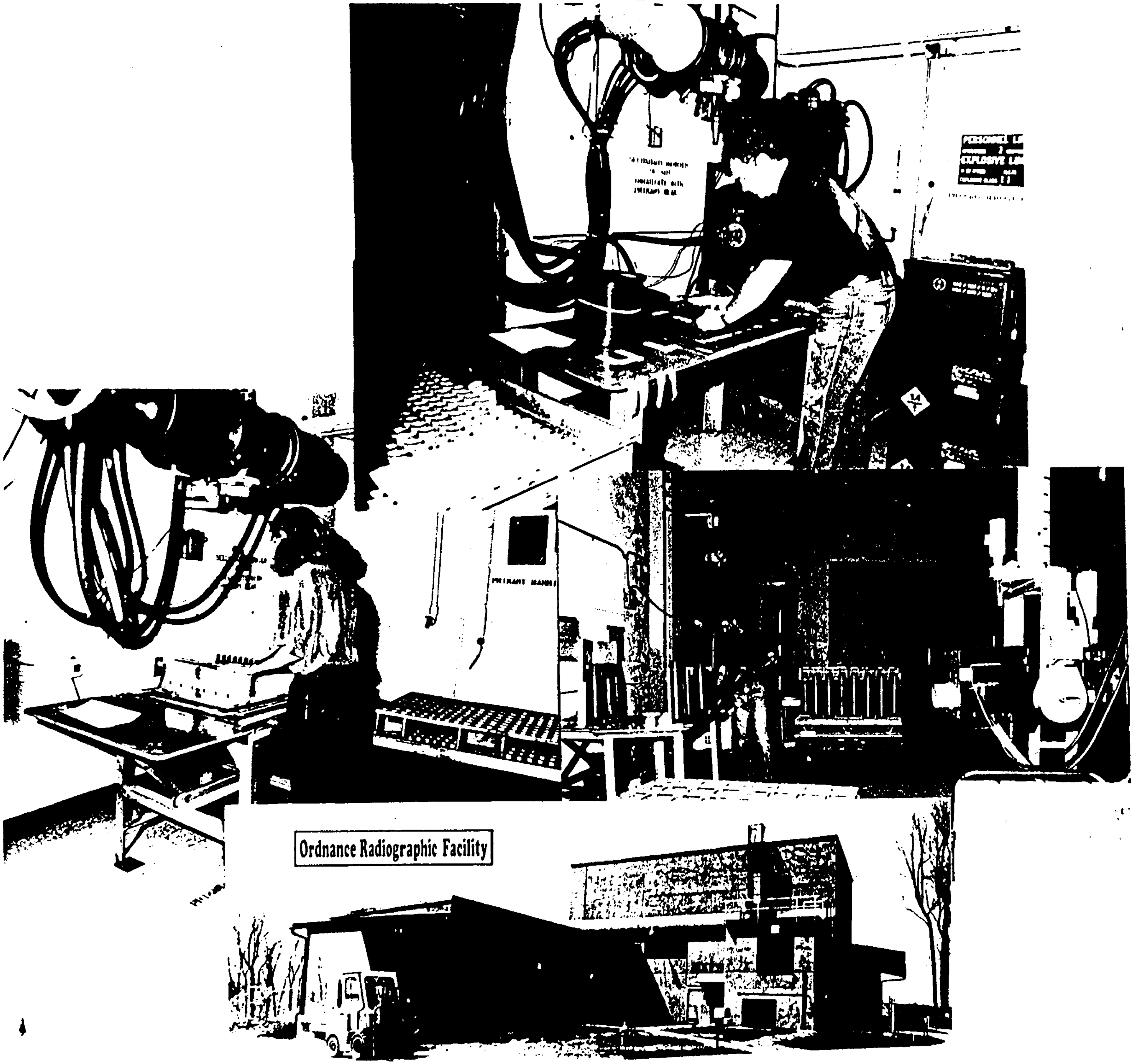
SAFETY EVALUATION



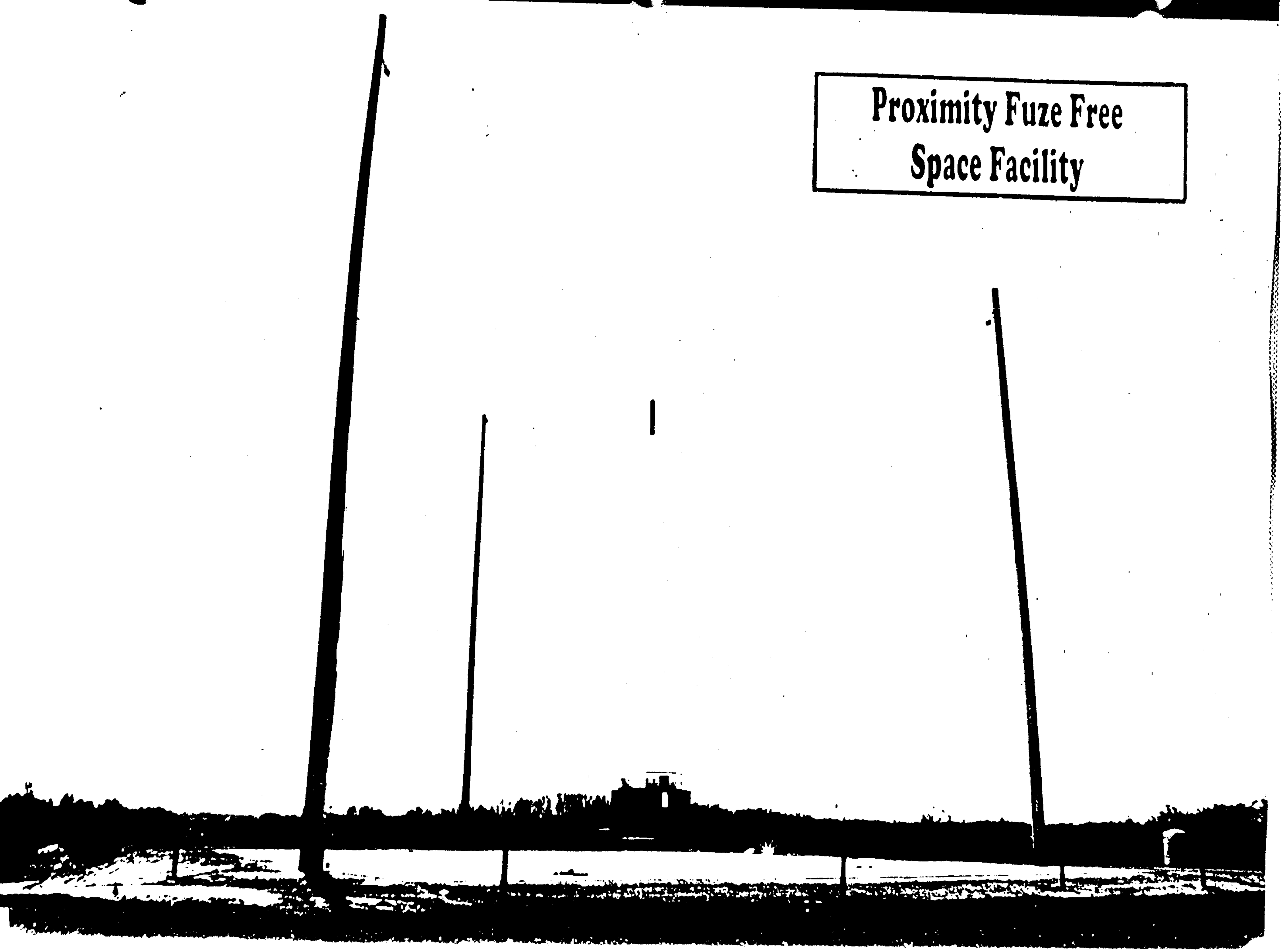
MATERIAL ANALYSIS

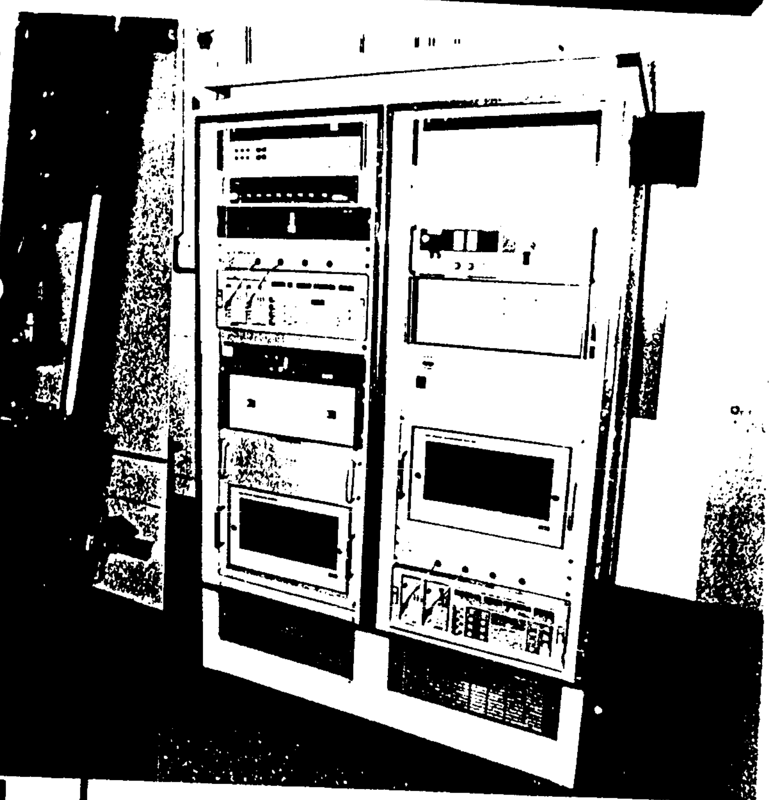


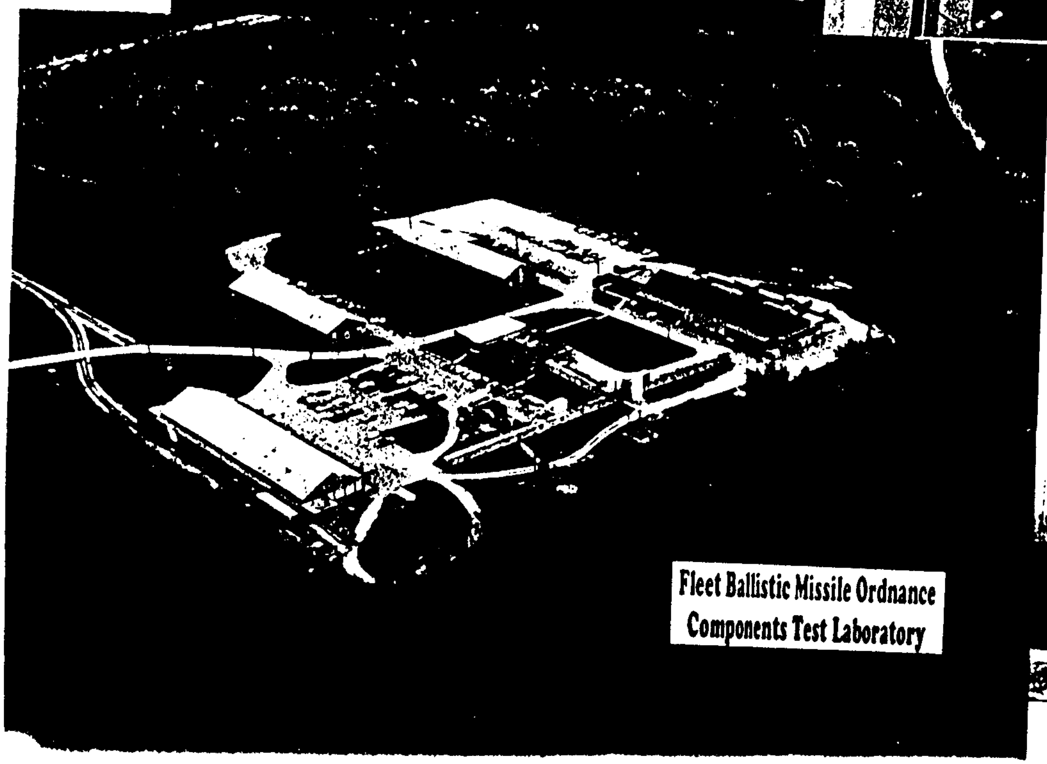
Ordnance Environmental
Test Area


Ordnance Radiographic Facility

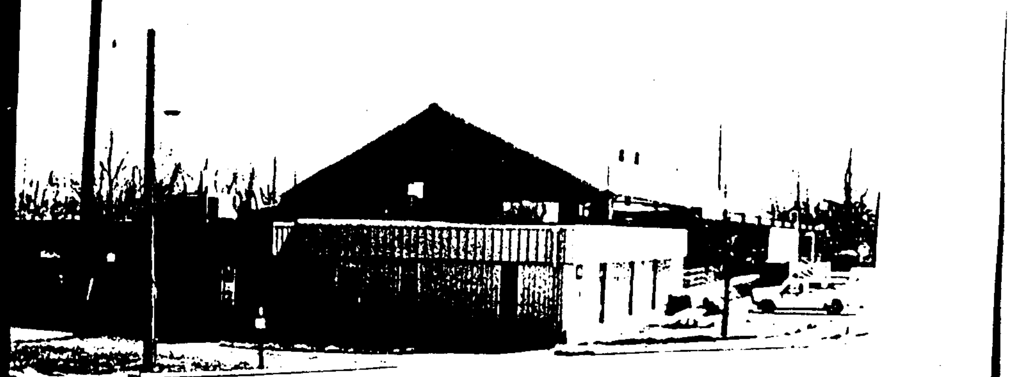
Missile Fuze


Proximity Fuze Free
Space Facility

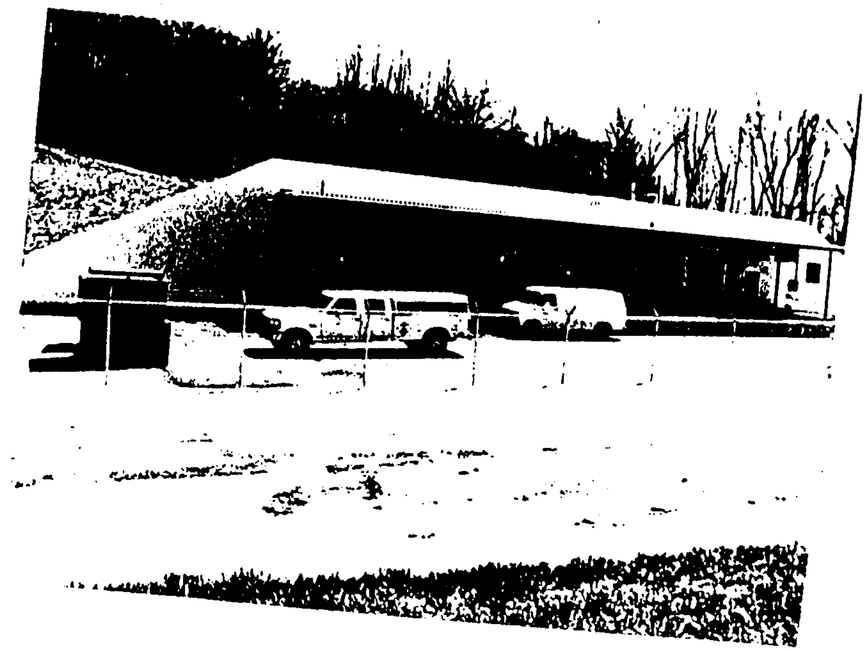


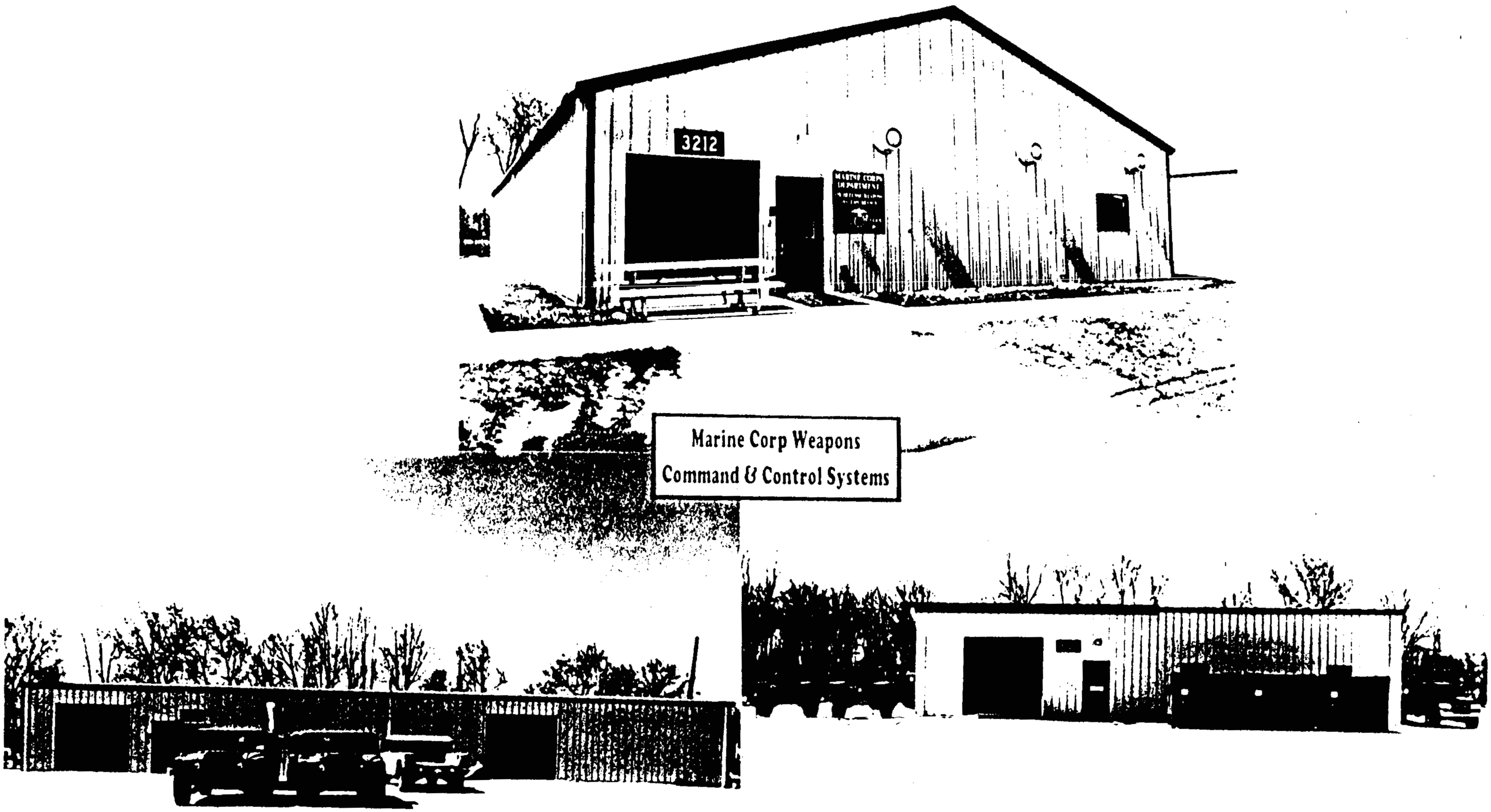


Fleet Ballistic Missile Ordnance
Components Test Laboratory

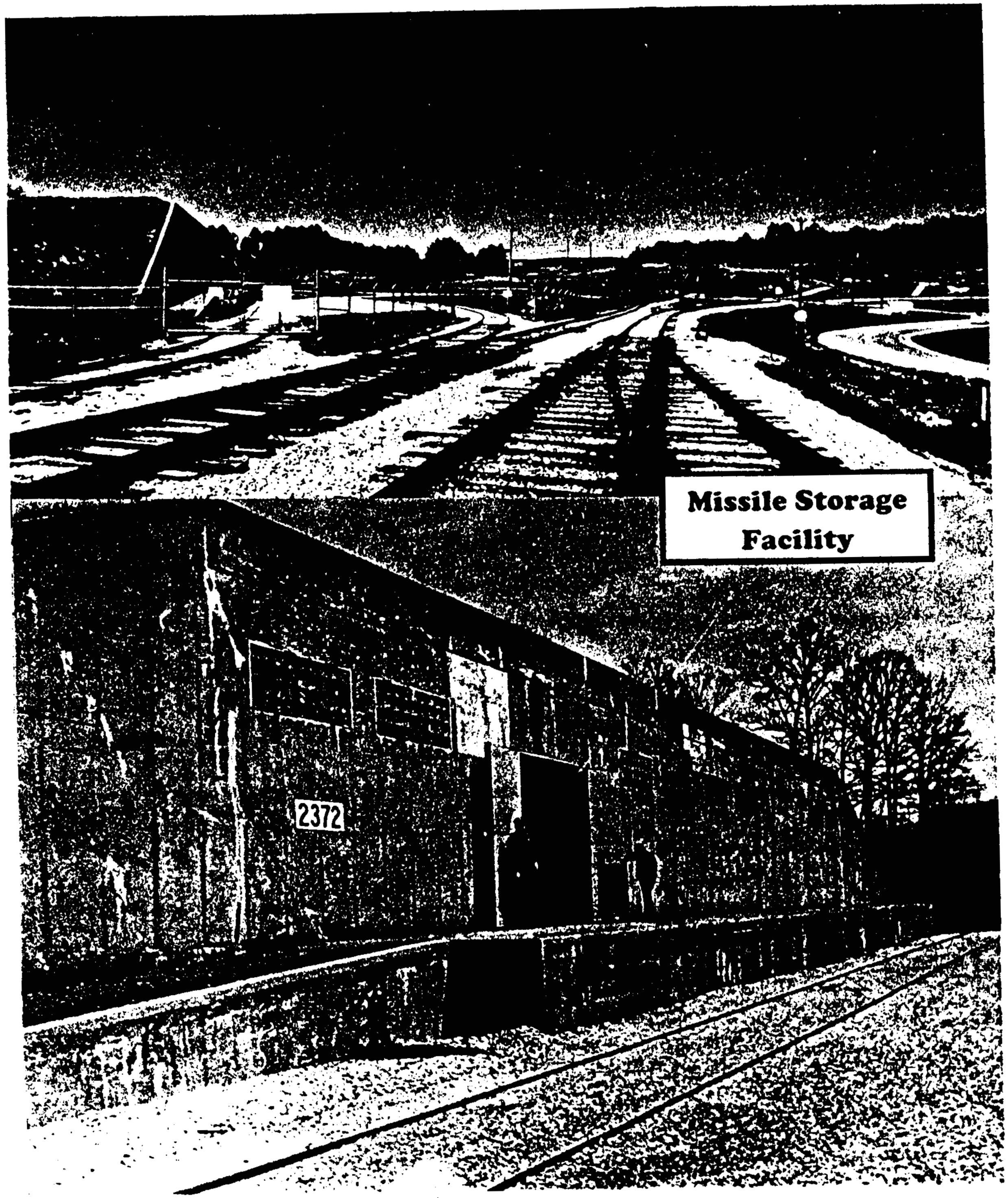


Missile Maintenance Facility




3212
Marine Corp Weapons
Command & Control Systems

Ordnance Ready
Magazine Storage


Missile Storage
Facility
2372

WEAPONS/CONVENTIONAL MISSILES/ROCKETS
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC's at the Crane Site.

*The mission for the Electrochemical Power Systems Technical Capability is:

- To assure affordable, safe, and reliable Electrochemical Power sources (batteries).

-To meet current and future performance requirements in operational environments; for the Navy and Marine Corps, the Army and Air Force, and other government agencies.

-Provide a full spectrum of support for batteries and related equipments from Research and Development (R&D) through system retirement.

*The mission for the Conventional Ammunition Technical Capability is:

-Provide engineering support for Marine Corps conventional missiles/training systems including modification, repair and testing.

-Assure all technical requirements are met to provide safe, reliable and effective products for field use.

-Provide configuration management support including technical data package and ECP control.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

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3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various
Weapons/ Conventional Missiles/ Rockets	CAAA	Ammunition Production	1 mile		2 Est.
Weapons/ Conventional Missiles/ Rockets	COMARCO	Engr Support	8 miles		8 Est.

This relationship is described in the following paragraphs. There are no other supporting organizatons/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

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Specifically applicable to this CSF, co-location of engineering functions supporting surface ship, air launched and Marine Corps ammunition (e.g., acquisition, ammunition logistics management, surveillance, modification, maintenance, testing, demilitarization and disposal) provides a synergism and efficiency that would be unavailable if these efforts were dispersed among several activities. R

Crane Army Ammunition Activity - Co-location of the Program Management and engineering functions with a major DOD ammunition production, storage, maintenance, and disposal activity, the Crane Army Ammunition Activity (CAAA) provides rapid response capability throughout the life cycle to major regional conflicts such as Operation Desert Shield/Desert Storm. Fifty-eight percent of CAAA's magazine storage (1.9 Million sq ft) contain Navy/marine Corps Ammunition assets. R

Co-location of Navy acquisition, maintenance, and demilitarization and disposal engineering functions with SMCA production operations at Crane offers excellent opportunities to support commodities applicable to this CSF. R

Comarco - The availability of the Comarco contractor is beneficial but is not critical to the accomplishment of the mission of this CSF. R

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

CSF- WEAPONS/CONVENTIONAL MISSILES/ROCKETS

Types of personnel	Number of Personnel				
	Government		On-Site FFRDC	On-Site SETA	
	Civilian	Military			
Technical	24R	0	0	0	R
Management (Supv)	1	0	0	0	
Other	0R	0	0	0	R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position			
	Technical	Management (Supv)	Other	
High School or Less	8	0	0	
Associates	2	0	0	
Bachelor	8	1	0	
Masters	3	0	0	
Doctorate (include Med/Vet/etc.)	3R	0	0R	R

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service					
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years	
Technical	0	6	4R	5	9R	R
Management	0	0	0	0	1	
Other	0	0	0R	0	0R	R
Total	0	6	4	5	10	

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Weapons/ Conventional Missiles/Rockets	1 R	The Lithium Battery[1]

R

[1]American Society of Naval Engineers Publication, August 1992

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

WEAPONS/CONVENTIONAL MISSILES/ROCKETS

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	1.7	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	21.7	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Weapons/ Conventional Missiles/Rockets	Prod Engr/ILS	2,096K	21.7	Marcorp Missiles

.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons/ Conventional Missiles/Rockets	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons/ Conventional Missiles/Rockets	1,683K	1,549K	1,567K	1,432K

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

The facilities applicable to this CSF are assets of the **Conventional Ammunition Engineering and Electrochemical Power Systems** TC's at NSWC Crane. The facilities are described in pages 108 through 112.

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Weapons/ Conventional Missiles/ Rockets	Electrochemical Power Systems Facility			X	35,000K
"	Ordnance Environmental Test Facility				15,100K
"	Ordnance Radiographic Facility				5,200K
"	Ordnance Material Characterization Laboratory			X	7,400K
"	Missile Maintenance Facility				6,300K
"	Ordnance Test Area			X	5,700K

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"	Missile Storage Facility				10,000K
"	Ordnance Ready Magazine Storage				7,600K
"	Missile Fuze Test Facility				11,800K

R

The following describes the assets of the Electrochemical Power Systems TC and their utilization relative to this CSF and other related functions.

The NSWC Crane Division Electrochemical Power Systems Facility is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries*. Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart*, avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

"	Missile Storage Facility				10,000K
"	Ordnance Ready Magazine Storage				7,600K

The following describes the assets of the Electrochemical Power Systems TC and their utilization relative to this CSF and other related functions.

The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a \$12.5 million plant, and over \$23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries*. Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart*, avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

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ELECTROCHEMICAL POWER SYSTEMS FACILITY	
FUNCTION	**PERCENTAGE UTILIZATION**
Air Vehicles, Fixed Wing, Avionics	0.5 %
Air Vehicles, Fixed Wing, Flight Subsystems	5.2 %
Air Vehicles, Rotary Wing, Avionics	0.7 %
Air Vehicles, Rotary Wing, Flight Subsystems	3.8 %
Weapons, Conventional Missiles/Rockets	1.5 %
Space Systems, Satellites	4.4 %
C4I Systems, Airborne C4I	0.5 %
Other Functions *	83.4 %

* The Electrochemical Power Systems Facility at Crane is a national asset providing a full spectrum of support for electrochemical power systems (batteries), including RDT&E, engineering, acquisition, depot rework, manufacturing, fleet support and system retirement. Programs and projects supported include missiles and weapons, aircraft, ground support equipment, shipboard and underwater, special warfare, satellites and other space-based equipment, transportation and various other systems. This facility provides support for a wide variety of batteries incorporated within systems and platforms of the Department of the Navy (NAVSEA, NAVAIR, NSWC, NAWC, NUWC, SSPO, SPECWAR, ONR, SOCOM, SPCC & NELO), United States Marine Corps. (USMC), the Department of the Army, the Department of the Air Force, the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), Special Operations Command, Advanced Research Projects Agency (ARPA), Defense General Supply Command (DGSC), the Federal Aviation Administration (FAA), Coast Guard, Foreign Military Sales (FMA), and Private Industry.

The following table lists the major facilities of the Conventional Ammunition Engineerng TC. The information in the table describes the percent the facilities are shared between CSF's applicable to Data Call #12 and other related functions. Some facilities are described in the text that are not included in the table because they are minor and supporting facilities. Other related functions includes support to acquisition engineering functions at NSWC Crane. Support is provided primarily for components of Air/Surface Ship Combat systems using energetics, pyrothechnics, propellents and explosives.

Major Facility or Equipment Description	Weapons Guns & Ammunition	Weapons Conventional Missiles & Rkts	Cruise Missiles	Other Related Functions
Ordnance Environmental Test Facility	49.6%	20.9%	0.0%	29.5%
Ordnance Radiographic Test Facility	64.9%	8.1%	0.0%	27.0%
Ordnance Ready Magazine Storage	52.3%	23.4%	0.0%	24.3%
Ordnance Material Characterization Laboratory	13.0%	9.0%	0.0%	78.0%
Ordnance Test Area	70.0%	21.0%	0.0%	9.0%
Missile Maintenance Facility	0.0%	100.0%	0.0%	0.0%
Missile Storage Facility	0.0%	100.0%	0.0%	0.0%
Missile Fuze Test Facility	0.0%	97.3%	1.0%	1.7% R

The following table lists the **major** facilities of the **Conventional Ammunition Engineerng** TC. The information in the table describes the percent the facilities are shared between CSF's applicable to Data Call #12 and other related functions. Some facilities are described in the text that are not included in the table because they are **minor and supporting facilities.** Other related functions includes support to acquisition engineering functions at NSWC Crane. Support is provided primarily for components of Air/Surface Ship Combat systems using energetics, pyrothechnics, propellents and explosives.

Major Facility or Equipment Description	Weapons Guns & Ammunition	Weapons Conven-tional Missiles & Rkts	Other Related Functions	
Ordnance Environmental Test Facility	49.6%	20.9%	29.5%	
Ordnance Radiographic Test Facility	64.9%	8.1%	27.0%	
Ordnance Ready Magazine Storage	52.3%	23.4%	24.3%	
Ordnance Material Characterization Laboratory	13.0%	9.0%	78.0%	
Ordnance Test Area	70.0%	21.0%	9.0%	
Missile Maintenance Facility	0.0%	100.0%	0.0%	R
Missile Storage Facility	0.0%	100.0%	0.0%	R

In the **Ordnance Environmental Test** facilities the design, selection and procurement of test equipment and facilities have been made with the test and evaluation of explosive and other hazardous materials in mind. Environmental test facilities and equipment are available to do vibration, shock, temperature, humidity, altitude, jolt, jumble, sunshine and rain, sand and dust, and salt spray. Environmental test facilities are contained in four buildings with 20,000 square feet.

The **Ordnance Radiographic Facility** provides radiographic testing of ordnance items for the three Services. Radiographic inspection capabilities include both real time and conventional X-ray. A special high bay exposure room with a high energy accelerator is available for radiographic inspection of very large items, e.g. 2,000 pound bombs, that can be brought in on trucks/trailers and X-rayed without unloading. The radiographic facilities are in two buildings with 7,100 square feet.

Ordnance Ready Magazine Storage in Support of Ordnance Engineering Directorate provides ordnance receiving, shipping and storage for the various Programs of the Directorate. The facilities are used to receive a wide variety of ammunition and explosives for the Directorate. After receipt, the ordnance is either forwarded immediately to the user or placed in storage magazines temporarily until ready for evaluation. Total number of magazines is 37 with 57,400 square feet of storage space.

The **Ordnance Material Characterization Laboratory** provides chemical and metallurgical laboratories for performing failure evaluations, thermal characterization analyses, physical and chemical properties of materials and materials compatibility of explosives, propellants, pyrotechnics, metals, polymers, ceramics, adhesives, coatings and compositions. Accelerated aging studies of ordnance materials complete with temperature controlled environments for isothermal studies as well as temperature cycling studies are provided in an ordnance qualified facility. In addition to the normal quality evaluation and safety tests of ordnance materials such as impact, friction and electrostatic sensitivity, vacuum and thermal stability, self-heating and ignition the Division operates a complete thermal characterization laboratory. This laboratory has six microcalorimeters to infer long term aging characteristics, an Accelerated Rate Calorimeter and numerous thermal analyzers and differential scanning calorimeters.

The **Ordnance Test Area** provides test ranges and facilities for first article, lot acceptance, surveillance, qualification and safety testing of pyrotechnic, demolition and conventional ammunition items. The test areas have a total of 88 unencumbered acres and are supported by eleven buildings (5600 square feet). In addition to normal function testing the ranges also support Insensitive Munitions Testing on All-Up-Rounds (pyrotechnic, demolition and conventional ammunition) including Fast and Slow Cookoff, Bullet Impact and Sympathetic Detonation. Specialized equipment includes a Remote

Ammunition Breakdown Facility, a Rockeye Bomblet Drop and Air Launch Facility, a Forty Foot Drop Tower, a Grenade Launch Range and 100 and 300 foot Towers for suspension and testing of Aircraft Parachute Flares, Practice Bombs, Infrared Decoy Flares and Obscurants.

Missile Maintenance Facility performs intermediate level maintenance on STINGER air defense missiles and TOW and DRAGON anti-armor missiles. Engineering support services are available for test equipment and test fixture design, maintenance line layout and missile configuration monitoring and control. The larger of two facilities is a 19,000 square foot reinforced concrete multi-bay structure designed to minimize personnel injuries and capability loss in the event of an explosive incident. A second smaller facility is a 5,000 square foot earth covered structure designed to allow performance of minor maintenance and double as a shipping and receiving facility. Both structures are protected by static and ordnance grounding systems and lightning protection systems. Both facilities are DOD safety site approved and with no explosive operating waivers or exemptions.

Missile Storage Facilities perform storage of preposition war reserve Navy and Marine Corps Stinger Missiles and Marine Corps Tow and Dragon Missiles. Perform receipt, storage, and issue of training missiles for the Marine Corps. Urgent missile delivery capability to operational areas worldwide is provided via Wright Patterson Air Force Base, Dayton, Ohio. Total storage space for Risk Category 1 arms, ammunition and explosives (AA&E) is 45,000 square feet. Total storage space for Risk Category 2 AA&E is 50,000 square feet.

Missile Fuze Test Facility provides for testing a wide variety of missile fuzing components (warhead section components). Equipment used includes centrifuge, burn rate/velocity tester, active optical test ranges, leak detectors and many specialized pieces of equipment. This test equipment supports production acceptance, surveillance, and maintenance of these fuzing components. Approximately 25 missiles are supported including STANDARD, TOMAHAWK and SIDEWINDER. This effort supports the Navy as well as joint programs with the Air Force, Army, Foreign Military Sales and private parties.

Ammunition Breakdown Facility, a Rockeye Bomblet Drop and Air Launch Facility, a Forty Foot Drop Tower, a Grenade Launch Range and 100 and 300 foot Towers for suspension and testing of Aircraft Parachute Flares, Practice Bombs, Infrared Decoy Flares and Obscurants.

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3.5 Expansion Potential

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons/ Conventional Missiles/ Rockets	Bldg 34	Technical	33.6	33.6	0
Weapons/ Conventional Missiles/ Rockets	Bldg 38	Technical	18.1	18.1	0
Weapons/ Conventional Missiles/ Rockets	Bldg 3235	Technical	27.4	27.4	0
Weapons/ Conventional Missiles/ Rockets	Bldg 369	Storage	5.4	5.4	0
Weapons/ Conventional Missiles/ Rockets	Bldg 2919	Technical	3.8	3.8	0
Weapons/ Conventional Missiles/ Rockets	Bldg 2949	Technical	5.1	5.1	0

Weapons/ Conventional Missiles/ Rockets	Bldg 355	Storage	.7	.7	0
Weapons/ Conventional Missiles/ Rockets	Bldg 650	Storage	.6	.6	0
Weapons/ Conventional Missiles/ Rockets	Bldg 652	Storage	.6	.6	.6
Weapons/ Conventional Missiles/ Rockets	Bldg 916	Storage	1.1	1.1	0
Weapons/ Conventional Missiles/ Rockets	Bldg 917	Storage	1.1	1.1	1.1
Weapons/ Conventional Missiles/ Rockets	Bldg 157	Storage	2.1	2.1	0
Weapons/ Conventional Missiles/ Rockets	Bldg 181	Technical	1.7	1.7	1.7
Weapons/ Conventional Missiles/ Rockets	Bldg 301	Storage	5.4	5.4	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electrochemical Power Sources - The Electrochemical Power Sources facility has a flexible facility to allow for considerable workload expansion. These include state-of-the-art equipments designed with the foresight to accommodate a wide variety of batteries, capable of multiple use, and easily upgradable. Also available are environmental equipments capable of simulating field conditions and material analysis capabilities required by each of the three services.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

C4I SYSTEMS/GROUND MOBILE C4I
COMMON SUPPORT FUNCTION

__SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs):__ Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC at the Crane Site.

*The mission for the Conventional Ammunition Technical Capability is:

-Provide engineering support for Marine Corps ground equipmnent/systems including modification, repair and testing.

-Assure all technical requirements during acquisition are incorporated into equipment to ensure safe, reliable and effective products for field use.

-Provide configuration management services including technical data documentation and ECP control.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

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3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various
C4I Systems/ Ground Mobile C4I	CAAA	Ammunition Production	1 mile		6 Est.
C4I Systems/ Ground Mobile C4I	COMARCO	Engr Support	8 miles		15 Est.

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

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Specifically for this CSF, co-location of engineering functions supporting surface ship, air launched and Marine Crops ammunition (e.g., acquisition, ammunition logistics management, surveillance, modification, maintenance, testing, demilitarization and disposal) provides a synergism and efficiency that would be unavailable if these efforts were dispersed among several activities. R

Crane Army Ammunition Activity - Co-location of the Program Management and engineering functions with a major DOD ammunition production, storage, maintenance, and disposal activity, the Crane Army Ammunition Activity (CAAA) provides rapid response capability throughout the life cycle to major regional conflicts such as Operation Desert Shield/Desert Storm. Fifty-eight percent of CAAA's magazine storage (1.9 Million sq ft) contain Navy/marine Corps Ammunition assets. R

Co-location of Navy acquisition, maintenance, and demilitarization and disposal engineering functions with SMCA production operations at Crane offers excellent opportunities to support commodities applicable to this CSF.

Comarco - The availability of the Comarco contractor is beneficial but is not critical to the accomplishment of the mission of this CSF. R

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

CSF- C4I SYSTEMS/GROUND MOBILE C4I

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	28	0	0	0
Management (Supv)	2	0	0	0
Other	0	0	0	0

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	4	0	0
Associates	4	0	0
Bachelor	20	0	0
Masters	0	2	0
Doctorate (include Med/Vet/etc.)	0	0	0

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	14	4	1	9
Management	0	0	0	0	2
Other	0	0	0	0	0
Total	0	14	4	1	11

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
C4I Systems/ Ground Mobile C4I	0	

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

C4I SYSTEMS/GROUND MOBILE C4I

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.0	0	0	0
Engineering Development	14.6	0	0	0
In-Service Engineering	15.6	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None
Other	5	14.6	1,827K	Marine Corp Ground Equip: HAWK[1] Light Armored Vehicle Air Defense Variant (LAV-AD)[2] AVENGER[3] Amphibious Assault Vehicle (AAV) Mine Rake[4] Air Defense Command and Control (AD-C&C)[5]

[illegible]VK Missile Ground Support Equipment: The Marine Corps, the only remaining Service with a HAWK [illegible]le requirement, is involved with Raytheon Corporation in the downsizing of ground support equipment in order to make it more rapidly deployable. NSWC Crane Division is acting as the Marine Corps Technical Agent to review engineering changes proposed by the contractor and advise the Marine Corps on the effectiveness and impact of these changes.

[2]Light Armored Vehicle Air Defense Variant (LAV-AD): The Marine Corps has chosen the General Electric Company version of the LAV-AD and is proceeding with its testing. NSWC Crane Division is supplying Blast Test Vehicles built around the STINGER launch motor to test the vehicles ability to withstand missile launches. In addition, the Crane Division is providing the Marine Corps with information on a possible compatible missile to STINGER, whether foreign or domestic in origin for improved anti-helicopter defense.

[3]AVENGER - The Marine Corps is fielding a modified AVENGER System to support its low altitude air defense capability. NSWC Crane Division is providing engineering and technical support in developing a Command and Control capability using non-developed items. In addition, the Crane Division is analyzing the AVENGER for weaknesses in original design when compared with Marine Corps requirements. Determined weaknesses will be identified with solutions.

[4]Amphibious Assault Vehicle (AAV) Mine Rake: The Marine Corps continues to look for equipment to proof beaches and other areas of land mines. NSWC Crane Division has provided engineering and rapid prototype fabrication capability to build full size models for the purpose of testing to prove a concept. This has employed the large fabrication capabilities of the Louisville Site. Concepts that are proven will then go through the regular Milestone process to final competitive procurement.

[5]Air Defense Command and Control: The Marine Corps is moving to net its low altitude air defense capabilities into a unified command and control structure. This will involve various inputs such as HAWK radar, AWACS, Aegis, etc. feeding information that can be used to assist the AVENGER and man-portable STINGER teams in locating hostile aircraft and helicopters. NSWC Crane Division is providing prototype design capability and systems integration capability to produce hardware and test the ideas being developed using Fleet Marine input.

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
C4I Systems/ Ground Mobile C4I	Prod Engr Support/ILS	2,725K	15.6	Marine Corps Ground Equipment

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
C4I Systems/ Ground Mobile C4I	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
C4I Systems/ Ground Mobile C4I	3,754K	3,300K	2,340K	2,095K

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3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

The facility utilized for this CSF is dedicated to this function only. It is described as follows.

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
C4ISystems/ ground Mobile C4I	Marine Corps Weapons Command & Control Systems Development & Production				900K

The Marine/Corps Weapons Command and Control Systems Development and Production performs prototype development and low rate initial production of Command and Control electronics shelters. Engineering support services available for systems integration and configuration control. Three separate facilities comprise the prototype complex. A 5,000 square foot facility is used for subsystem assembly and checkout. Two 4,000 square foot facilities are used for complete system assembly and checkout. All three facilities are pre-engineered steel structures. No special equipment or utilities are required.

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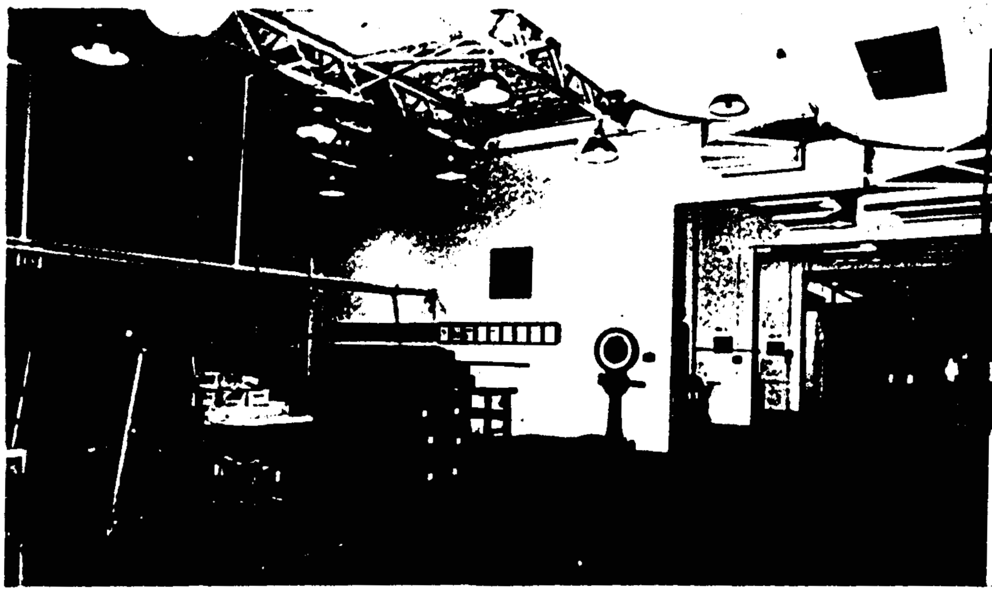
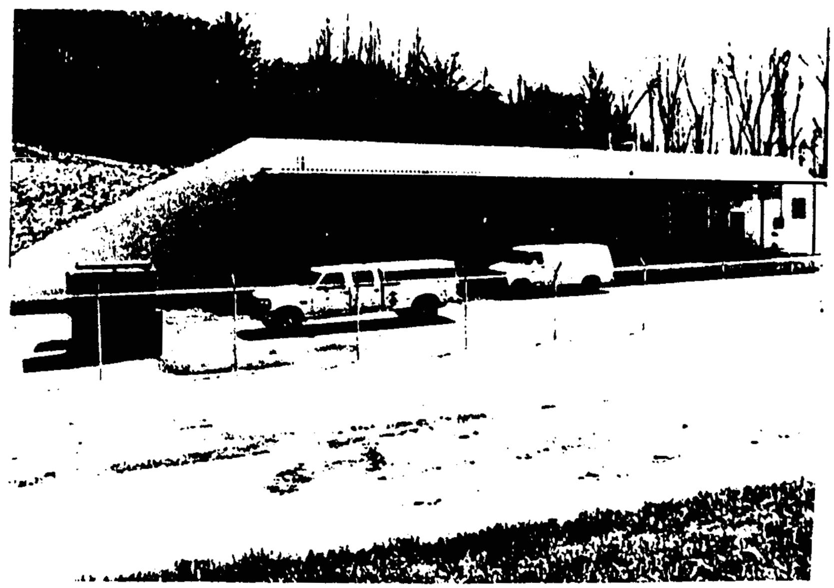
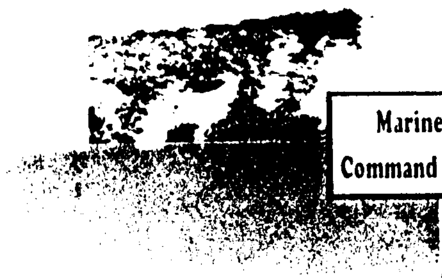
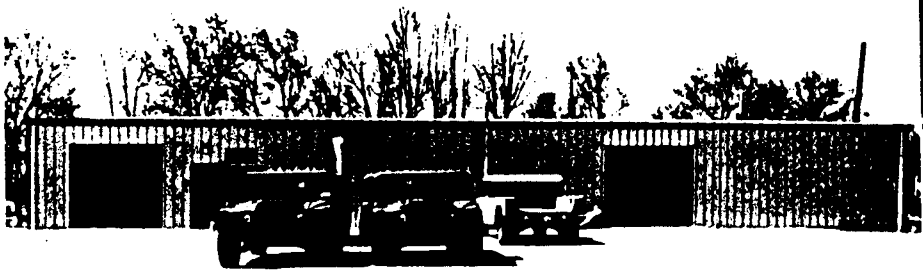


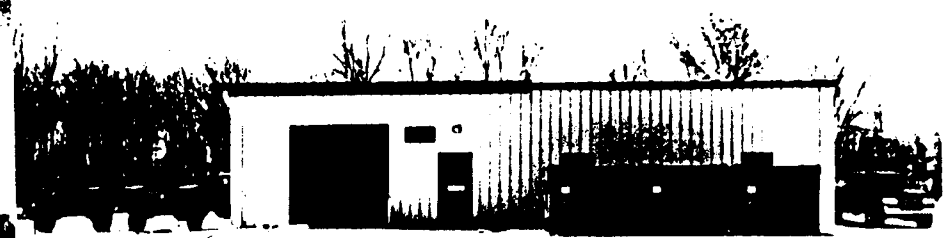
Missile Maintenance Facility

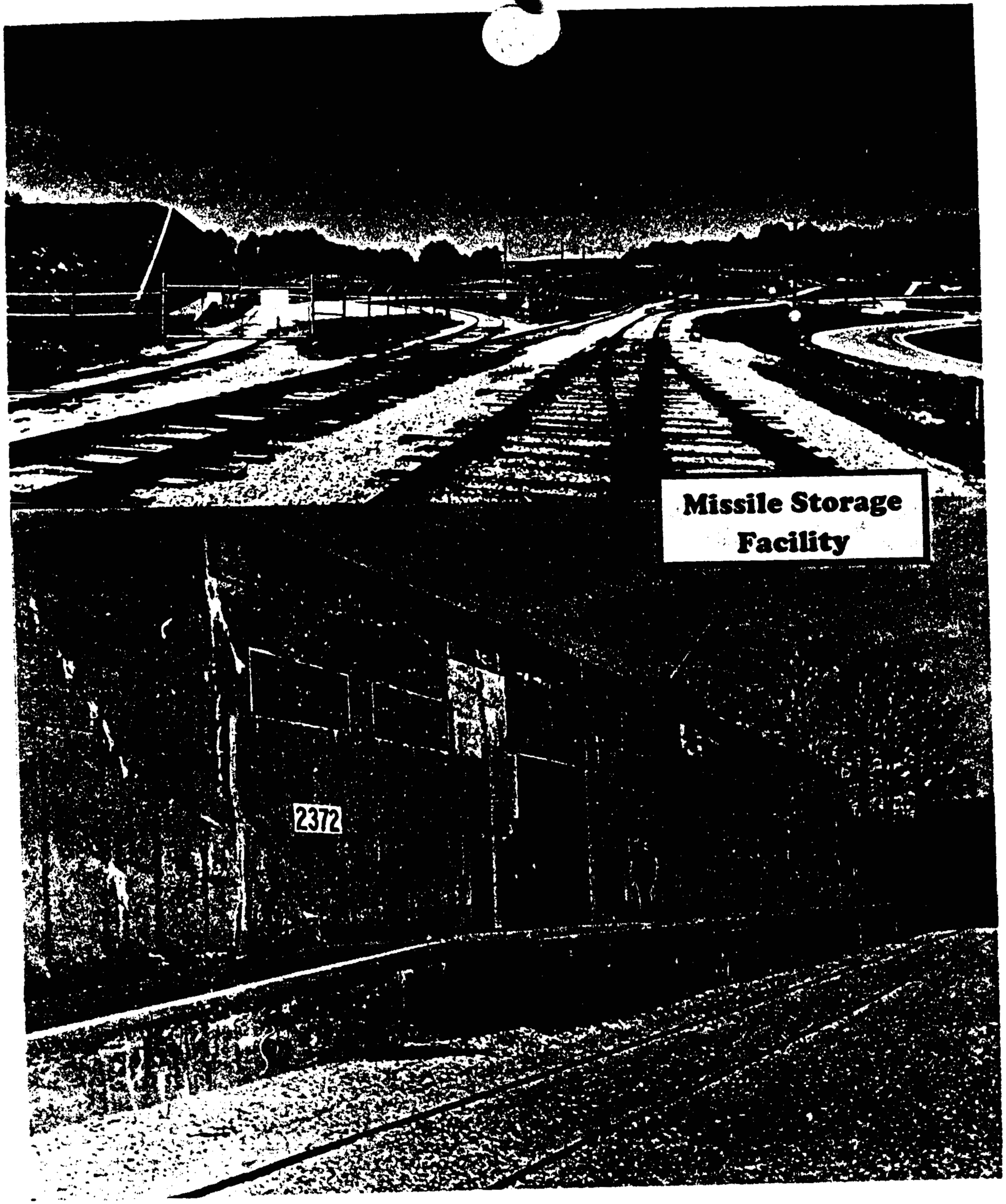




Marine Corp Weapons
Command & Control Systems






Missile Storage
Facility
2372


Ordnance Ready
Magazine Storage

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
C4I Systems/ Ground Mobile C4I	None				

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

WEAPONS/GUNS AND AMMUNITION
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC's at the Crane Site.

* The mission for the **Pyrotechnics** Technical Capability is:

- Perform research, design, development, test and evaluation and engineering support for navy pyrotechnics

- Provide technical support to pyrotechnic producers to assure safe, reliable and effective pyrotechnics for fleet use

- Provide program management support to headquarters for pyro technics

- Technical support focal point office for airborne expendables and aircraft self-protection

* The mission for the **Conventional Ammunition** Technical Capability is:

- Provide program management support for Navy Conventional Ammunition

- Assure all fleet requirements are incorporated into conventional ammunition and safe, reliable effective products are available for fleet use.

- Perform qualification, acceptance, surveillance and failure analysis testing

- Demilitarization and disposal processes

- Provide program management support and information system design to Naval Ordnance Center

* The mission of the **Small Arms** Technical Capability is:

- Full life-cycle support including design, development, acquisition, engineering, test and evaluation, logistics management and maintenance.

- Secure storage areas for weapons and ammunition.

- Rapid prototyping capability.

- Prototype ammunition loading facility.

- 100-meter underground firing range with capability to test up to 25mm guns in addition to lasers and night-vision equipment under controlled lighting and temperature conditions. Climatic test cell to fire under temperature/humidity extremes and freezing rain.

-1000-yard outdoor firing range with capability to test up to 25mm guns in addition to lasers and night-vision equipment. Six computer-controlled automatic targeting system stations from 50 yards to 1000 yards. Full range of ballistic test equipment including doppler radar, IR video, flash photometer, and ballistic computer.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered
requirements for the accomplishment of the mission.

1000 Yard Outdoor Firing Range - Removal from high density population centers allows for the testing of small arms weapons, mounts and ammunition without restrictions based on noise pollution requirements. Also, **this location reduces security risks due to infiltration or threat of urban riot.**

Low Background Radiation - As an ordnance storage and control facility, radio frequency radiators are controlled internally, enabling testing that requires low background noise (large acreage and remote rural area with no large commercial radiators).

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

Ordnance Test Area - the activity has a variance from open burning regulations of the State of Indiana. The variance is needed to allow the activity to perform cook-off testing. Cook-off testing involves open burning of JP fuel. State of Indiana Regulations 326 IAC 4 prohibits open burning in general. Variances are issued for special needs with approval by The Commissioner of the State Environmental Office.

3.1.3 Environmental Constraints:

The Ordnance Test Area (OTA) is a RCRA solid Waste Management Unit (SWMU). The site was a relatively low priority to the U.S. EPA. RCRA Facility Investigations Release Assessment for groundwater, surface water, and soil should begin within the next two years. Although the SWMU designation and need for sampling dictates caution when expanding the site's volume or spectrum, it is not anticipated that the scope of work at the OTA would be deleteriously constrained.

3.1.4 Special Support Infrastructure:

Ranges - Operational ranges exist for ordnance demolition, ordnance burning, ordnance test area which includes the capability to do various drop tests from 250' towers, destructive tests of ordnance items and pyrotechnics, flare test operations, inside small arms firing range for environmental control and night vision tests, outside small arms firing ranges which includes a 1000 yard range, antenna ranges (for the test of large shipboard antennas and small antennas', and a 120 foot deep by 4000 feet long lake for the test of acoustic devices and other devices as required. These ranges in conjunction with the extensive testing laboratories and equipment gives the Center a extensive testing laboratories and equipment gives the Center a full range of capability to do all tests except for full operation testing of shipboard and aircraft ordnance and electronics at this one location. This virtually eliminates shipping hazards and costs.

Ordnance Storage - The Crane site has 1679 explosive ordnance storage magazines. Most of these magazines are leased to the Crane Army Ammunition Activity who stores navy and Army conventional ammunition. the storage f conventional ammunitions and pyrotechnics has been essential to the testing and evaluations of the products. The site has the ability to store a full spectrum of ammunition products with expansion capability.

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

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Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity	
All CSF's	Crane TC's	Technical Support	Co-located	Various	Various	
Weapons/ Guns & Ammo	Comarco	Engr Support	8 Miles	168.2	12 Est.	R
"	CAAA	Ammo Production	1 Mile	168.2	7 Est.	R
"	Crane Div. Louisville site	Government	100 miles	168.2	1.0	R

These relationships are described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

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Specifically applicable to this CSF, co-location of engineering functions supporting surface ship, air launched and Marine Crops ammunition (e.g., acquisition, ammunition logistics management, surveillance, modification, maintenance, testing, demilitarization and disposal) provides a synergism and efficiency that would be unavailable if these efforts were dispersed among several activities. R

Crane Army Ammunition Activity - Co-location of the Program Management and engineering functions with a major DOD ammunition production, storage, maintenance, and disposal activity, the Crane Army Ammunition Activity (CAAA), provides rapid response capability throughout the life cycle to major regional conflicts such as Operation Desert Shield/Desert Storm. Fifty-eight percent of CAAA's magazine storage (1.9 Million sq ft) contain Navy/marine Corps Ammunition assets. R

Co-location of Navy acquisition, maintenance, and demilitarization and disposal engineering functions with SMCA production operations at Crane offers excellent opportunities to support commodities applicable to this CSF.

Comarco - The availability of the Comarco contractor is beneficial but is not critical to the accomplishment of the mission of this CSF. R

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort.

(BRAC Criteria I)

CSF- Weapons/Guns & Ammunition

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	158R	0	0	0	R
Management (Supv)	15	0	0	0
Other	0R	0	0	0	R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position			
	Technical	Management (Supv)	Other	
High School or Less	51R	2	OR	R
Associates	7	0	0	
Bachelor	84R	10	0R	R
Masters	12R	2	0R	R
Doctorate (include Med/Vet/etc.)	4	1	0	

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service					
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years	
Technical	0	50R	28R	6R	74R	R
Management	0	0	1	0	14	
Other	0	0R	0R	0R	0R	R
Total	0	50R	29	6	88	R

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Weapons/ Guns & Ammunition	0 R	

R

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

WEAPONS/GUNS AND AMMUNITION

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	21.0	0	0	0
Engineering Development	34.0	0	0	0
In-Service Engineering	112.5 R	0	0	0

R

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	Offensive Handgun	7.5	1,009K	The program is to provide the United States Special Operations Command with an offensive Handgun Weapon system. The system is for use by Special Operations Forces in close-quarter battle during target site infiltration. The system will include an enhanced .45 caliber pistol with detachable suppressor and detachable laser aiming model.

ACAT III/IV	**Rifleman's Breaching Munitions**	**4.1**	**65K**	**The Rifleman's Breaching Munitions (RBM) program conducted evaluation testing on a candidate Non-Developmental Item munitions system intended to fulfill the requirements of the U.S. Marine Corps. The evaluation effort determined that additional design efforts were required to enable the RBM system to meet the type classification requirements.**
Other	**11**	**1.5**	**99K**	**Shoulder-Launched Multi-Purpose Assault Weapon (SMAW) High Explosive Anti-Armor (HEAA) Warhead[1]**
		0.6	**120K**	**Ordnance Reclam/Environ[2]**
		0.8	**164K**	**Conventional Munitions[3]**
		11.6	**2,755K**	**Special Purpose Munitions[4]**
		7.9	**475K**	**Navy Small Arms[5]**
		2.8	**174K**	**Craft Life Improvement Program (CLIP)[6]**
		2.5	**381K**	**ALE-47 Block Development[7]**
		5.0	**1,000K**	**Kinematic Decoy Flare Development[8]**
		8.7	**1,550K**	**Advanced Strategic Tactical Expendables (ASTE)[9]**
		1.4	**140K**	**F-22 Flare Tests[10]**
		0.5	**38K**	**Army Missile Tests[11]**

R

[1]Shoulder-Launched Multi-Purpose Assault Weapon (SMAW) High Explosive Anti-Armor (HEAA) Warhead: The Marine Corps is developing through NSWC Dahlgren Division a new more capable warhead for the SMAW. NSWC Crane Division, as the In-Service Engineering Agent for both the weapon and the ammunition round, is providing input on Engineering Change Proposals by the developing contractor and is maintaining the configuration data base for eventual use during the warhead's service life.

[2]Develops and demonstrates technologies to treat and/or dispose of propellants, explosives and pyrotechnics addressing specific needs of the Navy to comply with all relevant environmental standards.

[3]The objective of this program is to evaluate the performance of commercially available 5.56mm and 9mm frangible ammunition to determine the best cartridge for: (1) eliminating the hazardous waste contaminates; (2) Close Quarter Battle (CQB) indoor training; (3) outdoor training; and (4) possible use for CQB operation and Military Operations in Urban Terrain (MOUT). This program includes evaluation testing and may include a complete type classification of the cartridges.

[4]This program was established by Naval Sea Systems Command to provide non-standard munitions (including small arms ammunition, cartridge and rifle grenades, and shoulder fired rockets) to a specific Navy user activity in a timely manner. Crane provides technical support in the form of procurement package preparation and monitoring, safety and evaluation testing, and field engineering support for this program.

[5]The project provides full life cycle support for the Navy's small arms, ammunition, mounts, and armament systems in the areas of design and in-service engineering, logistics support, maintenance and data management. As the principal field activity, Navy small arms readiness consistent with mobilization requirements is provided and maintained.

[6]The CLIP program supports the SPECWAR small boat Navy by providing an ongoing Product Improvement Program directed at resolving fleet identified and documented problems relative to in-service hardware. The CLIP program encompasses the entire craft; the Crane portion of the program only encompasses small arms [illegible]d efforts.

[7]The ALE-47 work provides engineering support for the development of the magazines for the ALE-47 Countermeasure Dispensing System. The ALE-47 is the next generation dispensing system for aircraft self-protection expendable countermeasures.

[8]The Kinematic Decoy Flare work is an effort to develop an improved decoy flare to counter advanced infrared missile seeker threats.

[9]The ASTE work is an engineering effort to develop new decoy flare concepts for the Air Force program in Advanced Strategic and Tactical Expendables. The effort involves the design and testing of several different flare concepts.

[10]The F-22 work is an effort to provide infrared spectral and intensity measurements of various Air Force decoy flare concepts designed for the F-22 under flight test conditions. The effort is performed in the Transient Velocity Windstream Apparatus at Crane.

[11]Support Missile Tests is an effort to provide missile test support to the Office of the Test Directorate at White Sands, NM. This is a field test to test various seekers against decoy flares.

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Weapons/ Guns & Ammunition	Life Cycle Support	1518K	16.5	Small Caliber
Weapons/ Guns & Ammunition	Prod Engr Supp	75K	1.1	Bomb Pyro
Weapons/ Guns & Ammunition	Prod Engr Supp/ ILS	555K	3.2	Markers
Weapons/ Guns & Ammunition	Prod Engr Supp/ ILS/FMS	60K	2.0	Decoys
Weapons/ Guns & Ammunition	Prod Engr Supp/ ILS	379K	3.1	Target Flare
Weapons/ Guns & Ammunition	Prod Engr Supp	6,991K	46.1	Navy/MC Ammunition
Weapons/ Guns & Ammunition	Ord Demil/ Disp Engr	565K	11.3	Navy/MC Ammunition
Weapons/ Guns & Ammunition	Prod Engr Supp/ ILS	4,069K R	29.2 R	Navy/MC Ammunition

R

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons/ Guns & Ammunition	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons/ Guns & Ammunition	27,190K R	21,950K R	22,834K R	26,184K R

R

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3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. BRAC Criteria II)

The facilities applicable to this CSF are assets of the **Conventional Ammunition, Pyrotechnics and Small Arms** TC's at NSWC Crane. The facilities are described in the following pages.

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Weapons/ Guns & Ammunition	Ord Envr Test Fac				15,100K
"	Ord Rad Test Fac				5,200K
"	Demil Eval Fac				6,000K
"	Prox Fuze Test Fac				400K
"	Ord Comp Test Lab (Bldg 142)				3,000K
"	Ord Comp Test Lab (Bldg 365)				1,100K
"	Ord Ready Mag Storage				7,600K

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Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Weapons/ Guns & Ammunition	Weapons Development & Test Facility				2,995K
"	Weapons Development /Administrative				338K
"	Outdoor Firing Range (1000 yard)				523K
"	Automated IR Test Facility			X	3,000K
"	Transient Velocity Windstream Facility			X	700K
"	Ordnance Prototype Manufacturing Facility			X	10,100K
"	Ordnance Material Characterization laboratory			X	7,400K
"	Ordnance Test Area			X	5,700K

The following table and paragraphs lists the **major** facilities of the **Conventional Ammuntiion** TC at NSWC Crane. The information in the table describes the percent the facilities are shared between CSF's applicable to Data Call #12 and other related functions. In some cases facilities are described in the text that are not included in the table because they are **minor and supporting facilities.**

Other related functions includes support to acquisition engineering functions at NSWC Crane. Support is provided primarily for components of Air/Surface Ship Combat systems using energetics, pyrotechnics, propellents and explosives.

Major Facility or Equipment Description	Weapons Guns & Ammunition	Weapons Conventional Missiles & Rkts	Other Related Functions	
Ordnance Environmental Test Facility	49.6%	20.9%	29.5%	
Ordnance Radiographic Test Facility	64.9%	8.1%	27.0%	
Ordnance Ready Magazine Storage	52.3%	23.4%	24.3%	
Ordnance Material Characterization Laboratory	13.0%	9.0%	78.0%	
Ordnance Test Area	70.0%	21.0%	9.0%	
Demil Evaluation Facility	100.0%	0.0%	0.0%	R
Proximity Fuze Test Facility	100.0%	0.0%	0.0%	R
Ordnance Components Test Facility (Building 142)	100.0%	0.0%	0.0%	F

Major Facility or Equipment Description	Weapons Guns & Ammunition	Weapons Conven-tional Missiles & Rkts	Other Related Functions	
Ordnance Components Test Facility (Building 365)	100.0%	0.0%	0.0%	R
Weapons Development & Test Facility	100.0%	0.0%	0.0%	R
Weapons Development/Administrative	100.0%	0.0%	0.0%	R
Outdoor Firing Range (1000 yard)	100.0%	0.0%	0.0%	R
Automated IR Test Facility	100.0%	0.0%	0.0%	R
Transient Velocity Windstream Facility	100.0%	0.0%	0.0%	R
Ordnance Prototype Manufacturing Facility	100.0%	0.0%	0.0%	R

In the **Ordnance Environmental Test** facilities the design, selection and procurement of test equipment and facilities have been made with the test and evaluation of explosive and other hazardous materials in mind. Environmental test facilities and equipment are available to do vibration, shock, temperature, humidity, altitude, jolt, jumble, sunshine and rain, sand and dust, and salt spray. Environmental test facilities are contained in four buildings with 20,000 square feet. This facility is used approximately 10 percent of the time in support of "laboratory" operations. The remainder of the usage is for acquisition support.

The **Ordnance Radiographic Facility** provides radiographic testing of ordnance items for the three Services. Radiographic inspection capabilities include both real time and conventional X-ray. A special high bay exposure room with a high energy accelerator is available for radiographic inspection of very large items, e.g. 2,000 pound bombs, that can be brought in on trucks/trailers and X-rayed without unloading. The radiographic facilities are in two buildings with 7,100 square feet. This facility is used approximately 10 percent of the time in support of "laboratory" operations. The remainder of the usage is for acquisition support.

The **Demilitarization Evaluation Facility** is a new facility just being completed that allows for remote disassembly of various ordnance devices up to 500 lbs. The facility has the capability of pilot operations for the demilitarization of conventional and hazardous ordnance items. The facility's design is such that all waste is contained and disposed of without escaping to the environment.

The **Proximity Fuze Free Space Facility** (10,000 ft reflectivity plane) is the certified Navy Standard used to establish the electronic values of Radio Frequency Fuze Standard Monitors. These Standard Monitors are used for correlation of systems used in production and testing of Proximity Fuzes by both the private and public sectors. Radio Frequency Proximity Fuzes are used on all the major caliber ammunition in the Navy stockpile.

The Ordnance Components Test Facility (Buildings 142/365) provides lot acceptance and surveillance testing of numerous ordnance components and sub-assemblies as well as small explosives devices. The facility has test cells which provide capability for controlled and monitored function testing of components. Test cells are also equipped with capability for remote breakdown and dissection of ordnance components for failure analysis. Ordnance items tested in the facilities include demolition devices, fuzes, linear explosives, detonators and offboard countermeasures.

Ordnance Ready Magazine Storage in Support of Ordnance Engineering Directorate provides ordnance receiving, shipping and storage for the various Programs of the Directorate. The facilities are used to receive a wide variety of ammunition and explosives for the Directorate. After receipt, the ordnance is either forwarded immediately to the user or placed in storage magazines temporarily until ready for evaluation. Total number of magazines is 37 with 57,400 square feet of storage space.

The **Ordnance Material Characterization Laboratory** provides chemical and metallurgical laboratories for performing failure evaluations, thermal characterization analyses, physical and chemical properties of materials and materials compatibility of explosives, propellants, pyrotechnics, metals, polymers, ceramics, adhesives, coatings and compositions. Accelerated aging studies of ordnance materials complete with temperature controlled environments for isothermal studies as well as temperature cycling studies are provided in an ordnance qualified facility. In addition to the normal quality evaluation and safety tests of ordnance materials such as impact, friction and electrostatic sensitivity, vacuum and thermal stability, self-heating and ignition the Division operates a complete thermal characterization laboratory. This laboratory has six microcalorimeters to infer long term aging characteristics, an Accelerated Rate Calorimeter and numerous thermal analyzers and differential scanning calorimeters. The facility is used approximately 20% for "laboratory" functions. The remaining efforts include acquisition engineering support, normal analytical chemistry functions and process control testing of ordnance production.

The **Ordnance Test Area** provides test ranges and facilities for first article, lot acceptance, surveillance, qualification and safety testing of pyrotechnic, demolition and conventional ammunition items. The test areas have a total of 88 unencumbered acres and are supported by eleven buildings (5600 square feet). In addition to normal function testing the ranges also support Insensitive Munitions Testing on All-Up-Rounds (pyrotechnic, demolition and conventional ammunition) including Fast and Slow Cookoff, Bullet Impact and Sympathetic Detonation. Specialized equipment includes a Remote Ammunition Breakdown Facility, a Rockeye Bomblet Drop and Air Launch Facility, a Forty Foot Drop Tower, a Grenade Launch Range and 100 and 300 foot Towers for suspension and testing of Aircraft Parachute Flares, Practice Bombs, Infrared Decoy Flares and Obscurants. The facility is used approximately 20% of the time for "laboratory" functions. The remainder of the time is in support of acquisition engineering efforts.

The following faciities are assets of the **Pyrotechnics** TC.

The **Automated Infrared Test Facility** is identified as the Navy Standard for the measurement of infrared decoy flare intensity performance. The facility is used for development, first article, lot acceptance, surveillance and qualification testing of infrared decoy flares. The facility is contained in Building 366 and consists of a burning chamber capable of burning decoy flares up to 1000 grams, a 70 meter measurement tunnel with an environmentally controlled measurement room and several support rooms adjacent to the tunnel. Because of the many variables associated with infrared intensity measurements a single standard measurement facility is required to provide a legally defensible measurement of decoy flare performance. This facility is used approximately 20 percent of the time for "laboratory" measurements. The remainder of the time is used for acquisition engineering support efforts.

The facility provides at least three unique capabilities that are non-existent at any other facility in the United States. The most significant is that measurements in the facility have been correlated with actual air to air measurements of the intensity and effectiveness of infrared decoys thus providing a baseline for all future development efforts. This baseline allows us to be able to minimize the amount of costly air to air testing required during the development of new devices. The facility provides a controllable air stream profile. In this facility we can change the air stream profile to simulate different flare launch conditions and different profiles for our more advanced flares. The facility also provides for robotic loading of the pyrotechnic devices - the most hazardous operation in the testing. This robotic loading provides an extra measure of safety for the operator in that he/she is not exposed to the combustion products of the flare burnings.

The **Transient Velocity Windstream Facility** is a free jet expansion windstream apparatus designed to provide adjustable air velocity versus time profiles to simulate the launch of decoy flares from a moving aircraft. The outdoor apparatus consists of several air compressors, a bank of air storage tanks, a computer controlled valve to control air flow and a nozzle and can produce air flows from 0.1 to 0.9 Mach at either a constant velocity or, under computer control, a variable velocity versus time profile to simulate the observed velocity versus time behavior experienced by a decoy flare when ejected from an aircraft. Radiant and spectral radiant intensity are measured at distances of 30, 80 and 500 meters and at angles from 10 - 300 degrees around the device. The facility is also equipped to measure thrust and drag from next generation flares which might have some kinematic or aerodynamic design properties.

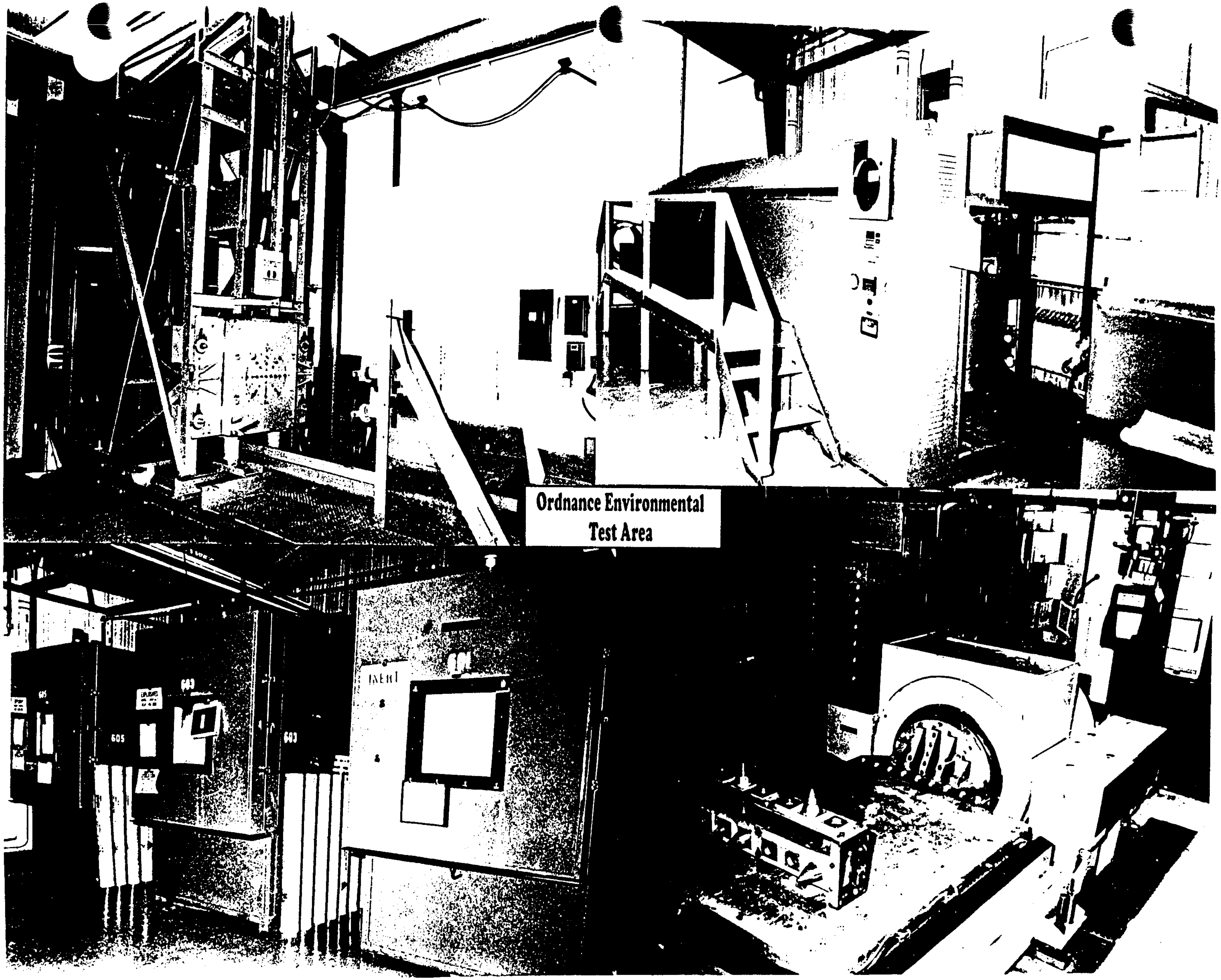
This combination of space, facility and measurement equipment is unique in the United States and is used by all of DOD and several private contractors to assess the performance of decoy flares and concepts in a test apparatus that is much less expensive to operate than an actual air-to-air test. The facility use is 100% "laboratory" testing.

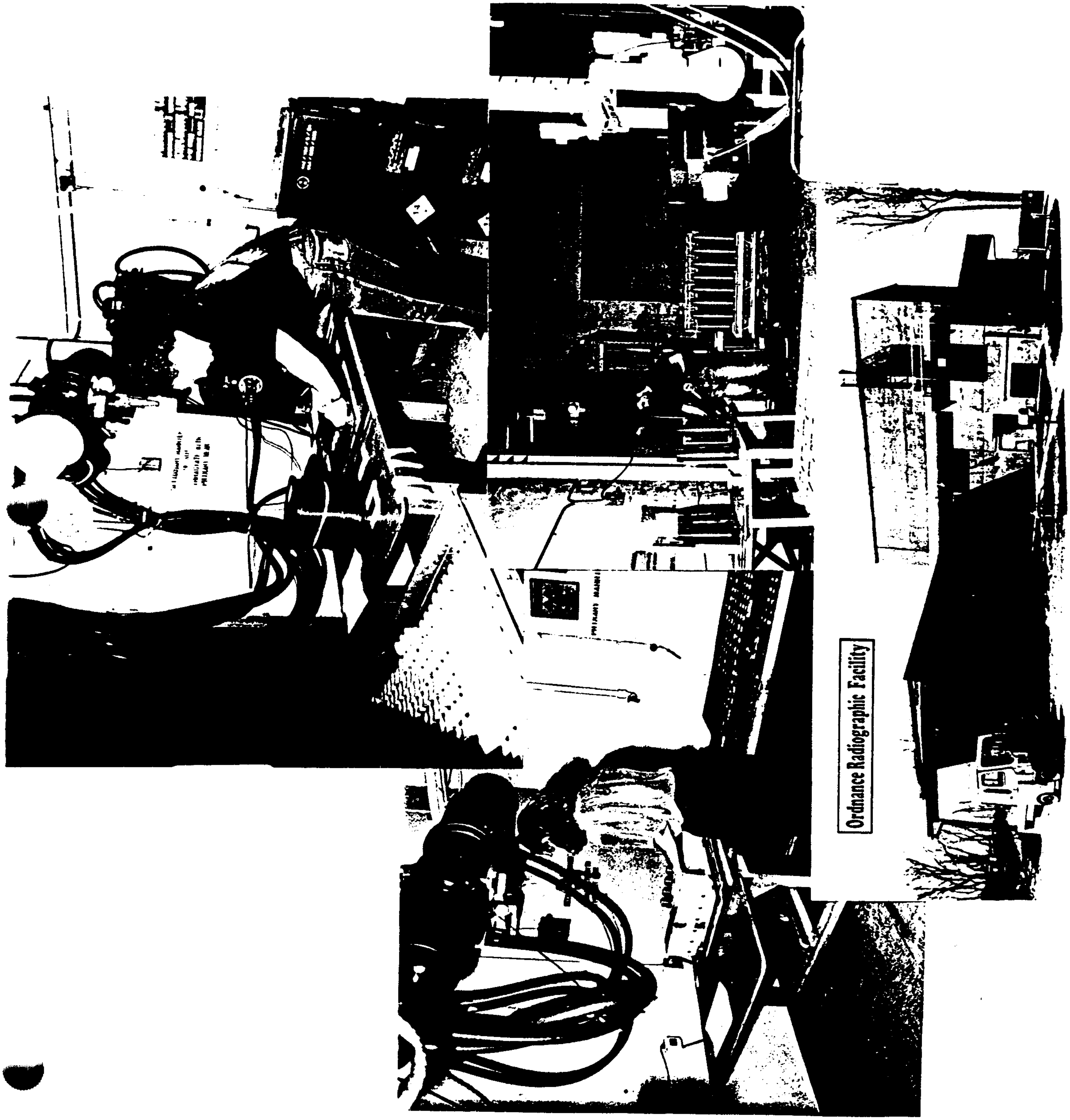
While not a "laboratory" in the strictest definition, the **Ordnance Prototype Manufacturing Facility** is used for the development and production of prototype models of new designs and product improvements of pyrotechnic devices and explosive components. Mixing, blending and consolidation equipment allows the development and production of a large range of pyrotechnic compositions for infrared, colored and illuminating flares, colored smokes and other devices. Virtually any pyrotechnic composition in the DOD inventory can be made in this facility. Capabilities include remotely operated extruders and presses for consolidating compositions which can then be remotely cut and machined to required configurations. Hardware components from either plastic or metal are fabricated internally with capabilities including vacuum forming machines, foam fabrication equipment, injection molding, lathes, milling machines, etc. Hardware and compositions are assembled into devices to allow test and evaluation to be performed to evaluate the new or modified design. The facility has been used for limited production and low rate initial production during both Vietnam and Desert Storm to produce infrared decoy flares in a short time for Fleet use. The facility is contained in four buildings - two of which are specially constructed with explosive containment cells with blow out walls to allow the production of pyrotechnic compositions - occupying approximately 30000 sq. ft. This facility is used to support "laboratory" operations approximately 50 % of the time. The remaining 50% is used for acquisition engineering support functions.

The following facilities are assets of the **Small Arms** TC.

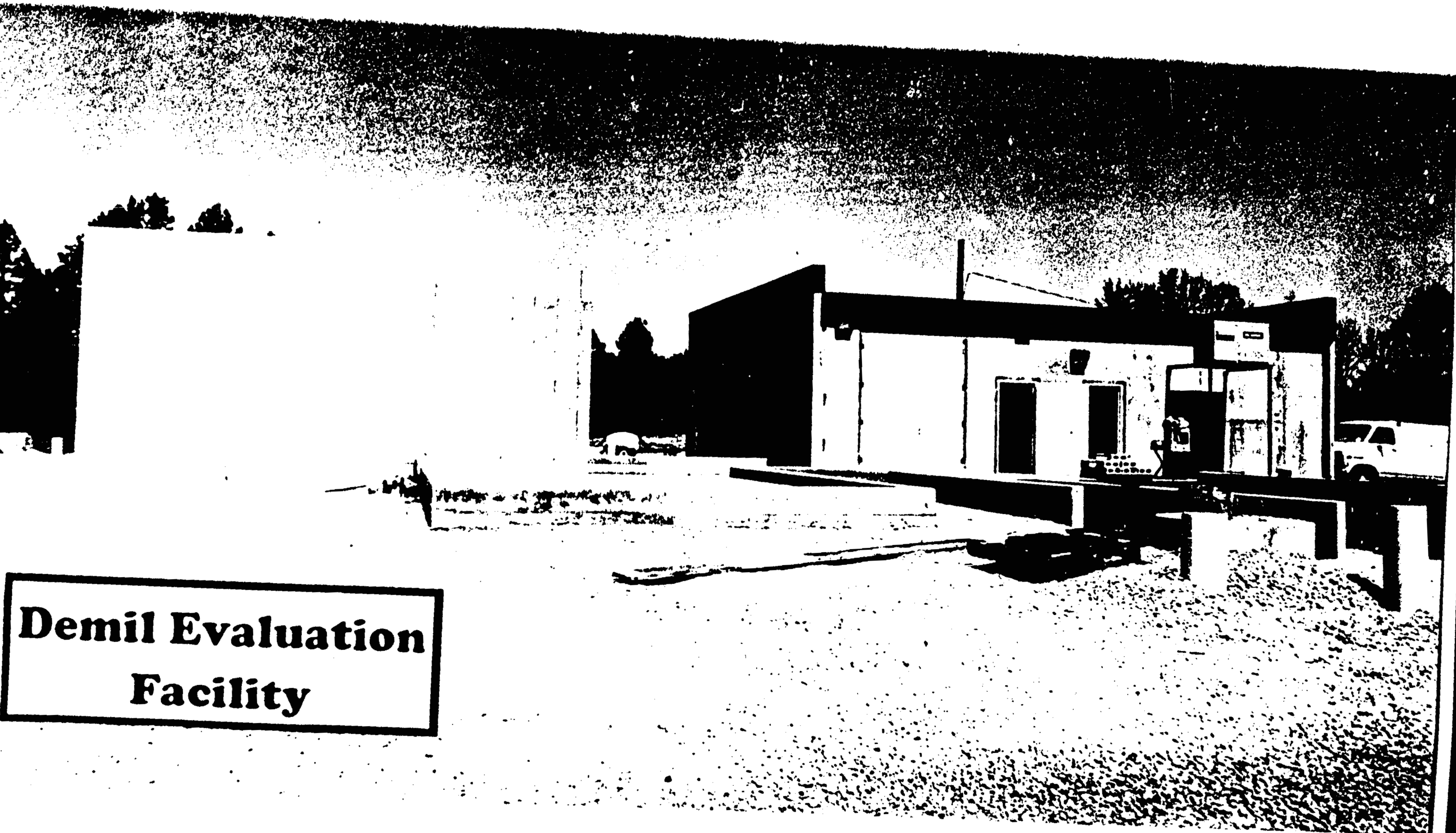
The **Weapon Development and Test Facility** features a rapid prototyping shop, engineering test and assembly areas, and a 100 meter underground test range which is unique to the Navy. The underground range has the capability to test calibers up to 25mm and features a climatic test cell for firing weapons under temperature/humidity extremes and freezing rain conditions. State-of-the-art data acquisition and ballistics test equipment compliment developmental efforts. The facility is used approximately 80 percent of the time for laboratory operations. The remainder of the usage is for acquisition support of small arms, lasers, and night vision/electro-optic devices.

The **Outdoor Firing Range (1000 yard)**, encompassing 14 acres, contains six computer-controlled automatic targeting system stations (from 50-1000 yards), and a full range of ballistic test equipment. The range can accommodate sniper weapon firing or large mounts up to 25mm affixed to reinforced concrete and steel pads. This facility is used approximately 40 percent of the time for laboratory operations. The remainder of the usage is for acquisition support of small arms, lasers and night-vision equipment.

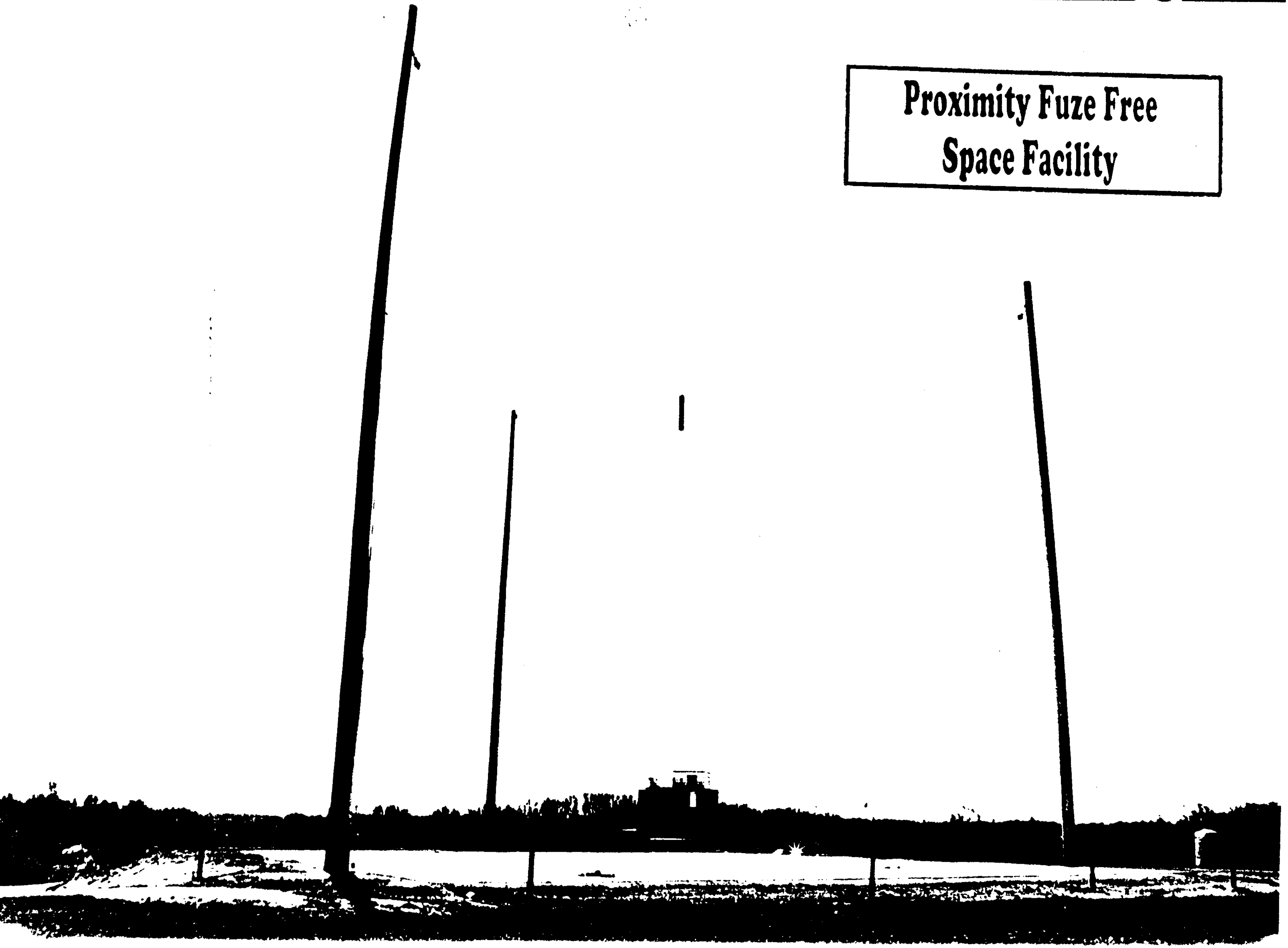

Ordnance Environmental
Test Area

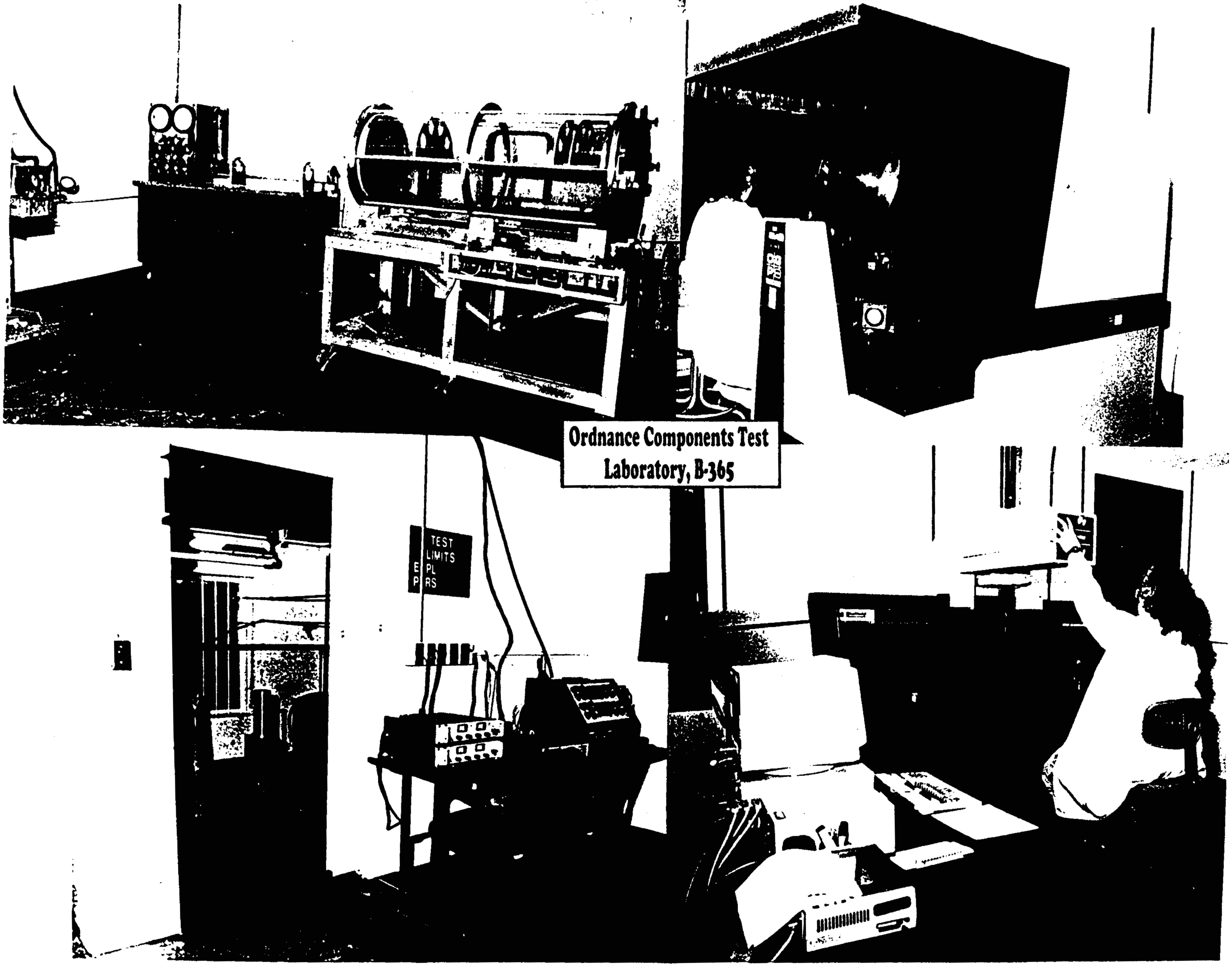


Ordnance Radiographic Facility


Demil Evaluation
Facility

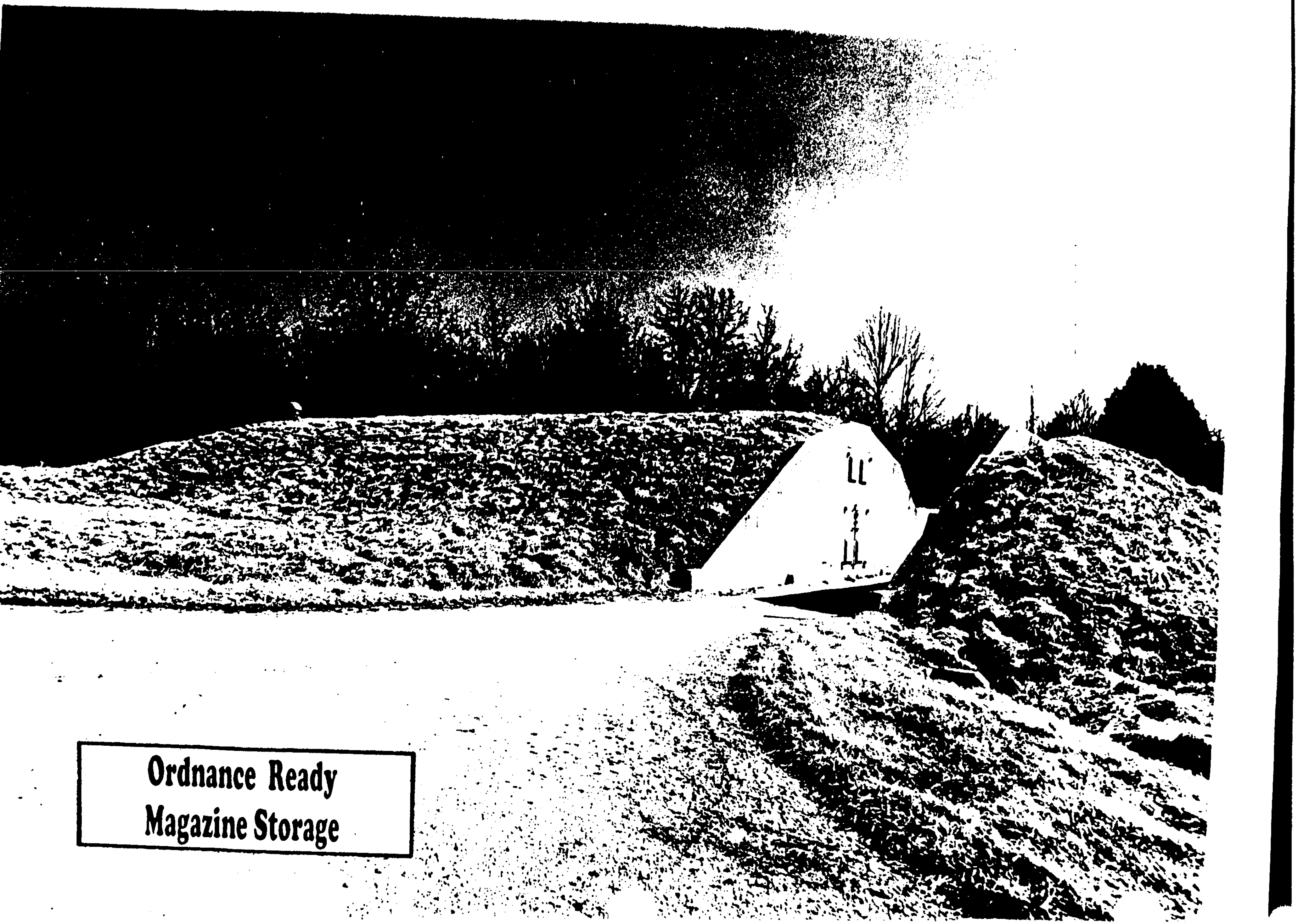
Proximity Fuze Free Space Facility



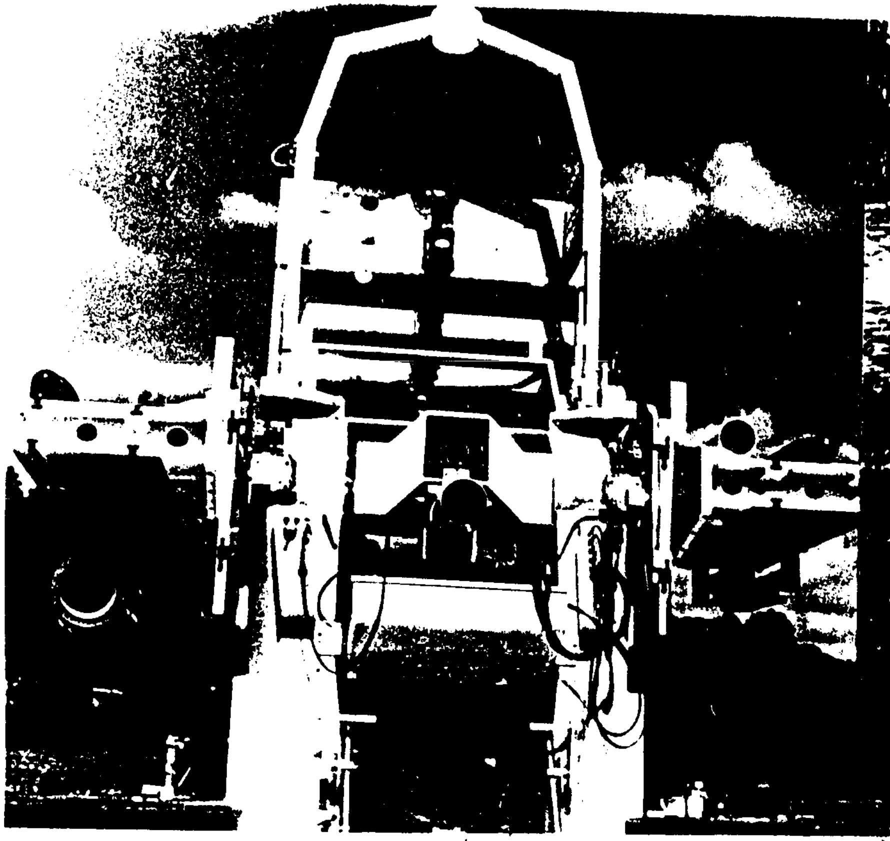


Ordnance Components Test Laboratory, B-365

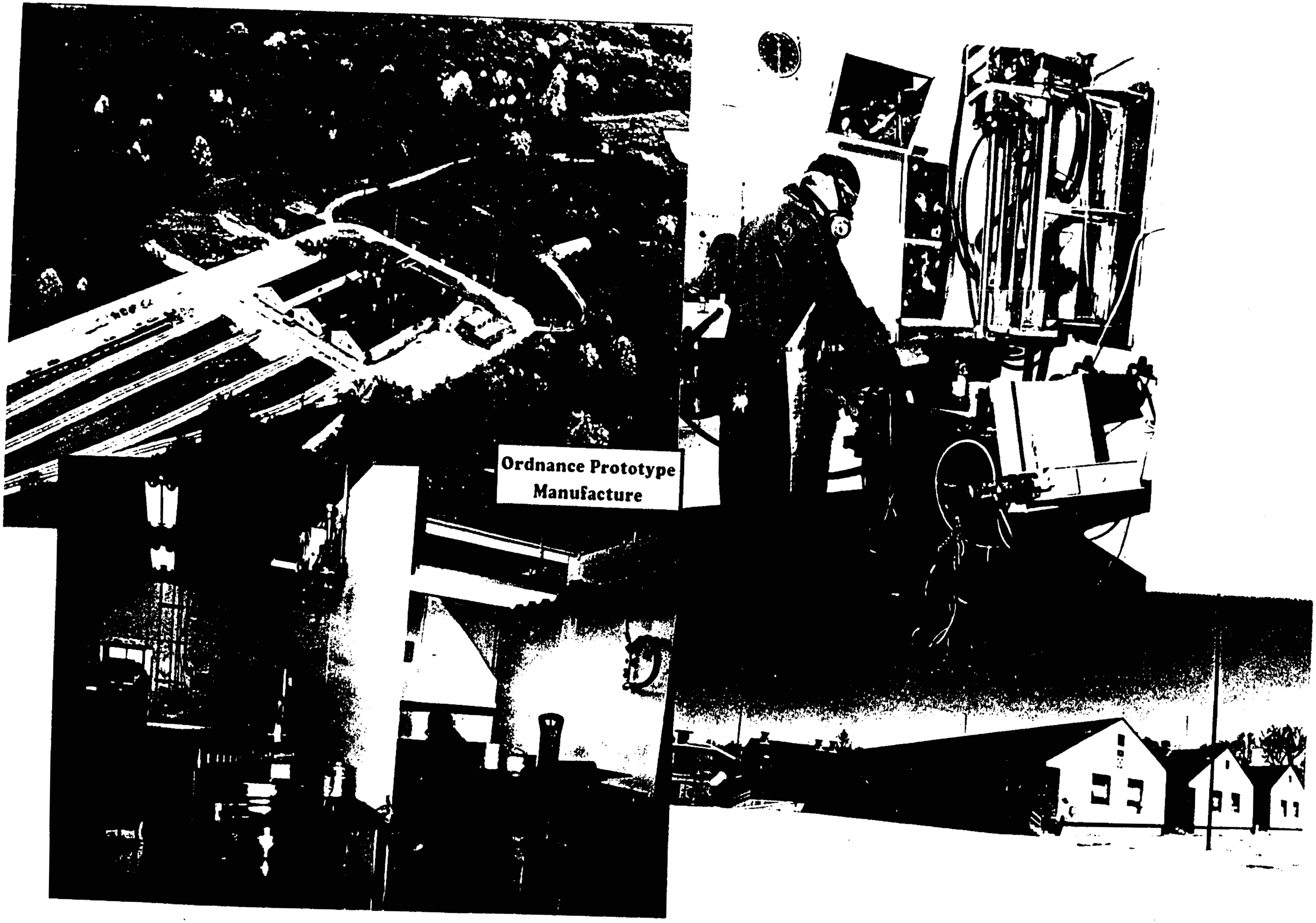

Ordnance Components Test
Laboratory, B-142

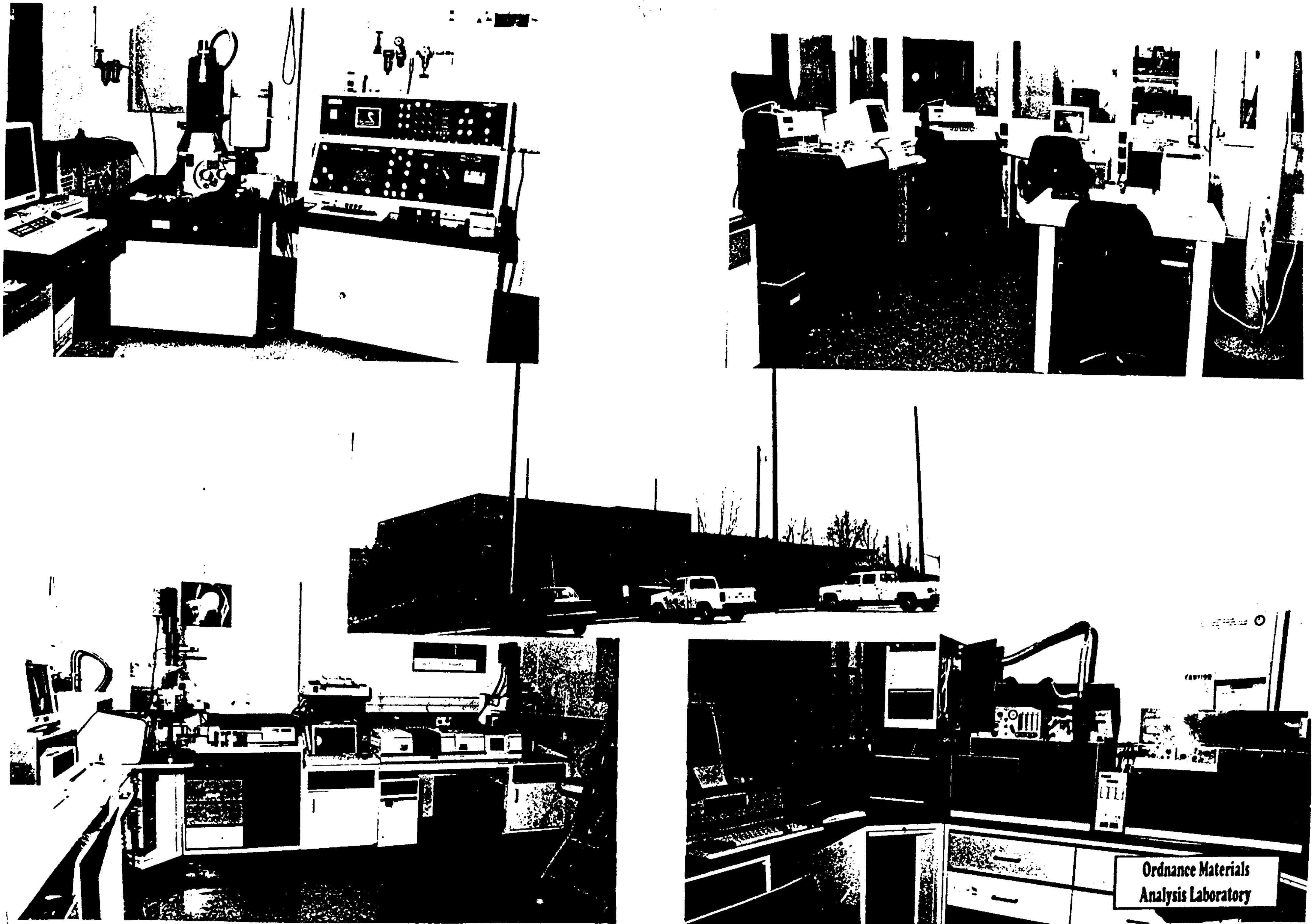

Ordnance Ready
Magazine Storage

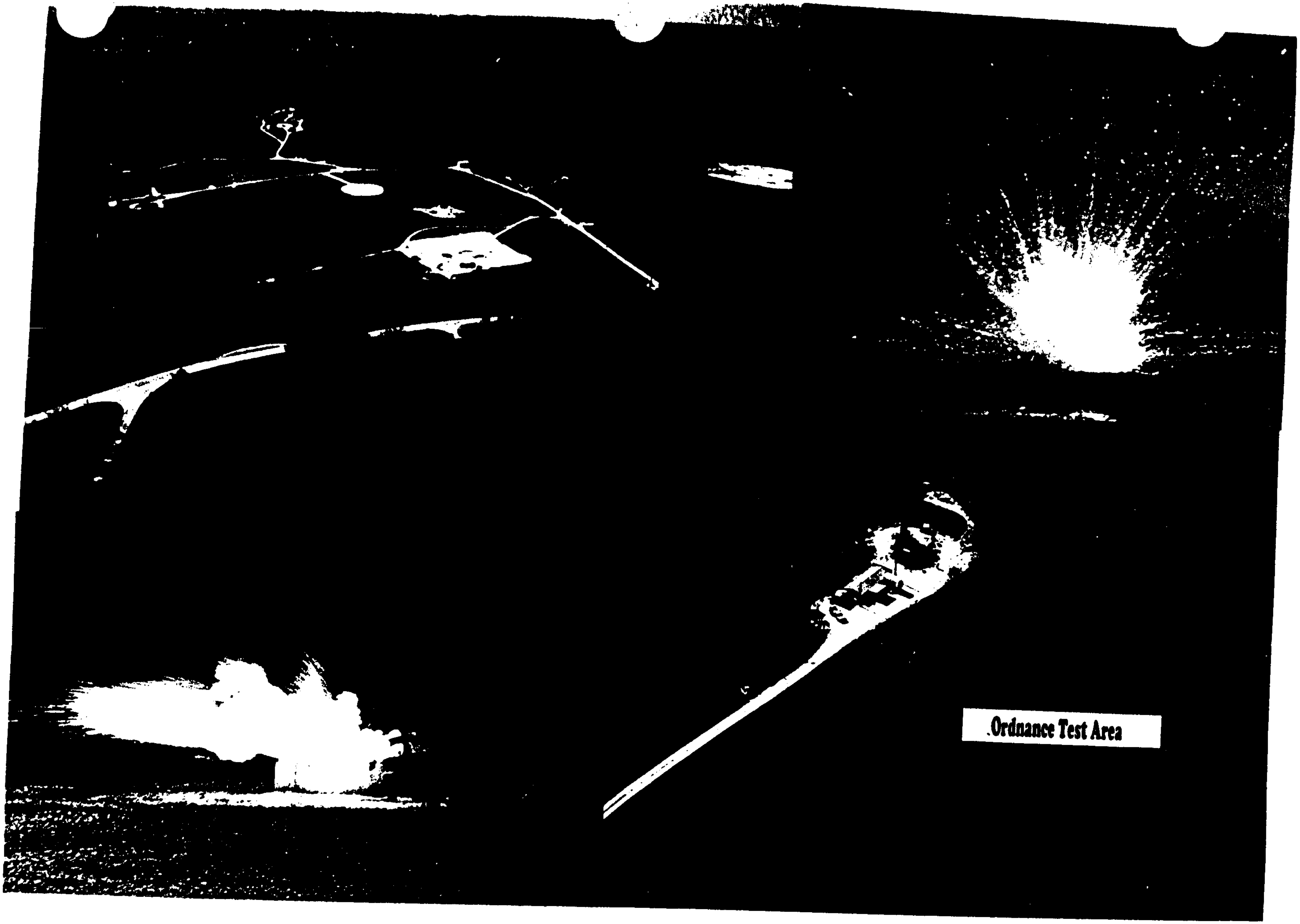

CINCINNATI
MILACRON
Automated Infrared
Test Facility
366



Transient Velocity Windstream Test Apparatus


Ordnance Prototype
Manufacture


Ordnance Materials
Analysis Laboratory



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3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons/ Guns & Ammo	Bldg 2521	Technical	25.6	25.6	0
Weapons/ Guns & Ammo	Bldg 2524	Admin	.5	.5	.5
Weapons/ Guns & Ammo	Bldg 2911	Technical	2.0	2.0	0
Weapons/ Guns & Ammo	Bldg 366	Technical	10.2	10.2	0
Weapons/ Guns & Ammo	Bldg 3087	Technical	.9	.9	0
Weapons/ Guns & Ammo	Bldg 2707	Tecnical	9.1	9.1	0
Weapons/ Guns & Ammo	Bldg2947	Technical	2.3	2.3	2.3
Weapons/ Guns & Ammo	Bldg 2670	Technical	.3	.3	0
Weapons/ Guns & Ammo	Bldg 2888	Technical	0.1	0.1	0
Weapons/ Guns & Ammo	Bldg 2945	Technical	1.0	1.0	0
Weapons/ Guns & Ammo	Bldg 2963	Technical	1.0	1.0	0
Weapons/ Guns & Ammo	Bldg 2995	Technical	1.0	1.0	0
Weapons/ Guns & Ammo	Tower 3086	Technical	N/A	N/A	N/A

Weapons/ Guns & Ammo	Bldg 3107	Storage	1.0	1.0	0
Weapons/ Guns & Ammo	Bldg 2923	Technical	1.0	1.0	0
Weapons/ Guns & Ammo	Bldg 2925	Technical	0.1	0.1	0
Weapons/ Guns & Ammo	Bldg 143	Technical	23.3	23.3	0
Weapons/ Guns & Ammo	Bldg 142	Technical	15.6	15.6	0
Weapons/ Guns & Ammo	Bldg 365	Technical	10.2	10.2	0
Weapons/ Guns & Ammo	Bldg 363	Technical	10.2	10.2	0
Weapons/ Guns & Ammo	Bldg 364	Technical	10.7	10.2	0
Weapons/ Guns & Ammo	Bldg 2987	Technical	6.1	6.1	0
Weapons/ Guns & Ammo	Bldg 2986	Technical	1.0	1.0	0
Weapons/ Guns & Ammo	Bldg 2964	Technical	7.7	7.7	7.7
Weapons/ Guns & Ammo	Bldg 2951	Technical	2.0	2.0	2.0
Weapons/ Guns & Ammo	Bldg 2921	Technical	5.9	5.9	5.9
Weapons/ Guns & Ammo	Bldg 3007	Technical	2.0	2.0	2.0
Weapons/ Guns & Ammo	Bldg 108	Technical	10.2	10.2	0
Weapons/ Guns & Ammo	Bldg 109	Technical	10.2	10.2	0
Weapons/ Guns & Ammo	Bldg 3115	Technical	2.1	2.1	0
Weapons/ Guns & Ammo	Bldg 180	Technical	3.0	3.0	3.0

Weapons/ Guns & Ammo	Bldg 99	Storage	.4	.4	0
Weapons/ Guns & Ammo	Bldg 684	Storage	2.1	2.1	0
Weapons/ Guns & Ammo	Bldg 881	Storage	2.1	2.1	0
Weapons/ Guns & Ammo	Bldg 2418	Storage	5.4	5.4	0
Weapons/ Guns & Ammo	Bldg 3076	Storage	0.1	0.1	0
Weapons/ Guns & Ammo	Bldg 3077	Storage	0.1	0.1	0
Weapons/ Guns & Ammo	Bldg 3082	Storage	0.1	0.1	0
Weapons/ Guns & Ammo	Bldg 2084	Technical	1.6	1.6	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Small Arms - The Small Arms Weapons Facility has the potential to absorb additional workyears in the Weapons Common Support Function, with minor to no modifications to the facility. This increase in workload could be realized with administrative, technical and testing work space.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Small Arms - Approximately nine (9) workyears of additional work could be absorbed with the existing facility.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units – e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

SPACE SYSTEMS/SATELLITES
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at the Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC at the Crane Site.

*The mission for the Electrochemical Power Systems Technical Capability is:

- To assure affordable, safe, and reliable Electrochemical Power sources (batteries).

-To meet current and future performance requirements in operational environments; for the Navy and Marine Corps, the Army and Air Force, and other government agencies.

-Provide a full spectrum of support for batteries and related equipments from Research and Development (R&D) through system retirement.

*The mission for the Microelectronic Technology Technical Capability is: R

-Perform research, development, test, and evaluation of weapons system electronics designed to be tolerant to nuclear radiation effects.

-To assure radiation effects work focuses on the development of total dose, dose rate, neutron, and single event upset hardening techniques for electronics.

-Perform failure analysis and modeling of nuclear effects on electronic devices and have been active in this field since 1972 beginning with U. S. Navy Fleet Ballistic Missile hardened electronics development work.

-Utilize facilities to support Electronic Devices CSF.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

<u>PERSONNEL ADVANTAGES</u> - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

Navy Radioactive Materials Permit for two (2) Cobalt 60 Irradiators used to perform total dose gamma testing of electronic devices. (13-00164-Q1NP) R

Navy Radioactive Materials Permit for Irradiated Electronic Components which is required to radiation test and retain electronic devices. (13-00164-WINP) R

3.1.3 Environmental Constraints:

None

3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

Linear Accelerator Facility - Requires 208 volt/3 phase power, 700 gallons/hour of chilled water with a 705 gallon reservoir for cooling of system electronics, and 100 psi dry, oil free compressed air for control valves. It also requires about 100 tons of special shielding and occupies about 12,000 square feet in a custom building located at a remote location at the Crane Site. Cobalt 60 sources require isolation by special shielding. Cryogenic testing of electronic devices being developed for use in infrared sensor space applications requires liquid nitrogen (1500 gallon tank) to achieve the extremely low temperatures. R

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3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

CSF- Space Systems/Satellites

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	11	0	0	0
Management (Supv)	1	0	0	0
Other	0	0	0	0

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	4	0	0
Associates	4	0	0
Bachelor	2	1	0
Masters	1	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	2	1	2	6
Management (Supv)	0	0	0	0	1
Total	0	2	1	2	7

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Space Systems/ Satellites	0 R	

R

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

SPACE SYSTEMS/SATELLITES

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	12.4 R	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

R

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
Common Support Functions	In-Service Engineering Efforts (List)	Funds Received (Obligation Authority)	Workyears	
Space Systems/ Satellites	None			

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Space Systems/ Satellites	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Space Systems/ Satellites	677K	324K	730K	515K

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Space Systems/ Satellites	Electrochemical Power Systems Facility			X	35,000K

The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries*. Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest

Space Systems/ Satellites	Radiation Effects Facility: Consists of Linear Accelerator, Cobalt 60 Gamma Sources (2), 10 KeV X-Ray Sources (2), Electrical Automatic Test Equipment, Data Acquisition Systems, and Computer Aided Design/Modeling Equipment. Facility is shared (this CSF uses 30%) with private customers (15%) and U.S. Navy Strategic Systems acquisition surveillance of electronic parts (55%)			X (see below)	12,200K	R

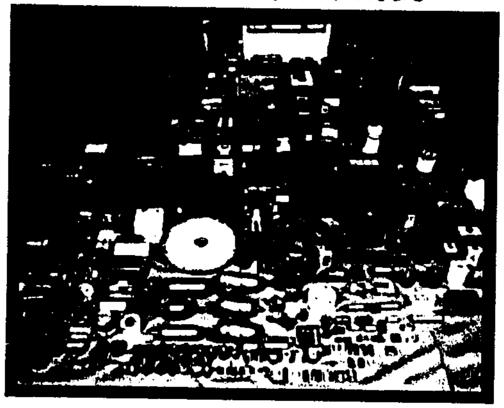
Note: The Linear Accelerator equipment included in this facility is unique because the radiation dose rates achievable on it are not available elsewhere in the United States. R

The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries.* Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-

ELECTROCHEMICAL POWER SYSTEMS FACILITY
NSWC CRANE DIVISION

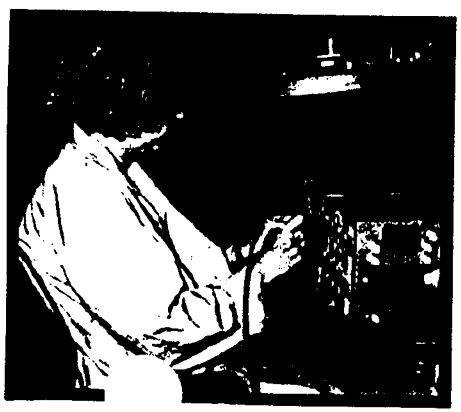
FAILURE ANALYSIS

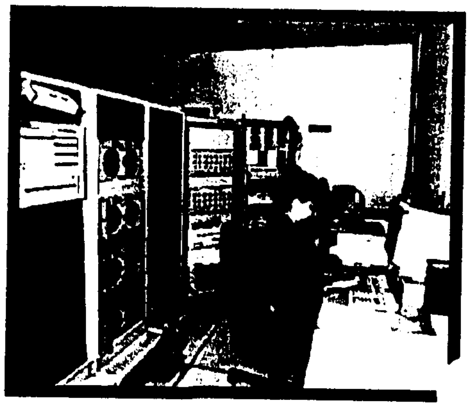
FAMILY OF BATTERIES

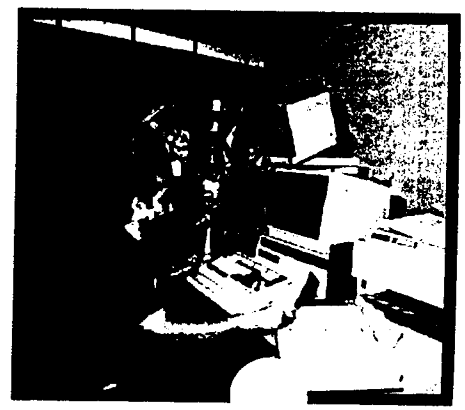


TEST CELLS

ENVIRONMENTAL







Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart*, avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

ELECTROCHEMICAL POWER SYSTEMS FACILITY	
FUNCTION	**PERCENTAGE UTILIZATION**
Air Vehicles, Fixed Wing, Avionics	0.5 %
Air Vehicles, Fixed Wing, Flight Subsystems	5.2 %
Air Vehicles, Rotary Wing, Avionics	0.7 %
Air Vehicles, Rotary Wing, Flight Subsystems	3.8 %
Weapons, Conventional Missiles/Rockets	1.5 %
Space Systems, Satellites	4.4 %
C4I Systems, Airborne C4I	0.5 %
Other Functions *	83.4 %

* The Electrochemical Power Systems Facility at Crane is a national asset providing a full spectrum of support for electrochemical power systems (batteries), including RDT&E, engineering, acquisition, depot rework, manufacturing, fleet support and system retirement. Programs and projects supported include missiles and weapons, aircraft, ground support equipment, shipboard and underwater, special warfare, satellites and other space-based equipment, transportation and various other systems. This facility provides support for a wide variety of batteries incorporated within systems and platforms of the Department of the Navy (NAVSEA, NAVAIR, NSWC, NAWC, NUWC, SSPO, SPECWAR, ONR, SOCOM, SPCC & NELO), United States Marine Corps. (USMC), the Department of the Army, the Department of the Air Force, the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), Special Operations

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Command, Advanced Research Projects Agency (ARPA), Defense General Supply Command (DGSC), the Federal Aviation Administration (FAA), Coast Guard, Foreign Military Sales (FMA), and Private Industry. R

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Space Systems/ Satellites	Bldg 34	Technical	33.6	33.6	0
Space Systems/ Satellites	Bldg 38	Technical	18.1	18.1	0
Space Systems/ Satellites	Bldg 3235	Technical	27.4	27.4	0
Space Systems/ Satellites	Bldg 369	Storage	5.4	5.4	0
Space Systems/ Satellites	Bldg 2919	Technical	3.8	3.8	0
Space Systems/ Satellites	Bldg 2949	Technical	5.1	5.1	0
Space Systems/ Satellites	Bldg 355	Storage	.7	.7	0
Space Systems/ Satellites	Bldg 650	Storage	.6	.6	0
Space Systems/ Satellites	Bldg 652	Storage	.6	.6	.6
Space Systems/ Satellites	Bldg 916	Storage	1.1	1.1	0
Space Systems/ Satellites	Bldg 917	Storage	1.1	1.1	1.1
Space Systems/ Satellites	Bldg 157	Storage	2.1	2.1	0

Space Systems/ Satellites	Bldg 181	Technical	1.7	1.7	1.7
Space Systems/ Satellites	Bldg 301	Storage	5.4	5.4	0
Space Systems/ Satellites	Radiation Effects	Technical	14.4	13.5	.9

R

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electrochemical Power Sources - The Electrochemical Power Sources facility has a flexible facility to allow for considerable workload expansion. These include state-of-the-art equipments designed with the foresight to accommodate a wide variety of batteries, capable of multiple use, and easily upgradable. Also available are environmental equipments capable of simulating field conditions and material analysis capabilities required by each of the three services.

Radiation Effects Facility - This area could absorb additional workyears of similar work (FY97 workyears) using the available facilities. This would require multiple shift operations at the Linear Accelerator Facility, but not major facility modifications. Additional personnel would also be required, however, specialized training and development of new people could be provided by existing personnel. R

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Radiation Effects Facility - 10 workyears could be absorbed. R

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

C4I SYSTEMS/AIRBORNE C4I
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC at the Crane Site.

*The mission for the Electrochemical Power Systems Technical Capability is:

- To assure affordable, safe, and reliable Electrochemical Power sources (batteries).

-To meet current and future performance requirements in operational environments; for the Navy and Marine Corps, the Army and Air Force, and other government agencies.

-Provide a full spectrum of support for batteries and related equipments from Research and Development (R&D) through system retirement.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

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Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

CSF- C4I Systems/Airborne C4I

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	2	0	0	0
Management (Supv)	0	0	0	0
Other	0	0	0	0

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	0	0
Associates	0	0	0
Bachelor	2	0	0
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	1	0	0	1
Management (Supv)	0	0	0	0	0
Total	0	1	0	0	1

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
C4I Systems/ Airborne C4I	1 R	The Lithium Battery[1]

R

[1]American Society of Naval Engineers Publication, August 1992

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

C4I SYSTEMS/AIRBORNE C4I

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.5	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering effort . the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
Common Support Functions	In-Service Engineering Efforts (List)	Funds Received (Obligation Authority)	Workyears	.
C4I Systems/ Airborne C4I	None			

`2 Projected Funding

ↄ.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
C4I Systems/ Airborne C4I	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
C4I Systems/ Airborne C4I	50K	50K	50K	50K

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
C4I Systems/ Airborne C4I	Electrochemical Power Systems Facility			X	35,000K

/99.5 = 34,93

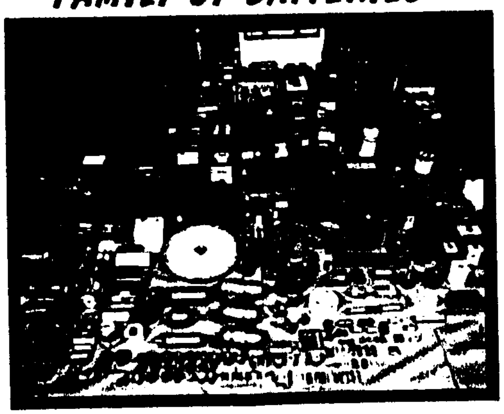
The NSWC Crane Division **Electrochemical Power Systems Facility** is a unique national asset providing *full spectrum* support for electrochemical power systems (batteries) throughout a system's life cycle beginning with RDT&E and continuing through engineering, acquisition, deployment and concluding with system retirement. Services are provided for a wide variety of batteries used in *Navy, Air Force, Army, Marine Corps, NASA, DOE, SOCOM, FAA, FMS* systems & platforms including the Common Support Functions of Air Vehicles, Weapons, Space Systems and C4I. A listing of the systems and platforms supported is provided in the attached Table. This facility is the DoD's largest (101,000 sq ft) and most modern electrochemical power systems complex. The facility includes a $12.5 million plant, and over $23.1 million of *state-of-the-art* test and evaluation equipment, *all dedicated to batteries.* Integrated within the facility is over 150 pieces of specialized equipment. *Unique in all the world* is a 26,400 sq ft High-

ELECTROCHEMICAL POWER SYSTEMS FACILITY

NSWC CRANE DIVISION

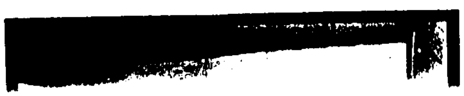
FAILURE ANALYSIS

FAMILY OF BATTERIES



TEST CELLS

ENVIRONMENTAL



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Energy Battery Evaluation and Abuse Facility for test and evaluation of the latest technology batteries in a safe and ecologically suitable manner. Batteries are *essential* to all DoD mission areas and are *critical* components of most military systems. The mission of the Electrochemical Power Systems Facility is to assure affordable, safe, and reliable batteries meeting *current and future* performance requirements in all operational environments. Personnel at this facility are *recognized experts* in the field of electrochemical power systems. This expertise allows the government to *buy smart*, avoid technological surprises, advance standardization, assess progress in the battery industry, encourage competition and work with the private sector while preserving *inherently governmental* decision-making functions.

ELECTROCHEMICAL POWER SYSTEMS FACILITY R

FUNCTION	PERCENTAGE UTILIZATION
Air Vehicles, Fixed Wing, Avionics	0.5 %
Air Vehicles, Fixed Wing, Flight Subsystems	5.2 %
Air Vehicles, Rotary Wing, Avionics	0.7 %
Air Vehicles, Rotary Wing, Flight Subsystems	3.8 %
Weapons, Conventional Missiles/Rockets	1.5 %
Space Systems, Satellites	4.4 %
C4I Systems, Airborne C4I	0.5 %
Other Functions *	83.4 %

* The Electrochemical Power Systems Facility at Crane is a national asset providing a full spectrum of support for electrochemical power systems (batteries), including RDT&E, engineering, acquisition, depot rework, manufacturing, fleet support and system retirement. Programs and projects supported include missiles and weapons, aircraft, ground support equipment, shipboard and underwater, special warfare, satellites and other space-based equipment, transportation and various other systems. This facility provides support for a wide variety of batteries incorporated within systems and platforms of the Department of the Navy (NAVSEA, NAVAIR, NSWC, NAWC, R

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NUWC, SSPO, SPECWAR, ONR, SOCOM, SPCC & NELO), United States Marine Corps. (USMC), the Department of the Army, the Department of the Air Force, the National Aeronautics and Space Administration (NASA), the Department of Energy (DOE), Special Operations Command, Advanced Research Projects Agency (ARPA), Defense General Supply Command (DGSC), the Federal Aviation Administration (FAA), Coast Guard, Foreign Military Sales (FMA), and Private Industry. R

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
C4I Systems/ Airborne C4I	Bldg 34	Technical	33.6	33.6	0
C4I Systems/ Airborne C4I	Bldg 38	Technical	18.1	18.1	0
C4I Systems/ Airborne C4I	Bldg 3235	Technical	27.4	27.4	0
C4I Systems/ Airborne C4I	Bldg 369	Storage	5.4	5.4	0
C4I Systems/ Airborne C4I	Bldg 2919	Technical	3.8	3.8	0
C4I Systems/ Airborne C4I	Bldg 2949	Technical	5.1	5.1	0
C4I Systems/ Airborne C4I	Bldg 355	Storage	.7	.7	0

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C4I Systems/ Airborne C4I	Bldg 650	Storage	.6	.6	0
C4I Systems/ Airborne C4I	Bldg 652	Storage	.6	.6	.6
C4I Systems/ Airborne C4I	Bldg 916	Storage	1.1	1.1	0
C4I Systems/ Airborne C4I	Bldg 917	Storage	1.1	1.1	1.1
C4I Systems/ Airborne C4I	Bldg 157	Storage	2.1	2.1	0
C4I Systems/ Airborne C4I	Bldg 181	Technical	1.7	1.7	1.7
C4I Systems/ Airborne C4I	Bldg 301	Storage	5.4	5.4	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electrochemical Power Sources - The Electrochemical Power Sources facility has a flexible facility to allow for considerable workload expansion. These include state-of-the-art equipments designed with the foresight to accommodate a wide variety of batteries, capable of multiple use, and easily upgradable. Also available are environmental equipments capable of simulating field conditions and material analysis capabilities required by each of the three services.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electrochemical Power Sources - Electrochemical Power Sources can easily accomodate 40 additional workyears in any combination across the four common support functions.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

ELECTRONIC DEVICES
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

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6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC at the Crane Site.

* The mission of the Microelectronics Technical Capability is:

- Provides capability for the design, selection and application of electronic/photonic components to assure that Navy systems meet reliability, maintainability and supportability requirements.

- Performs research, development, test, and evaluation of weapons system electronics designed to be tolerant to nuclear radiation effects.

- Perform radiation effects work which focuses on the development of total dose, dose rate, neutron, and single event upset hardening techniques for electronics.

- Performs failure analysis and modeling of nuclear effects on electronic devices and have been active in this field since 1972 beginning with US Navy Fleet Ballistic Missile hardened electronics development work.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

High Level Radiation Testing - This remote geographic location, with its low population density, has reduced FCC requirements and regulations for radiation of energy. Our "Blue Sky" facility, located in a valley and directed straight into space (thus the facility name "Blue Sky") has a restricted fly zone that provides the free space that high power microwave radiation testing requires. The valley location, surrounded by large indeciduous trees, minimizes outside interference and blocks horizontal radiation. In addition, large available acreage allows adaptability for all DoD antenna range requirements.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

There are currently two licenses which this activity holds which are required for the Radiation Effects testing to be done at the Crane site:

a. Navy Radioactive Materials Permit for two (2) Cobalt 60 Irradiators used to perform total dose gamma testing of electronic devices. (13-00164-Q1NP)

b. Navy Radioactive Materials Permit for Irradiated Electronic Components which is required to perform the radiation test on electronic devices. (13-00164-WINP)

3.1.3 Environmental Constraints:

None

3.1.4 Special Support Infrastructure:

The Linear Accelerator Facility requires 208 volt/3 phase power, 700 gallons/hour of chilled water with a 705 gallon reservoir for cooling of system electronics, and 100 psi dry, oil free compressed air for control valves. It also requires about 100 tons of special shielding and occupies about 12,000 square feet in a custom building located at a remote location at the Crane site. Cobalt 60 sources require isolation by special shielding. Cryogenic testing of electronic devices being developed for use in infrared sensor space applications requires liquid nitrogen (1500 gallon tank) to achieve the extremely low temperatures.

Much of the equipment in use in the Electronic/Photonic Component Engineering and Test Facility requires special utility support; especially those equipments used in environmental test and evaluation. In these areas, the utilities supply must include 3 phase 240V power, along with provisions for compressed air, CO_2, and both distilled and deionized water. Equipment used in photonic component evaluation requires 3 phase 240V power and must be furnished with special non-laser reflecting wall coverings. In addition, 8" concrete floors are required to support the optical tables. One or more rooms must be rated safe for class IV laser testing to include entrance door safety power disconnects.

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

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3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

CSF- Electronic Devices

Types of personnel	Number of Personnel				
	Government		On-Site FFRDC	On-Site SETA	
	Civilian	Military			
Technical	25R	0	0	0	R
Management (Supv)	3	0	0	0	
Other	1R	0	0	0	R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position			
	Technical	Management (Supv)	Other	
High School or Less	8R	0	1R	R
Associates	1	0	0	
Bachelor	13R	1	0R	R
Masters	3R	1	0R	R
Doctorate (include Med/Vet/etc.)	0	1	0	

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service					
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years	
Technical	0	8R	5R	3R	9R	R
Management	0	0	1	0	2	
Other	0	0R	0R	1R	OR	R
Total	0	8	6	4	11	

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Electronic Devices	12 R	Long Term Ionization Response of Several BICMOS VLSIC Technologies[1] Trends in the Total-Dose Response of Modern Bipolar Transistors[2] Single Event Burnout of Power Bipolar Junction Transistors[3] Response of Advanced Bipolar Processes to Ionizing Radiation[4] Effects of Ionizing Radiation on the Noise Properties of DMOS Power Transistors[5] Total Dose and Transient Radiation Effects on a Tuneable Bandpass Filter Operating at Liquid Nitrogen Temperatures[6] Process Effects on the Ionizing Radiation Hardness of Trench Isolation[7] Radiation-Hardened Electronics Thermomechanical Shock Testing on the DISKO ELM UGT (Classified)[8] Radiation-Hardened Electronics Thermomechancial Shock Testing on the Mission CYBER Underground Test (Classified)[9] Total Dose Hardening of Cryogenic Analog CMOS[10] Radiation hardening of a High Voltage IC Technology[11] Understanding Single Event Phenomena in Complex Analog and Digital Integrated Circuits[12]

R

R

[1]IEEE Transactions on Nuclear Science, June 1992
[2]IEEE Transactions on Nuclear Science, December 1992
[3,4,5]IEEE Transactions on Nuclear Science, December 1991
[6,7,8]Journal of Radiation Effects, Research and Engineering, December 1991
[9,10]Journal of Radiation Effects, Research and Engineering, December 1990
[11,12]IEEE Transactions on Nuclear Science, December 1990

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

ELECTRONIC DEVICES

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	25.1	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Electronic Devices	None			

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Electronic Devices	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Electronic Devices	8,200K	8,000K	7,000K	5,900K

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3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Electronic Devices	Electronic/Photonic Component Engr & Test Facility				$7,800K
Electronic Devices	Radiation Effects Facility			X	$12,200K

These facilities are described in the next two pages. R

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The **Electronic/Photonic Component Engineering & Test Facility** is a national asset providing a full spectrum of support for microelectronic devices including RDT&E, engineering, acquisition support, fleet support and obsolescence management. The equipment consists of Automated and Bench Electrical Test Systems, environmental test chambers and special photonic test equipment. The facility is used 10% for S&T work and 90% for major surface and undersea acquisition programs.

This facility provides support for digital, analog, and photonic components used in a wide variety of equipments of the Department of the Navy (NAVSEA, NAVAIR, SSPO), Department of the Air Force, Department of the Army Strategic Defense Command and NASA. In addition, the facility provides component test & evaluation support to other agencies such as the Defense Electronic Supply Center (DESC) and the DoD Inspector General's office. Finally, the facility is used in collaborative efforts with the Naval Research Lab, Army Research Lab, Air Force Rome Labs, Air Force Wright Labs and Department of Energy Sandia Labs.

USAGE OF ELECTRONIC/PHOTONIC COMPONENT ENGINEERING & TEST FACILITY

PERVASIVE FUNCTION	PERCENT UTILIZATION
ELECTRONIC DEVICES	10 %
OTHER FUNCTIONS (*)	90 %

* Other related functions for which this facility is utilized include electronic device evaluation for shipboard and underwater combat systems, gun weapons systems, strategic fire control and navigation systems, satellites and other space systems.

The **Radiation Effects Facility** is a uniquely capable engineering facility providing support for measurement and analysis of the effects of nuclear and space radiation of microelectronic devices.

The equipment consists of Linear Accelerator, Cobalt 60 Gamma Sources (2), 10 KeV X-ray Sources (2), Electrical Automatic Test Equipment, Data Acquisition Systems, and Computer Aided Design/Modeling Equipment. Facility is shared (this CSF uses 30%) with private customers (15%) and U.S. Navy Strategic Systems Acquisition surveillance of electronic parts (55%). The Linear Accelerator Equipment included in this facility is unique because the radiation dose rates achievable on it are not available elsewhere in the United States.

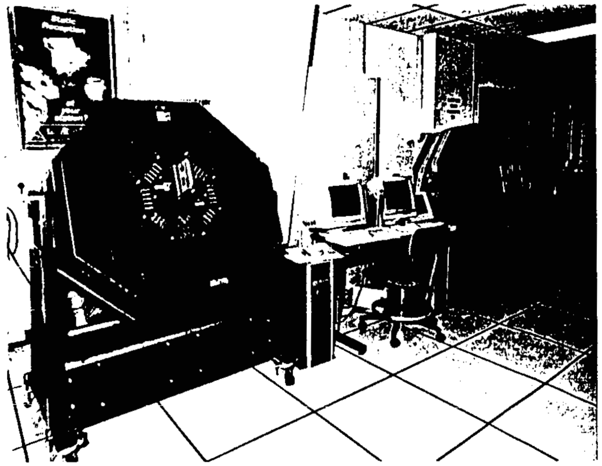
This facility provides support of digital, analog, microwave and photonic components used in a wide variety of equipments of the Department of the Navy (NAVSEA and SSPO), Department of the Air Force, Department of the Army Strategic Defense Command and NASA. The facility provides support to other agencies such as the Defense Nuclear Agency (DNA), the Department of Energy (DOE) and to private parties performing on government contracts. The facility is used in collaborative efforts with the Naval Research Lab, Air Force Rome Labs, and Department of Energy Sandia Labs.

USAGE OF RADIATION EFFECTS FACILITY

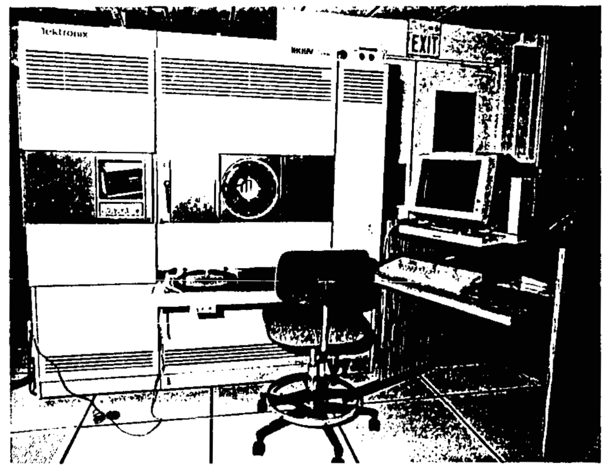
PERVASIVE FUNCTION	PERCENT UTILIZED
ELECTRONIC DEVICES	30%
OTHER FUNCTIONS (*)	70%

*Other related functions for which this facility is used include strategic missile guidance and flight control systems, satellites and other space systems. Strategic missile guidance and flight control systems work is production support and does not fit in S&T, Engineering Development or ISE life cycle phases. Satellite work is in support of the Global Positioning System and is reported in Section III. R

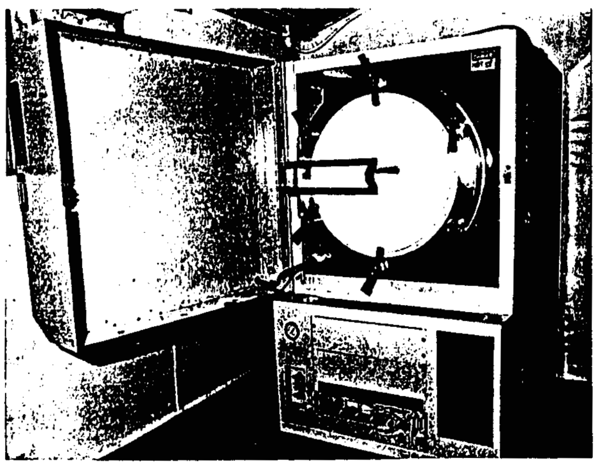
ELECTRONIC/PHOTONIC ENGINEERING & TEST FACILITY



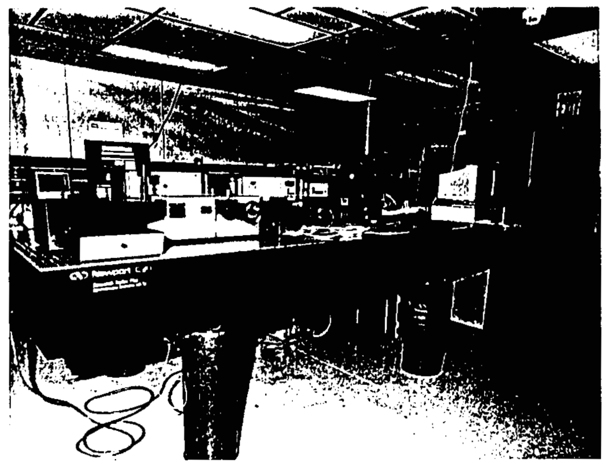
AUTOMATIC TEST SYSTEM
CUSTOM MICROCIRCUITS



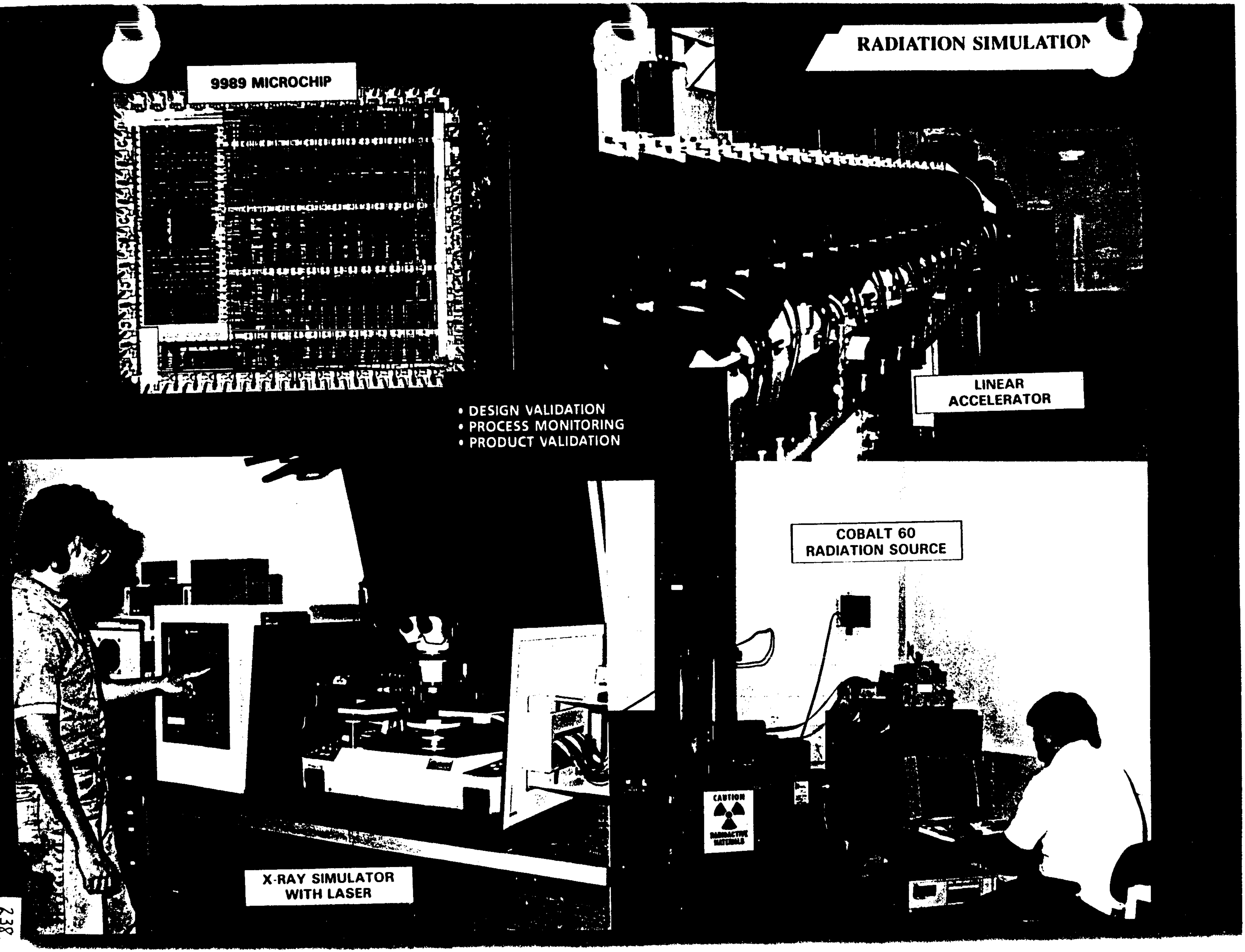
AUTOMATIC TEST SYSTEM
MEMORY MICROCIRCUITS



HIGHLY ACCELERATED STRESS CHAMBER
COMMERCIAL COMPONENTS



OPTICS TABLE
FIBER OPTIC COMPONENTS


RADIATION SIMULATION
9989 MICROCHIP
LINEAR ACCELERATOR
• DESIGN VALIDATION
• PROCESS MONITORING
• PRODUCT VALIDATION
COBALT 60 RADIATION SOURCE
CAUTION
X-RAY SIMULATOR WITH LASER

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Electronic Devices	Bldg 2044	Technical	2.7	2.7	0
Electronic Devices	Bldg 2917	Technical	2.5	2.5	0
Electronic Devices	Bldg 2931	Technical	8.5	8.5	0
Electronic Devices	Bldg 2940W	Technical	3.5	3.5	0
Electronic Devices	Bldg 2035	Technical	1.7	1.7	0
Electronic Devices	Bldg 3059	Technical	11.9	11.9	0
Electronic Devices	Bldge 2088	Technical	2.5	2.5	0

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	.4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

WEAPONS/CRUISE MISSILES
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC at the Crane Site.

*The mission of the **Conventional Ammunition** Technical Capability is:

-Perform surveillance and failure analysis testing of missile ordnance components (TOMAHAWK).

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered requirements for the accomplishment of the mission.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical Support	Co-located	Various	Various
Weapons/ Cruise Missiles	Crane Army Ammo Activity	Ammunition Production	1 mile		0
Weapons/ Cruise Missiles	Comarco	Engineering Support	8 miles		0

This relationship is described in the following paragraphs.

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center require access to other facilities and capabilities co-located on the base in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

Co-location of engineering functions supporting surface ship, air launched and Marine Corps ammunition (e.g. acquisition, ammunition, logistics management, surveillance, modification, maintenance, testing, demilitarization and disposal) provides a synergism and efficiency that would be unavailable if these efforts were dispersed among several activities. Co-location of the Program Management and engineering functions with a major DOD ammunition production, storage, maintenance, and disposal activity, the Crane Army Ammunition Activity (CAAA), provides rapid response capability throughout the life cycle to major regional conflicts such as Operation Desert Shield/Desert Storm. Fifty-eight percent of CAAA's magazine storage (1.9 million sq ft) contain Navy/Marine Corps Ammunition assets. Co-location of Navy acquisition, maintenance, and demilitarization and disposal engineering functions with SMCA production operations at Crane offers excellent opportunities to incorporate modifications and improvements to Navy production commodities.

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

CSF- Weapons/Cruise Missiles

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	1	0	0	0
Management (Supv)	0	0	0	0
Other	0	0	0	0

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	0	0
Associates	0	0	0
Bachelor	1	0	0
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	1	0	0	0
Management	0	0	0	0	0
Other	0		0	0	0
Total	0	1	0	0	0

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
Weapons/Cruise Missiles	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Weapons/Cruise Missiles	0	

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

WEAPONS/CRUISE MISSILES

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	0.7	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None

3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Weapons/ Cruise Missiles	Engr Support	38K	0.7	Missile Component Evaluation (Surveillance)

3.3.2 Projected Funding

3.3.2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons/ Cruise Missiles	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons/ Cruise Missiles	49K	70K	55K	58K

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3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Weapons/ Cruise Missiles	Missile Fuze Test Facility				$11,800K

Missile Fuze Test Facility

Provides for testing a wide variety of missile fuzing components (warhead section components). Equipment used includes centrifuge, burn rate/velocity tester, active optical test ranges, leak detectors and many specialized pieces of equipment. This test equipment supports production acceptance, surveillance, and maintenance of these fuzing components. Approximately 25 missiles are supported including STANDARD, TOMAHAWK and SIDEWINDER. This effort supports the Navy as well as joint programs with the Air Force, Army, Foreign Military Sales and private parties.

Major Facility or Equipment Description	Weapons Conventional Missiles & Rkts	Cruise Missiles	Other Related Functions
Missile Fuze Test Facility	97.3%	1.0%	1.7%

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3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
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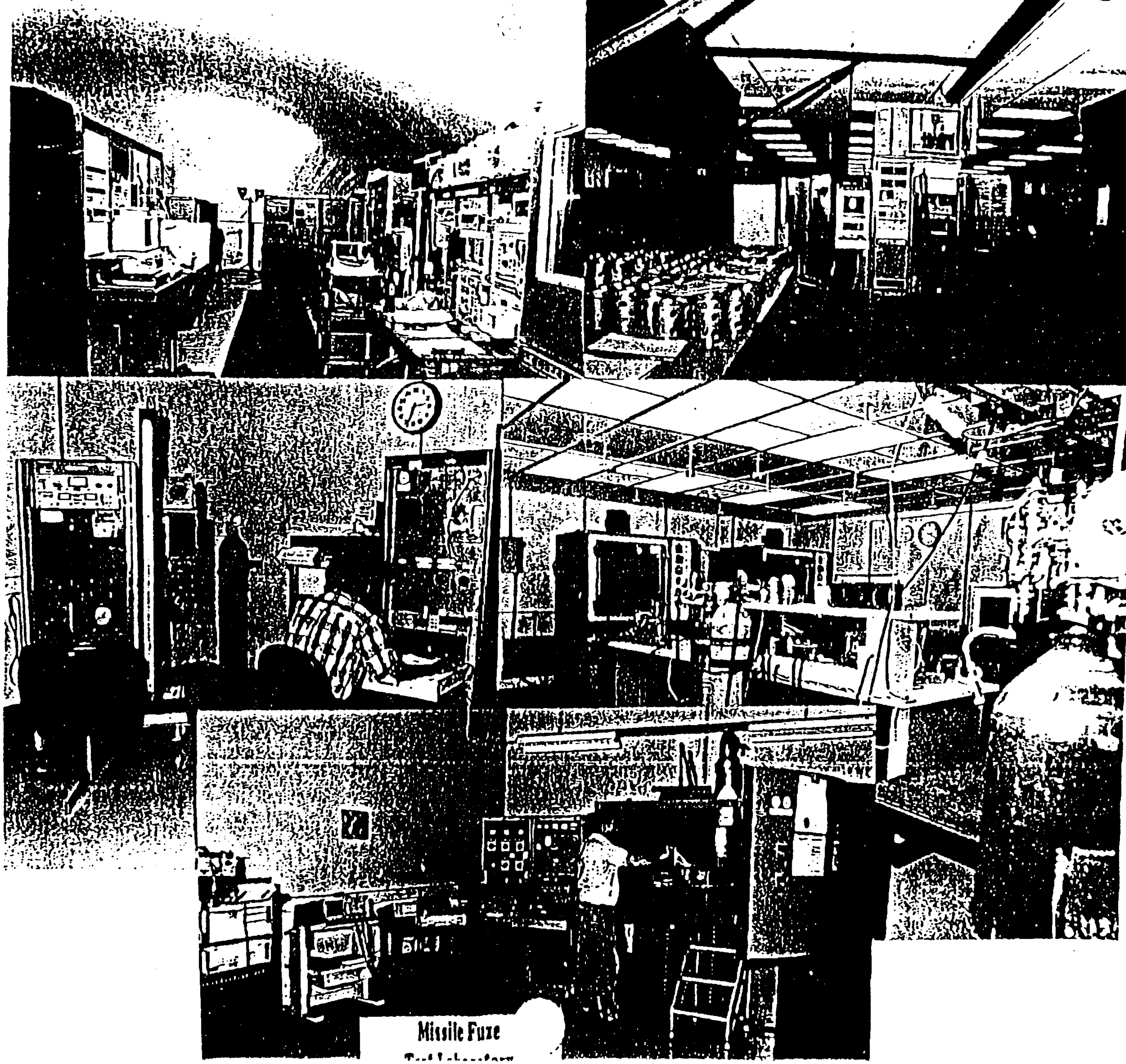
Missile Fuze

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons/ Cruise Missiles	None				

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alternation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

ADVANCED MATERIALS
COMMON SUPPORT FUNCTION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

As reported in BRAC95 Data Call #1, the technical program at the Crane Division is managed and described in terms of seventeen Technical Capabilities (TC's) recognized by the Naval Surface Warfare Center. The ones at Crane Site are:

1. Electronic Warfare
2. Microelectronic Technology
3. Electronic Module Test & Repair
4. Microwave Components
5. Electrochemical Power Systems
6. Acoustic Sensors
7. Small Arms
8. Conventional Ammunition
9. Pyrotechnics
10. Night Vision/Electro-Optics
11. Mine Countermeasures
12. Radar Engineering & Industrial Support

The following mission is presented for the applicable TC at the Crane Site.

* The mission of the Microelectronics Technical Capability is:

- Designs and develops electronic packaging for systems and equipment.

- Performs analysis of advanced materials and electronic cooling techniques for electronic packaging systems.

3.1 Location:

3.1.1 Geographic/Climatological Features: Describe any Geographic features in and around your activity that are relevant to each CSF.

TECHNICAL ADVANTAGES - The following technical advantages exist at the Crane Division and are applicable to the Common Support Functions of this data call. They are considered
requirements for the accomplishment of the mission.

High Level Radiation Testing - This remote geographic location, with its low population density, has reduced FCC requirements and regulations for radiation of energy. Our "Blue Sky" facility, located in a valley and directed straight into space (thus the facility name "Blue Sky") has a restricted fly zone that provides the free space that high power microwave radiation testing requires. The valley location, surrounded by large indeciduous trees, minimizes outside interference and blocks horizontal radiation. In addition, large available acreage allows adaptability for all DoD antenna range requirements.

Environmental Compliance - From an environmental standpoint, the geographic location of this facility is a key to its successful operation and the continuation of missions which other facilities are being forced to close. Crane Division is remote, with little encroachment from residential or private industry. **The facility occupies land which, due to the topography and soil types, is of little value for farming, residential development, or private industry.**

EPA Region V and the Indiana Department of Environmental Management work well with the people and operations at Crane. Furthermore, the communities surrounding the Division are extremely supportive of the facility and its programs. **In other words, there is almost no antagonistic opposition from the public or regulators to environmental permits and related activities.** This favorable relationship is extraordinary among Department of Defense facilities.

PERSONNEL ADVANTAGES - The following advantages exist at the Crane Division, are applicable to the Common Support Functions, and are considered enhancements for the accomplishment of the mission.

Educational Support and Recruitment - Although Indiana is noted as a major producer and exporter of consumer and industrial electronic goods, **Crane Division has little local competition for people with technological skills.** The Division is centrally located with respect to some of the world's largest and most highly regarded schools of engineering. In addition, a number of nearby schools and universities offer two year Associate degrees in engineering technology.

Quality of Life - Crane Division is the largest employer of engineers in Southern Indiana. The quality of life, low cost of living (including cost of housing), and ease in getting to work lead to extremely low attrition rates. **Thus far there has been no need to offer recruitment or retention bonuses to either acquire or retain technical personnel.** The low cost of living is supported by the fact that we are covered under RUS (Rest of United States) insofar as locality pay is concerned.

Recruitment - There are a number of reputable engineering schools within a 100-150 mile radius of Crane, for example: Purdue University, the University of Evansville, Rose-Hulman Institute of Technology, the University of Cincinnati, IUPUI, and the University of Louisville. **We have had approximately 1,000 engineering applications in our files within the past two-three years.** In addition, there are a number of technical schools in the local areas which furnish a substantial supply of electronic, electrical, and mechanical engineering technicians. These technical programs include both two-year and four-year curricula.

3.1.2 Licenses & Permits:

None

3.1.3 Environmental Constraints:

None

3.1.4 Special Support Infrastructure:

Utilities - The Crane site has excess capacity of all utilities available for the expansion of operations at the facility. Water and sewer capacities are at 50% utilization and are totally controlled by the facility. Electric and gas are supplied by utility companies to the base infrastructure and supplies may be expanded by more than 50% from the present usage.

Roads and Railroads - The Crane site has an extensive network of well maintained roads and railroads. This network allows for the safe and efficient transportation of all materials on the facility and the opportunity to transport materials by whatever means is most cost effective to the government.

Warehouse Storage - The Crane site has 980,000 sf of warehouse space directly controlled by the navy with another 1.3 million sf controlled by the Crane Army Ammunition Activity. This storage capacity has allowed the Center to support many of the Navy's inert material storage requirements.

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3.1.5 Proximity to Mission-Related organizations: List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
All CSF's	Crane TC's	Technical support	Co-located	Various	Various

This relationship is described in the following paragraphs. There are no other supporting organizations/activities nearby which are critical to accomplishing the mission of NSWC Crane Division. R

ADVANTAGE OF SYNERGIES IN CO-LOCATION

Many of the functions performed at the Crane Division, Naval Surface Warfare Center **require access to other facilities and capabilities co-located on the base** in order to accomplish their missions. These facilities/capabilities are considered vital and include:

- *Environmental simulation facilities such as humidity, temperature cycling, vibration, shock, altitude, sun/rain, sand/dust, salt spray, jolt, and jumble;*
- *X-ray facilities including real-time capability;*
- *Ordnance materials analysis lab;*
- *Battery engineering and test support;*
- *Failure Analysis of components;*
- *Firing Ranges and Range Support for Lasers and/or Weapon Sights/Fire Control Testing;*
- *Circuit card engineering and repair support;*
- *System interface testing;*

As an example of the benefits of co-location, the Electronic Warfare (EW) Technical Capability at Crane is collocated at the Crane Division with seven other complimentary TCs (Microwave Components, Radar, Electrochemical Power Systems,Naval Gun Weapon System, Electronic Module Test and Repair, Microelectronics Technology and Pyrotechnics). The skills, knowledge, equipment and facilities of these seven TCs are utilized extensively in EW TC support. Examples of this support is the Radar TC's antenna personnel and equipment; Microwave Component TC's traveling wave tube expertise; Electrochemical Power Systems TC's chemical battery knowledge and test capability support for expendable EW devices; etc. The EW TC's also supports the other TC's indicated by performing system analysis on products being developed in those TCs.

These facilities are unique from the standpoint they are Navy owned and operated. This gives complete control over physical security. Another advantage is that test and evaluation activities can be controlled and executed with **no interference from civil marine traffic** unlike test facilities in densely populated coastal areas. The result is effective execution of test processes with minimal cost due to the avoidance of down time and **freedom from excessive public relations complications.**

3.2 Personnel:

3.2.1 Total Personnel: What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

CSF- Advanced Materials

Types of personnel	Number of Personnel				
	Government		On-Site FFRDC	On-Site SETA	
	Civilian	Military			
Technical	3R	0	0	0	R
Management (Supv)	0	0	0	0	
Other	0R	0	0	0	R

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	0	0	0
Associates	0	0	0
Bachelor	2R	0	0R
Masters	1R	0	0R
Doctorate (include Med/Vet/etc.)	0	0	0

R
R

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	0	2R	1R	0
Management	0	0	0	0	0
Other	0	0	0R	0R	0
Total	0	0	2	1	0

R
R

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
None	0	0	
Total	0	0	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Advanced Materials	1	An Overview of Navy Composite Developments for Thermal Management[1]	R

[1]Naval Engineers Journal, May 1992

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 Work Year and Lifecycle: Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

ADVANCED MATERIALS

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	2.5	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	0	0	0	0

3.3.1.2 Engineering Development By ACAT: For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
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  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	None	None	None	None
ACAT ID	None	None	None	None
ACAT II	None	None	None	None
ACAT III/IV	None	None	None	None

3.3.1.3 In-Service Engineering: For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
Advanced Materials	None			

3.3.2 Projected Funding

2.1 Direct Funding: For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Advanced Materials	0	0	0	0

3.3.2.2 Other Obligation Authority: For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Advanced Materials	0	220K	250K	180K

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3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities: Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
Advanced Materials	Electronic Packaging & Thermal Analysis Facility				1,700K

This facility is described on the following page. R

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The **Electronic Packaging & Thermal Analysis Facility** provides full spectrum support for microelectronic components, circuit cards and cabinets including RDT&E, engineering, acquisition and fleet support.

The equipment consists of computer data acquisition and analysis equipment, thermal shock exposure chambers and special equipment for performing cabinet level cooling assessments. The facility is used 15% for S&T work and 85% for major surface and undersea acquisition programs.

This facility provides support for components, circuit cards and cabinets used in a wide variety of equipments of the Department of the Navy (NAVSEA, NAVAIR, SSPO). The facility is used in collaborative efforts with the Naval Research Lab, Army Research Lab, Air Force Wright Labs and Department of Energy Sandia Labs.

USAGE OF ELECTRONIC PACKAGING & THERMAL ANALYSIS FACILITY

PERVASIVE FUNCTION	PERCENT UTILIZATION
ADVANCED MATERIALS	15 %
OTHER FUNCTIONS (*)	85 %

* Other related functions for which this facility is utilized include advanced material evaluation of shipboard and underwater combat systems, and strategic fire control and navigation systems.

ELECTRONIC PACKAGING & THERMAL ANALYSIS LAB
Performs component- to cabinet-level
structural & thermal evaluation for

3.5 Expansion Potential

3.5.1 Laboratory Facilities: Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Advanced Materials	Electronic Packaging & Thermal Analysis	Technical	2.7	1.9	.5

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Electronic Packaging and Thermal Analysis - Additional structural and thermal modeling workload could be absorbed along with additional structural and thermal test/evaluation workload with minor facility modification.

Facility Master Plan - The Crane Division has a Master Facility Plan for mothballing facilities as the DOD downsizing affects our workload. The following table indicates the planned availability of space in the buildings utilized for work associated with these CSF's.

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
2/217	22	22	143	13' 9"	200
2/441	4	4	23	13' 9"	50
36/217	3			9'	
37/217	35			9'	
41/217	28			26'	
54/219	17	17	110	19'	350
64/441	53	53	355	19'	1,000
64/217	21			19'	
64/610	28			8'	
121/217	23			8'	
180/216	3			11'	
180/217	5			11'	
190/216	2			9'	
353/217	3	3	21	15' 4"	200
353/441	8	8	50	15' 4'	300
354/441	10	10	67	15' 4"	500

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
355/217	4	4	33	15'44"	250
355/441	5	5	33	15'4"	250
472/441	10	10	67	15'4"	250
2069/441	10	10	67	15' 4"	500
2070/441	10	10	67	15' 4"	500
2071/441	10	10	67	15' 4"	500
2072/441	10	10	67	15' 4"	500
2073/441	10	10	67	15' 4	500
2521/217	4			10'	
2540/216	13			8'	
2921/216	6			12' 8"	
2932/216	4			10'	
2935/216	4			12'	
2947/216	2			7'	
2951/216	2			13' 4"	
2964/216	8			15'	

Constrained Class 2 Space Available for Expansion at NAVSURFWARCENDIV CRANE (UIC N00164) (Cont)

Building # / Category Code (3 digit)	Current GFA (KSF)	Additional Capacity Provided By Expansion		Height of High Bay (FT)	Estimated Cost of Rehab ($K's)
		* GFA (KSF)	# of Personnel		
Totals	377	186	1,237		5,350

* Space requiring modification

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

Electronic Packaging and Thermal Analysis - Four workyears could be absorbed.

Crane Division Master Facility Plan - As indicated in the previous table, 186,000 square feet of space applicable to these CFS's will become available as the DOD downsizing occurs.

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other altemation projects programmed in the FY95 PBS. (BRAC Criteria II)

None

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

Land Use	Total Acres	Developed Acreage	Available for Development	
			Restricted	Unrestricted
Maintenance	78.7	78.7	0	0
Operational Non-Ordnance	722.5	305.0	10.6	406.9
Operational Ordnance	1266.7	768.2	0	* 498.5
Training	13.4	6.2	0	* 7.2
R & D	0	0	0	0
Supply & Storage Ordnance	23734.0	17485.6	0	6248.4
Supply & storage Non-Ordnance	1055.9	863.2	0	192.7
Admin	84.1	76.2	0	* 7.9
Housing	170.7	45.1	0	125.6
Recreational	675	257	0	418
Navy Forestry Program	** 48,563	0	** 44,723	** 3,840
Navy Agricultural Outlease Program	0	0	0	0
Hunting/Fishing Programs	** 56,290	0	**52,450	**3,840
Other (Submerged)	900	0	900	0
TOTAL	*** 62467			

* Recommended "Best Use" but could support all uses marked with an asterisk.

** Overlapping concurrent land use

*** Total actual acres. Sum of column greater due to overlapping land use.

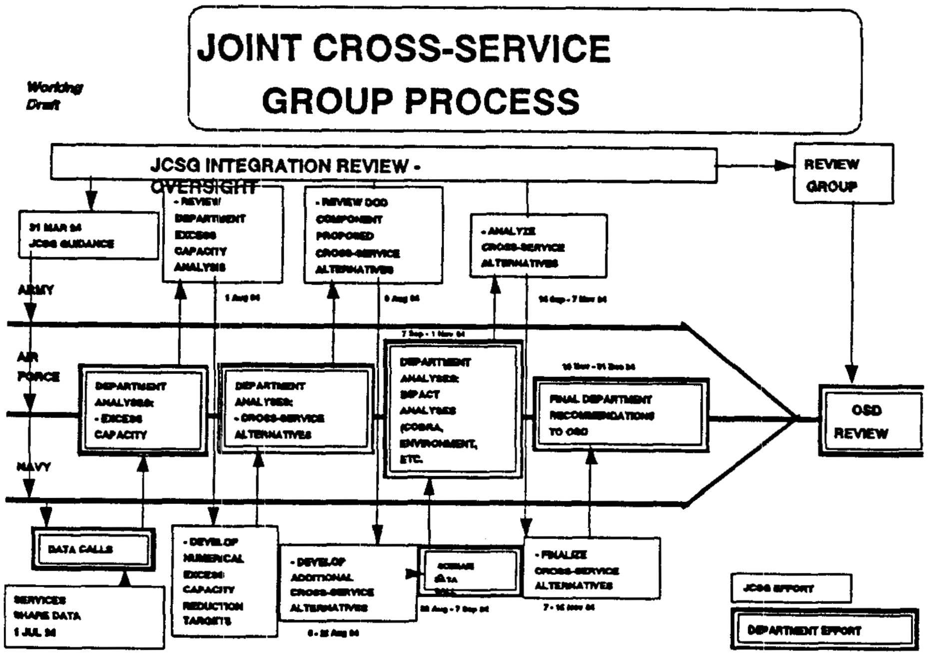
3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

	On Base Capacity	Off Base Long Term Contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	66600KVA Transmission capability	unlimited supply	16127.7KVA	19149.5KVA
Natural Gas (CFH)	3000M Transmission capability	Unlimited supply	55585	101864
Sewage (GPD)	1.2M Process Capability	None	475000	673000
Potable Water (GPD)	2.1M Production Capability	50000 Contract Supply	572000	789000
Steam (PSI & lbm/Hr)	487340 lb/Hr @ 110 PSI Production Capability	None	25000 lb/hr @ 110 PSI	365000 lb/hr @ 110 PSI
Long Term Parking	0	0	0	0
Short Term Parking (Square Yard)	188,303	0	19,224	60,000

SECTION IV: APPENDICES

A. Macro Process/Schedule
B. List of Activities
C. Common Support Functions

APPENDIX A



APPENDIX B

LIST OF ACTIVITIES

AIR FORCE

1. Armstrong Lab, Brooks AFB
2. Armstrong Lab, Tyndall AFB
3. Armstrong Lab, Wright-Patterson AFB
4. Armstrong Lab, Williams AFB
5. Human Systems Center, Brooks AFB
6. Wright Lab, Wright-Patterson AFB
7. Wright Lab, Eglin AFB
8. Aeronautical Systems Center, Wright-Patterson AFB
9. Aeronautical Systems Center, Eglin AFB
10. Oklahoma City Air Logistics Center, Tinker AFB (In-service engineering)
11. Ogden Air Logistics Center, Hill AFB (In-service engineering)
12. San Antonio Air Logistics Center, Kelly AFB (In-service engineering)
13. Sacramento Air Logistics Center, McClellan AFB (In-service engineering)
14. Warner-Robins Air Logistics Center, Robins AFB (In-service engineering)
15. Phillips Lab, Kirtland AFB
16. Phillips Lab, Hanscom AFB
17. Phillips Lab, Edwards AFB
18. Space & Missile Center, Los Angeles AFB
19. Space & Missile Center, Norton AFB
20. Sacramento Air Logistics Center, Peterson AFB
21. Rome Lab, Griffiss AFB
22. Rome Lab, Hanscom AFB
23. Electronic Systems Center, Hanscom AFB
24. Sacramento Air Logistics Center, Peterson AFB (In-service engineering)

ARMY

1. Army Research Lab (ARL), Adelphi, MD
2. ARL, Aberdeen Proving Grounds (APG), MD
3. ARL, White Sands Missile Range, NM
4. ARL, NASA Langley, VA
5. ARL, NASA Lewis, OH
6. Natick Research, Development and Engineering Center, Natick, MA
7. Aviation Research, Development and Engineering Center, St Louis, MO
8. Aviation Troop Command, Aeroflight Dynamics Directorate, Moffitt Field, CA
9. Aviation Troop Command, Aviation Applied Technology Directorate, Fort Eustis, VA
10. Edgewood Research, Development and Engineering Center, Aberdeen Proving Ground, MD
11. Communications Electronics Command Research, Development and Engineering Center, Ft Mammoth, NJ
12. Communication Electronics Command Research, Development and Engineering Center - Night Vision EO Directorate, Ft Belvoir, VA
13. Missile Research, Development and Engineering Center, Redstone Arsenal, AL
14. Armaments Research, Development and Engineering Center, Picatinny Arsenal, NJ
15. Armaments Research, Development and Engineering Center, Benet Labs, Watervliet Arsenal, NY
16. Tank-Automotive Command Research, Development and Engineering Center, Warren, MI
17. USA Research Institute of Infectious Diseases, Ft Detrick, MD

18. Walter Reed Army Institute of Research, Washington D.C.
19. USA Institute of Surgical Research, Ft Sam Houston, TX
20. USA Aeromedical Research Lab, Ft Rucker, AL
21. Medical Research Institute of Chemical Defense Aberdeen Proving Grounds, MD
22. USA Research Institute of Environmental Medicine, Natick, MA
23. Construction Engineering Research Laboratory, Champaign, IL
24. Cold Regions Research and Engineering Lab, Hanover, NH
25. Topographic Engineering Center, Alexandria, VA
26. Waterways Experiment Station, Vicksburg, MS
27. USA Research Institute for Behavioral & Social Sciences, Alexandria, VA
28. Simulation, Training and Instrumentation Command (STRICOM), Orlando, FL

NAVY

1. Naval Air Warfare Center, Weapons Division, China Lake
2. Naval Air Warfare Center, Weapons Division, Point Mugu
3. Naval Air Warfare Center, Aircraft Division, Patuxent River
4. Naval Air Warfare Center, Aircraft Division, Indianapolis
5. Naval Air Warfare Center, Aircraft Division, Lakehurst
6. Naval Research Lab, Washington D.C.
7. Naval Research Lab Detachment, Bay St Louis
8. Naval Surface Warfare Center, Carderock Division, Bethesda
9. Naval Surface Warfare Center, Carderock Detachment, Annapolis
10. Naval Surface Warfare Center, Crane Division
11. Naval Surface Warfare Center, Crane Detachment, Louisville
12. Naval Surface Warfare Center, Dahlgren Division
13. Naval Surface Warfare Center, Dahlgren Detachment, Panama City
14. Naval Surface Warfare Center, Indian Head Division
15. Naval Surface Warfare Center, Port Hueneme Division
16. Naval Command, Control, and Ocean Surveillance Center, RDT&E Division, San Diego
17. Naval Command, Control, and Ocean Surveillance Center, In-Service Engineering, West Coast Division, San Diego
18. Naval Command, Control, and Ocean Surveillance Center, In-Service Engineering Division, Charleston
19. Naval Aerospace Medical Research Center, Pensacola
20. Naval Biodynamics Lab, New Orleans
21. Naval Dental Research Lab, Great Lakes
22. Naval Health Research Center, San Diego
23. Naval Medical Research Institute, Bethesda
24. Naval Undersea Warfare Center, Keyport Division, WA
25. Naval Surface Warfare Center, Carderock, Philadelphia Detachment
26. Naval Undersea Warfare Center, Newport, RI
27. Naval Undersea Warfare Center (Newport), New London, CT
28. Naval Personnel Research and Development Center, San Diego, CA

DEPARTMENT OF DEFENSE

1. Armed Forces Radiobiology Research Institute (AFRRI), Bethesda, MD

APPENDIX C

COMMON SUPPORT FUNCTIONS
(DEFINITIONS LISTED FOLLOWING PAGES)

Product Functions

1. Air Vehicles
   - Fixed
     -- Structure
     -- Propulsion
     -- Avionics
     -- Flight Subsystems
   - Rotary
     -- Structure
     -- Propulsion
     -- Avionics
     -- Flight Subsystems

2. Weapons
   - ICBMs/SLBMs
   - Conventional Missiles/Rockets
   - Cruise Missiles
   - Guided Projectiles
   - Bombs
   - Guns and Ammunition
   - Directed Energy
   - Chemical/Biological

3. Space Systems
   - Launch Vehicles
   - Satellites
   - Ground Control Systems

4. C4I Systems
   - Airborne C4I
   - Fixed Ground-Based C4I
   - Ground Mobile C4I

Pervasive Functions

1. Electronic Devices

2. Environmental Sciences

3. Infectious Diseases

4. Human Systems

5. Manpower and Personnel

6. Training Systems

7. Environmental Quality

8. Advanced Materials

DEFINITIONS

COMMON SUPPORT FUNCTIONS

Product Functions

1. Air Vehicles. Air vehicles are broken out into common support functions for fixed wing and rotary wing. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of air vehicles. Included are all air vehicles including their application as UAV's and targets.

- Structures. Includes but not limited to all air vehicles structure technology, engineering and production efforts. Include technology and engineering practices which advance structural design and analysis; advanced structural concepts and fabrication techniques; and structural integrity.

- Propulsion. Includes but not limited to all technology, engineering and production efforts associated with air vehicle propulsion such as turbine engine, rotorcraft power drive, and hypersonic propulsion components. Such components include compressors, inlets and nozzles, turbines, mechanical systems and control, gears, bearings, shafts, and clutches. In addition, include associated subsystems activities such as turborocket, turboramjet and rotorcraft transmissions; and supporting technical and engineering disciplines.

- Avionics. Includes but not limited to all technology, engineering and production efforts associated with the air platform's integrated avionics system. The avionics suite includes but is not limited to weapon delivery systems, electronic warfare, navigation, communications, radar, electro-optic sensors, signal/data processing and associated software system and support. Includes efforts associated with developing the integrated avionics system (i.e. optimizing functional partitioning, distribution and integration of avionics/related functions).

- Flight Subsystems. Includes but not limited to all technology, engineering and production efforts for air vehicle support systems such as landing gear; transparent crew enclosures; egress systems; mechanical equipment integrity; electrical component integrity;

subsystem integration; and aircraft power, pressurization, and temperature control systems.

2. Weapons. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of ICBMs/SLBMs, conventional missiles and rockets, cruise missiles, guided projectiles, bombs, guns and ammunition, directed energy and chemical/biological munitions. Include with each weapon as appropriate, all related technology, engineering and production activities such as fusing/safe and arm, missile propulsion, warheads and explosives, and guidance and control.

3. Space. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of launch vehicles, satellites and associated ground control systems (satellite control only; ground systems for telemetry of data included in C4I). Include under satellites, all technology, engineering and production activities associated with space communications and space-based surveillance (and associated sensors) and space-based C4I.

4. C4I. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of airborne, fixed ground-based and mobile ground based C4I systems. Include all technology, engineering and production activities associated with communications networks, radios and links, distributed information systems, data fusion, decision aids, and associated computer architectures.

<u>Pervasive Functions (6.1, 6.2, and 6.3)</u>

1. Electronic Devices. Includes but not limited to all science and technology activities supporting development of semiconductor and superconductor materials for optoelectronic, acoustic and microwave devices. Include all associated electronic materials/device fabrication and processing.

2. **Environmental Sciences.** Includes but not limited to all science and technology activities to improve measurement, characterization and modeling of the earth atmosphere and space environment. Examples include global prediction systems, space effects, and celestial backgrounds/astronomical reference sources.

3. **Infectious Diseases.** Includes but not limited to all science and technology activities which preserve manpower and performance by the prevention and treatment of militarily important infectious diseases that occur naturally worldwide.

4. **Human Systems.** Includes but not limited to all science and technology activities to enable, protect, sustain and enhance human effectiveness in DOD operations. The focus of this pervasive, multi-disciplinary area is the human and therefore impacts all DOD systems and operations. This area includes: (1) human performance definition, assessment, and aiding; (2) physiologic bioeffects of toxic hazards, ionizing and non-ionizing radiation, biodynamic (bio-mechanical) stress, and extreme environments; (3) military operational medicine; and (4) generic, human-centered design standards/methodologies for crew station subsystems, information management and display, and life support.

5. **Manpower and Personnel.** Includes but not limited to all science and technology activities which support four broad areas: (1) selection and classification of DOD personnel (including pilots); (2) identification of operational tasks performed and requirements for skills, knowledge, and aptitudes; (3) matching the right people with the jobs they are best suited for according to the needs of DOD, (4) and developing techniques for measuring and enhancing the productivity of the operational force.

6. **Training Systems.** Includes but not limited to all science and technology which support training of personnel, including training strategies, devices and simulators, and computer aided intelligent tutoring systems.

7. **Environmental Quality.** Includes but not limited to all science and technology activities which support the development of technologies to reduce the environmental costs of DOD operations while ensuring mission accomplishment is not jeopardized by adverse environmental impacts. Specifically, this area encompasses technologies to: (1) identify and

cleanup sites contaminated with hazardous materials as a result of DOD operations (cleanup); (2) ensure DOD compliance with current and anticipated local, national, and international environmental laws and treaties (compliance); (3) minimize DOD use of hazardous materials and reduce DOD hazardous waste generation (pollution prevention); and (4) provide for protection of natural resources under DOD stewardship (conservation).

8. Advanced Materials. Includes but not limited to all science and technology activities related to structural, high temperature, electromagnetic protection, electronic, magnetic, optical, and biomolecular materials. Note: excludes materials areas which were included in DDR&E decision of 18 Mar 94 related to the Army's Materials Research Facility at Aberdeen Proving Ground and the Navy's Materials Facility at Carderock.

CRANE SITE 12 Aug 94 Transmittal

~~I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.~~

~~NEXT ECHELON LEVEL (if applicable)~~

~~NAME (Please type or print~~ ~~Signature~~

~~Title~~ ~~Date~~

~~Activity~~

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (Sel) D. P. Sargent, Jr.
NAME (Please type of print

Signature

Commander
Title

7/8/94
Date

Naval Surface Warfare Center
Activity

In certify that the information herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

G. R. STERNER
NAME (Please type or print

Signature

Title

8/5/94
Date

Commander
Naval Sea Systems Command
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

W. A. EARNER
NAME (Please type of print

Signature

Title

8/18/94
Date

12 Aug 94
Transmittal

NAVAL SURFACE WARFARE CENTER
CRANE DIVISION
DATA CALL #12

BRAC-95 CERTIFICATION

Reference: SECNAVNOTE 11000 of 08 December 1993

In accordance with policy set forth by the Secretary of the Navy, personnel of the Department of the Navy, uniformed and civilian, who provide information for use in the BRAC-95 process are required to provide a signed certification that states "I certify that the information contained herein is accurate and complete to the best of my knowledge and belief."

The signing of this certification constitutes a representation that the certifying official has reviewed the information and either (1) personally vouches for its accuracy and completeness or (2) has possession of, and is relying upon, a certification executed by a competent subordinate.

Each individual in your activity generating information for the BRAC-95 process must certify that information. Enclosure (1) is provided for individual certifications and may be duplicated as necessary. You are directed to maintain those certifications at your activity for audit purposes. For purposes of this certification sheet, the commander of the activity will begin the certification process and each reporting senior in the Chain of Command reviewing the information will also sign this certification sheet. This sheet must remain attached to this package and be forwarded up the Chain of Command. Copies must be retained by each level in the Chain of Command for audit purposes.

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

S.T. HOWARD
NAME (Please type or print)

Signature

COMMANDER
Title

7/22/94
Date

CRANE DIVISION, NSWC
Activity

In evaluating this data call, if there are no "R's" in the right hand column, then the whole page is new.

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

S. Howard

NAME (Please type or print

Signature

Commander

6/24/94

Title

Date

CRANE DIVISION
NAVAL SURFACE WARFARE CENTER

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (Sel) D. P. Sargent, Jr.

NAME (Please type of print

Signature

Commander

7/1/94

Title

Date

Naval Surface Warfare Center

Activity

In certify that the information herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

G. R. STERNER

NAME (Please type or print

Signature

7-1-94

Title [illegible]

Date

[illegible] Sea Systems Command

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

J. B. GREENE, JR.

NAME (Please type of print

Signature

ACTING

06 JUL 1994

Title

Date

DATA CALL #12
CRANE SITE

BRAC-95 CERTIFICATION

Reference: SECNAV NOTE 11000 dtd 8 Dec 93

In accordance with policy set forth by the Secretary of the Navy, personnel of the Department of the Navy, uniformed and civilian, who provide information for use in the BRAC-95 process are required to provide a signed certification that states "I certify that the information contained herein is accurate and complete to the best of my knowledge and belief."

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I certify the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

S. HOWARD
NAME (Please type of print)

Signature

COMMANDER
Title

6/24/94
Date

CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
Activity

DATA CALL #12
CRANE SITE

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

NAME (Please type or print | Signature

Title | Date

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (Sel) D. P. Sargent, Jr.
NAME (Please type of print | Signature

Commander | 8/23/94
Title | Date

Naval Surface Warfare Center
Activity

In certify that the information herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

NAME (Please type or print | Signature

~~G. R. STERNER~~ | 8/27/94
Title | Date
Commander
Naval Sea Systems Command

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

W. A. EARNER
NAME (Please type of print | Signature

7/1/94
Title | Date

NAVAL SURFACE WARFARE CENTER
CRANE DIVISION
DATA CALL #12

BRAC-95 CERTIFICATION

Reference: SECNAVNOTE 11000 of 08 December 1993

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I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

J. M. CARNEY
NAME (Please type or print)

JM Carney
Signature

COMMANDER
Title

8/21/94
Date

CRANE DIVISION, NSWC
Activity

Pages 12R and 14R. In-Service Engineering numbers revised.

Pages 16R and 16aR. Replacement Cost provided for Equipment/Facilities listed.

Page 36R. In-Service Engineering Efforts revised.

Pages 59R and 80R. In-Service Engineering Efforts revised.

(Continued)

DATA CALL #12
CRANE SITE

~~I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.~~

~~NEXT ECHELON LEVEL (if applicable)~~

~~NAME (Please type or print~~ ~~Signature~~

~~Title~~ ~~Date~~

~~Activity~~

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (Sel) D. P. Sargent, Jr.
NAME (Please type of print

Signature

Commander
Title

9/15/94
Date

Naval Surface Warfare Center
Activity

In certify that the information herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

NAME (Please type or print
G. R. STERNER

Signature

Commander
Naval Sea Systems Command
Title

9/19/94
Date

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

W. A. EARNER
NAME (Please type of print

Signature

Title

9/19/94
Date

NAVAL SURFACE WARFARE CENTER
CRANE DIVISION
DATA CALL #12
BRAC-95 CERTIFICATION

Reference: SECNAVNOTE 11000 of 08 December 1993

In accordance with policy set forth by the Secretary of the Navy, personnel of the Department of the Navy, uniformed and civilian, who provide information for use in the BRAC-95 process are required to provide a signed certification that states "I certify that the information contained herein is accurate and complete to the best of my knowledge and belief."

The signing of this certification constitutes a representation that the certifying official has reviewed the information and either (1) personally vouches for its accuracy and completeness or (2) has possession of, and is relying upon, a certification executed by a competent subordinate.

Each individual in your activity generating information for the BRAC-95 process must certify that information. Enclosure (1) is provided for individual certifications and may be duplicated as necessary. You are directed to maintain those certifications at your activity for audit purposes. For purpose of this certification sheet, the commander of the activity will begin the certification process and each reporting senior in the Chain of Command reviewing the information will also sign this certification sheet. This sheet must remain attached to the package and be forwarded up the Chain of Command. Copies must be retained by each level in the Chain of Command for audit purposes.

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

J. M. CARNEY
NAME (Please type or print)

JM Carney
Signature

COMMANDER
Title

9/14/94
Date

CRANE DIVISION, NSWC
Activity

These revised pages are provided for clarification as requested by the Base Structure Analysis Team on 12 September 1994.

Page 16 (13 June 1994)/Page 17cR (7/21/94). Page 16 (13 June 1994) was revised with pages 16R and 16a (submitted 20 August 1994). These revised pages list facilities that match the facilities on page 17cR (7/21/94). Copies of pages 16R (8/20/94) and 16aR (8/20/94) are attached.

Question 3.2.4.2--Pages 11R, 33R, 56R, 77R, 103R, 155R, 188R, 209R, 232R, 233R, 254R, . Revised as all papers previously submitted were not published in peer reviewed journals.

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Complete Revision

DATA CALL #12

"LAB" JOINT CROSS-SERVICE GROUP GUIDANCE PACKAGE

DAHLGREN SITE

DAHLGREN DIVISION

NAVAL SURFACE WARFARE CENTER

WC

31 March 1994

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Submission for
UIC **N00178**

DAHLGREN

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"LAB" JOINT CROSS-SERVICE GROUP GUIDANCE PACKAGE

This submission contains separate Section III's for:

III-AIR VEHICLES
-FIXED/AVIONICS
-ROTARY/AVIONICS
III- C⁴I
-FIXED GROUND-BASED
III- SPACE
-SATELLITES

R

III- WEAPONS
-ICBM'S/SLBM'S
-CRUISE MISSLE
-CONVENTIONAL MISSILES/ROCKETS
-GUNS & AMMUNITION
- GUIDED PROJECTILES
III- APPENDIX A - FACILITY PICTURES

31 March 1994

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UIC N00178

UIC

SECTION I: TASKING

In accordance with the Deputy Secretary of Defense memorandum dated 7 Jan 94, the Laboratory Joint Cross-Service Group (LJCSG) with DOD components should, where operationally and cost effective, strive to: retain in only one Service militarily unique capabilities used by two or more Services; consolidate workload across the Service to reduce capacity; and assign operational units from more than one Service to a single base. Specifically, the purpose of the LJCSG is:

- Determine common support functions and bases to be addressed by LJCSG
- Establish guidelines, standards, assumptions, measures of merit, data elements and milestone schedules for DOD Component conduct of cross-service analysis of common support functions
- Review excess capacity analysis
- Develop closure or realignment alternatives
- Analyze cross-service trade-offs

The following information identifies to the Services common support functions and data element requirements necessary to support the cross-service analysis of these common support functions.

1.1 Guidelines

Because the DOD components are organized differently, "Lab" activities are considered to be those involved in the following life cycle efforts: Science and technology, and/or engineering development, and/or in-service engineering.

Service missions and force structure will be as stipulated in the FY1995-2000 Defense Planning Guidance and Interim Force Structure Plan.

The Military Departments will use the projected funding in the FY95 President's Budget Submission (Future Years Defense Plan -- FYDP) and an estimate of funds that will be received from outside the military department for execution.

If "lab" excess capacity exists, the Military Departments will start to reduce it where operationally and cost effective through a combination of downsizing in place within the departments, internal service consolidation, and cross service alternatives.

The Military Departments will gather, exchange, and analyze data collected per this guidance call for Common Support Functions (Appendix C) at "lab" activities (Appendix B) in accordance with the milestones and schedule dates identified in Appendix A.

Cross-service alternatives will result in an aggregate reduction in the overall "lab" infrastructure

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across the Military Departments -- personnel/funding/facilities and equipment.

Common cross-service Measures of Merit will be consistently applied for all cross-service alternatives.

Integration of weapon systems/components into operational forces will remain with the individual Military Departments responsible for those forces.

1.2 Standards

Evaluation of cross-service alternatives will be consistent with PL 101-510 (as amended) and the eight BRAC criteria. Only certified data will be used.

The COBRA cost model will be used to calculate estimated costs, estimated savings, and Return on Investment (ROI) of alternatives leading to proposed closures and realignments. Common inputs will be used for Military COBRA runs incorporating cross-service alternatives.

Military value analysis will be conducted by the Military Departments IAW Title 10, USC responsibilities.

1.3 Assumptions

"Lab" Common Support Functions and activities identified herein represent the major opportunities for developing cross-service alternatives. The Military Departments are not precluded from proposing other cross-service alternatives to reduce excess capacity as they assess the full complement of "lab" functions.

Previous BRAC decisions will be factored into cross-service alternatives.

"Lab" capacity will be based on budgeted workyears. A workyear is considered to be 2080 hours adjusted for time not on the job (e.g. sick leave, annual leave, etc.)

1.4 Measures of Merit

The following Measures of Merit represent the outcome from the DOD component final realignment and closure recommendations that are supported by the capabilities data which will be gathered by activity and common support function in Section III of this guidance.

- Reduction of "lab" infrastructure

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- Return on investment (COBRA)
- Military value (BRAC criteria 1-4) -- the composite assessment of the quality of the remaining "lab" infrastructure

1.5 Activities

The Military Departments will collect capacity data for each "lab" activity identified in Appendix B. The "lab" activities were selected by considering all individual aggregates of personnel and facilities located at one base, under the same commander, performing predominantly science and technology (S&T), engineering development, and/or in-service engineering work. Small subelements of these "lab" activities were included with the activity. Larger subelements were broken out and defined as separate activities. The list of activities was then narrowed down to the list in Appendix B based on a joint Military Department assessment of common support functions with cross-service potential.

1.6 Common Support Functions

The common support functions (CSFs) were selected as shown in Appendix C based on a joint Military Department assessment of commonalty and cross-servicing potential. Common support functions which were already consolidated and being cross serviced were not included.

Common Support Functions are divided into two categories: product and pervasive. Product functions include all S&T, engineering development, and in-service engineering efforts associated with a product from all funding sources. Pervasive functions <u>only include</u> those efforts that are S&T funded, i.e. Technology Base (6.1)/Exploratory Development (6.2)/Advanced Development (6.3).

SECTION II: CAPACITY OF DOD COMPONENTS

2.1 **Workload**. Use the following table to describe historic and projected workload at each activity in terms of funding and workyears. Assume previous BRAC closures and realignments are implemented on schedule. Projected funding will be derived from FY95 President's Budget Submission (Then year dollars). Past fiscal year data shall begin with FY86 or at the inception of the activity as it existed on 1 Oct 93. (BRAC Criteria I & IV)

Information Required	Fiscal Years											
	86	87	88	89	90	91	92	93	94	95	96	97
Total Funds Programmed ($M)	259.8	307.5	215.2	255.8	303.4	346.6	396.4	449.5	471.5	407.1	428.0	431.0
Total Actual Funds ($M)	255.5	226.7	256.0	279.9	336.7	392.9	434.8	553.5				
Programmed Workyears	3143	3221	3100	3208	3196	3272	3429	3242	3301	2795	2768	2860
Actual Workyears	3152	3028	3160	3140	3234	3340	3355	3186				

- Budgeted workyears are the selected indicator of the "lab" infrastructure's capacity at an aggregate level for each Military Department. They include both workyears funded directly by the Military Department and the workyears funded from organizations outside the Military Department.

Workyears = government personnel and on-site FFRDCs and SETAs

2.2 **Excess "Lab" Capacity -- Measured at the DOD Component Level**

- Excess "Lab" Capacity = Sum of the Peak Workyears - Sum of the Projected Workyears
  -- Peak at each activity = Highest value between FY86 (or since inception of organization) and FY93
  -- Projected at each activity = Estimated at FY97

3355 - 2860 = 495

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UIC N00178

DAHLGREN DIVISION
NAVAL SURFACE WARFARE CENTER

SECTION III

AIR VEHICLES

FIXED/AVIONICS

R

31 March 1994

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

The capabilities at the activity which contribute to the Air Vehicles-Fixed Wing Avionics common support function are as follows:

- **Navy's lead laboratory for Hazards of Electromagnetic Radiation to Ordnance (HERO) and Joint Service Electromagnetic Vulnerability (EMV) with unique RDT&E capabilities; able to identify design flaws; research and develop cost effective solutions; and assure Navy and joint operation commanders that non-Navy aircraft and ordnance will safely perform in the intense shipboard EME.**
- **Only DoD activity with a full spectrum of facilities and technical expertise to design shipboard configurations to avoid E^3 problems and to test all service (i.e., Joint) aircraft, missiles, radar, system components, and ordnance for proper safety and operations.** R
- **Only agency (government or private sector) authorized to certify DoD aircraft and weapons systems for compliance with Navy HERO safety requirements.**
- **Since 1986, NSWCDD has been the premier government agency for evaluation, certification of safety-of-flight, and correction of electromagnetic vulnerability (EMV) deficiencies for DoD aircraft assigned to Joint Shipboard Operations.**
- **The NSWCDD Electromagnetic Vulnerability Assessment Facility (EMVAF) is the only complete electromagnetic test facility able to simulate the high-power full-threat operational EME in which the Navy and other U.S. Armed Forces must operate.**

Relationship and Interconnectivity with other Functions:

The availability of aviation support facilities complements the extensive test and evaluation capability. The 4200 foot lighted runway with three instrument approaches;

aircraft hanger, maintenance and servicing capability; bulk fuel storage with refueling capability; ground handling and emergency equipment; aircraft security; and sensitive ordnance stowage make NSWCDD ideally suited for use as a Joint Service Aircraft test site. The presence of the airfield facility permits U.S. Army, Navy, and Air Force testing to be supported by both fixed wing and helicopter logistic flights. R

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The relative proximity of Dahlgren Laboratory to the Washington, DC Department of Defense complex (55 miles) enables personnel interaction with customers to occur as frequently as is necessary with minimum notification or travel arrangements. R

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

The National Telecommunications and Information Administration Manual of Regulations and Procedures for Federal Radio Frequency Management, May 1986, Article 7.11, designates the Dahlgren Laboratory as an experimental radio station and authorizes the use of the necessary radio frequencies on station for normal Hazards of Electromagnetic Radiation to Ordnance (HERO) and Electromagnetic Vulnerability (EMV) testing without prior authorization. This designation is required to perform the necessary test and evaluation functions to evaluate air vehicle avionics systems. R

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

There are no environmental constraints that limit or restrict the current scope of support for the evaluation of air vehicle fixed wing avionics systems. R

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The facilities used to support these activities require special support infrastructure. Specifically, they require 400 Hz power; 440V power; 115V delta power; physical security approval for SECRET and TOP SECRET facilities; and classified and unclassified data links and networks with other Air Vehicle avionics development and acquisition activities and facilities ashore worldwide.

The successful performance of the Air Vehicle mission requires the coexistence of the following infrastructure: R

- **Public Works support with heavy equipment to adequately support development, test, and evaluation needs.**

- **Security forces commensurate with program classification and access needs.**

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

The necessary organizations (government and contractor) to support this CSF are co-located at Dahlgren. R

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel *			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	4	0	0	0
Management (Supv)	0	0	0	0
Other	0	0	0	0

* This response is limited to support for this CSF only. R

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position *		
	Technical	Management (Supv)	Other
High School or Less	2	0	0
Associates	0	0	0
Bachelor	2	0	0
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

* This response is limited to support for this CSF only. R

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service *				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	0	1	0	3
Management (Supv)	0	0	0	0	0
Total	0	0	0	0	0

* This response is limited to support for this CSF only. R

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
AIR VEHICLE (Fixed Wing Avionics)	0	0	
Total	0	0	

R

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
AIR VEHICLE (Fixed Wing Avionics)	0	
TOTAL	0	

R

3.3 Workload

3.3.1 **FY93 Workload**

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	4.3	0	0	0

R

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	0			
ACAT ID	0			
ACAT II	0			
ACAT III/IV	0			
Other	0			

R

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority) ($K)	Workyears	
AIR VEHICLE (Fixed Wing Avionics)	Production Engineering	365	1.8	AIR FORCE B2 BOMBER NAVY SPECIAL SUPPORT EQUIPMENT

R

	Product Improvements	482	2.5	NAVY A-6E AIRCRAFT NAVY E-2C AIRCRAFT NAVY KA-6D AIRCRAFT FAA BOEING 707 AIRCRAFT NAVY ELECTRONIC WARFARE SYSTEMS NAVY COUNTER-MEASURES SYSTEMS NAVY ITALD PROGRAM NAVY AVIONICS SUPPORT EQUIPMENT

R

3.3.2 **Projected Funding**

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
AIR VEHICLE (Fixed Wing Avionics)	NONE	NONE	NONE	NONE

R

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
AIR VEHICLE (Fixed Wing Avionics)	760K	800K	850K	900K

R

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III-APPENDIX A - FACILITY PICTURES for photographs.

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
AIR VEHICLE (Fixed Wing Avionics)	Electromagnetic Vulnerability Assessment Facility	X	X	X	$20,600

*** Replacement cost for equipment costs only.**

R

Electromagnetic Vulnerability Assessment Facility (EMVAF):

Complete electromagnetic test facility used to simulate the high-power full-threat operational electromagnetic environment (EME) in which the Armed Forces must

operate. Evaluation of the effects of a joint U.S. Armed Forces tactical EME upon electro-explosive, electronic, electrical, and electro-mechanical systems. Perform electromagnetic (EM) susceptibility and Hazards of Electromagnetic Radiation to Ordnance (HERO) testing in a simulated "real world" near-field environment. Conduct aircraft electromagnetic vulnerability (EMV) evaluations to the intended operational environment. Perform measurements of the susceptibility and vulnerability of weapon systems and shielding effectiveness of enclosures and material. Perform evaluation of electronic and weapon systems in their full-threat launch-to-target operational environment. The EMVAF consists of ground plane test facilities, anechoic chamber, mode-stirred chamber, and state-of-the-art telemetry collection and data reduction laboratories interconnected with a state-of-the-art fiber optic data collection and instrumentation systems. R

This facility is shared between the CSF elements: Conventional Missiles/Rockets (35%), Guns and Ammunition (5%), and Guided Projectile (30%). Remaining support is in Aircraft Avionic Systems EMV - Fixed/Avionics (15%) and Rotary/Avionics (15%).

3.5 Expansion Potential

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
AIR VEHICLE (Fixed Wing Avionics)	Electro-magnetic Vulnerability Assessment Facility**	Admin	3.4	3.4	0
		Technical	24.1	24.1	0
		Storage	3.5	3.5	0
		Utility	2.0	2.0	0

R

*** Administrative, Technical, Storage, Utility**
**** The entire EMVAF is required to support this CSF; however, the actual usage for this CSF represents approximately 15% of the total for the EMVAF.**

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

With appropriate adjustments to end strength this facility could absorb an additional 23 WY of air vehicle avionics testing workload with no facility modification. This is based upon the projected FY97 staffing requirements as compared with the previous peak staffing for test operations in existing facilities. Since this facility is unique and cost prohibitive to relocate, absorbing additional work at this facility would result in increased efficiency. This increased efficiency is attributed to increased utilization of the minimum assets that continue to be required to operate this unique facility. The uniqueness of the Electromagnetic Vulnerability Assessment Facility is fully described in data call 13 (T&E Joint Cross-Service Data Call). R

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5.1.1 R

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

No impact. R

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres R

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure. R

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

AIR VEHICLES R

ROTARY/AVIONICS

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

The capabilities at the activity which contribute to the Air Vehicles-Rotary Wing Avionics common support function are as follows:

- **Navy's lead laboratory for Hazards of Electromagnetic Radiation to Ordnance (HERO) and Joint Service Electromagnetic Vulnerability (EMV) with unique RDT&E capabilities; able to identify design flaws; research and develop cost effective solutions; and assure Navy and joint operation commanders that non-Navy aircraft and ordnance will safely perform in the intense shipboard EME.**

- **Only DoD activity with a full spectrum of facilities and technical expertise to design shipboard configurations to avoid E^3 problems and to test all service (i.e., Joint) aircraft, missiles, radar, system components, and ordnance for proper safety and operations.**

- **Only agency (government or private sector) authorized to certify DoD aircraft and weapons systems for compliance with Navy HERO safety requirements.** R

- **Since 1986, NSWCDD has been the premier government agency for evaluation, certification of safety-of-flight, and correction of electromagnetic vulnerability (EMV) deficiencies for DoD aircraft assigned to Joint Shipboard Operations.**

- **The NSWCDD Electromagnetic Vulnerability Assessment Facility (EMVAF) is the only complete electromagnetic test facility able to simulate the high-power full-threat operational EME in which the Navy and other U.S. Armed Forces must operate.**

Relationship and Interconnectivity with other Functions:

The availability of aviation support facilities complements the extensive test and

evaluation capability. The 4200 foot lighted runway with three instrument approaches; aircraft hanger, maintenance and servicing capability; bulk fuel storage with refueling capability; ground handling and emergency equipment; aircraft security; and sensitive ordnance stowage make NSWCDD ideally suited for use as a Joint Service Helicopter test site. The presence of the airfield facility permits U.S. Army, Navy, and Air Force testing to be supported by both fixed wing and helicopter logistic flights. R

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The relative proximity of Dahlgren Laboratory to the Washington, DC Department of Defense complex (55 miles) enables personnel interaction with customers to occur as frequently as is necessary with minimum notification or travel arrangements. R

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

The National Telecommunications and Information Administration Manual of Regulations and Procedures for Federal Radio Frequency Management, May 1986, Article 7.11, designates the Dahlgren Laboratory as an experimental radio station and authorizes the use of the necessary radio frequencies on station for normal Hazards of Electromagnetic Radiation to Ordnance (HERO) and Electromagnetic Vulnerability (EMV) testing without prior authorization. This designation is required to perform the necessary test and evaluation functions to evaluate air vehicle avionics systems. R

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

There are no environmental constraints that limit or restrict the current scope of support for the evaluation of air vehicle rotary wing avionics systems. R

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The facilities used to support these activities require special support infrastructure. Specifically, they require 400 Hz power; 440V power; 115V delta power; physical security approval for SECRET and TOP SECRET facilities; and classified and unclassified data links and networks with other Air Vehicle avionics development and acquisition activities and facilities ashore worldwide.

The successful performance of the Air Vehicle mission requires the coexistence of the following infrastructure: R

- **Public Works support with heavy equipment to adequately support development, test, and evaluation needs.**

- **Security forces commensurate with program classification and access needs.**

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

The necessary organizations (government and contractor) to support this CSF are co-located at Dahlgren. R

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel *			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	4	0	0	0
Management (Supv)	0	0	0	0
Other	0	0	0	0

*** This response is limited to support for this CSF only.**

R

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position *		
	Technical	Management (Supv)	Other
High School or Less	2	0	0
Associates	1	0	0
Bachelor	1	0	0
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

*** This response is limited to support for this CSF only.**

R

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service *				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	0	0	1	3
Management (Supv)	0	0	0	0	0
Total	0	0	0	0	0

*** This response is limited to support for this CSF only.**

R

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
AIR VEHICLE (Rotary Wing Avionics)	0	0	
Total	0	0	

R

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
AIR VEHICLE (Rotary Wing Avionics)	0	
TOTAL	0	

R

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0	0	0	0
Engineering Development	0	0	0	0
In-Service Engineering	3.7	0	0	0

R

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	0			
ACAT ID	0			
ACAT II	0			
ACAT III/IV	0			
Other	0			

R

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority) ($K)	Workyears	
AIR VEHICLE (Rotary Wing Avionics)	Production Engineering	195	1.0	AIR FORCE MH-53J HELICOPTER AIR FORCE MH-60G HELICOPTER
	Product Improvements	541	2.7	ARMY AH-64 LONGBOW HELICOPTER ARMY OH-58D HELICOPTER ARMY AN/AVS-7 AVIONICS NAVY CH-46E HELICOPTER NAVY MH-53E HELICOPTER

R

3.3.2 Projected Funding

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
AIR VEHICLE (Rotary Wing Avionics)	NONE	NONE	NONE	NONE

R

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
AIR VEHICLE (Rotary Wing Avionics)	730K	750K	800K	850K

R

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III-APPENDIX A - FACILITY PICTURES for photographs. R

Common Support Function	Major Facility or Equipment Description	Unique To DOD	Unique To Federal Gov't	Unique To U. S.	Replacement Cost ($K)
AIR VEHICLE (Rotary Wing Avionics)	Electromagnetic Vulnerability Assessment Facility	X	X	X	$20,600

*** Replacement cost for equipment costs only.**

Electromagnetic Vulnerability Assessment Facility (EMVAF):

Complete electromagnetic test facility used to simulate the high-power full-threat operational electromagnetic environment (EME) in which the Armed Forces must operate. Evaluation of the effects of a joint U.S. Armed Forces tactical EME upon electro-explosive, electronic, electrical, and electro-mechanical systems. Perform electromagnetic (EM) susceptibility and Hazards of Electromagnetic Radiation to Ordnance (HERO) testing in a simulated "real world" near-field environment. Conduct aircraft electromagnetic vulnerability (EMV) evaluations to the intended operational environment. Perform measurements of the susceptibility and vulnerability of weapon systems and shielding effectiveness of enclosures and material. Perform evaluation of electronic and weapon systems in their full-threat launch-to-target operational environment. The EMVAF consists of ground plane test facilities, anechoic chamber, mode-stirred chamber, and state-of-the-art telemetry collection and data reduction laboratories interconnected with a state-of-the-art fiber optic data collection and instrumentation systems. R

This facility is shared between the CSF elements: Conventional Missiles/Rockets (35%), Guns and Ammunition (5%), and Guided Projectile (30%). Remaining support is in Aircraft Avionic Systems EMV - Fixed/Avionics (15%) and Rotary/Avionics (15%).

3.5 Expansion Potential

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
AIR VEHICLE (Rotary Wing Avionics)	Electro-magnetic Vulnerability Assessment Facility**	Admin	3.4	3.4	0
		Technical	24.1	24.1	0
		Storage	3.5	3.5	0
		Utility	2.0	2.0	0

R

*** Administrative, Technical, Storage, Utility**
**** The entire EMVAF is required to support this CSF; however, the actual usage for this CSF represents approximately 15% of the total for the EMVAF.**

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

With appropriate adjustments to end strength this facility could absorb an additional 23 WY of air vehicle avionics testing workload with no facility modification. This is based upon the projected FY97 staffing requirements as compared with the previous peak staffing for test operations in existing facilities. Since this facility is unique and cost prohibitive to relocate, absorbing additional work at this facility would result in increased efficiency. This increased efficiency is attributed to increasing utilization from the present twelve hours per day to twenty-four hours per day. The uniqueness of the Electromagnetic Vulnerability Assessment Facility is fully described in data call 13 (T&E Joint Cross-Service Data Call). R

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5.1.1 R

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

No impact. R

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres R

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

R

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

C4I SYSTEMS

FIXED GROUND-BASED

203 #12 12 Aug 94 Transm. Ital

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

The capabilities at the activity which contribute to the C⁴I-Fixed Ground-Based Common Support Function are listed:

- **Software Support Activity (SSA) for Ocean Surveillance Information System (OSIS) Baseline Upgrade (OBU)**

- **Concept Development, Software Development, System Software Integration & Test, System Security Accreditation, Software Life Cycle Support for OBU**

Connectivity with other functions:

The OSIS Software Support Agent (SSA) capability at NSWCDD has no connectivity to other functions at this activity; in fact, it is because the capability is not within the NSWCDD stated mission area, that this function is being transitioned 1 October 1994 to the Naval Command and Control and Ocean Surveillance Center (NCCOSC), the activity with the C⁴I mission area. A signed Memorandum of Understanding (MOU) is in place between the two commands to effect this transition.

The only relationship with other functions at this activity is that the skills, knowledge, and engineering disciplines used by the personnel involved can and are being utilized by other NSWCDD functions such as the Cruise Missile Weapon System software development, as the OSIS/OBU SSA transitions to NCCOSC. R

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

12 Aug 94
Transmittal

The OBU SSA function transitions to NCCOSC/NRaD 1 October 1994 per Department of Navy laboratory mission purification decisions made in 1991.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

No licenses or permits are held or needed in support of tests, experiments, or other special capabilities in support of this Common Support Function.

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

There are no environmental or land use constraints which limit or restrict the current scope for this common support Function.

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The function requires 400 Hz delta power; 440V power; 115V delta power; TEMPST approval for facilities; physical security approval for SECRET, TOP SECRET, and SCI facilities; classified and unclassified data links and networks with other on-base facilities; classified and unclassified data links and networks with operational units afloat and ashore worldwide; and classified and unclassified data links and networks with other cruise missile development and acquisition activities and facilities ashore worldwide.

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
C^4I (FIXED GROUND BASED)		NONE			

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	15	0	0	0
Management (Supv)	1	0	0	0
Other	0	0	0	0

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	2	0	0
Associates	0	0	0
Bachelor	13	1	0
Masters	0	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	3	4	0	8
Management (Supv)	0	0	0	0	1
Total	0	3	4	0	9

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
C^4I	NONE	NONE	
(FIXED GROUND-BASED)			
Total			

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
C^4I	NONE	
(FIXED GROUND-BASED)		
TOTAL		

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0	0	0	0
Engineering Development	15.7	0	0	0
In-Service Engineering	0	0	0	0

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C^4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	0			
ACAT ID	0			
ACAT II	0			
ACAT III/IV	1	15.7	4,181,379*	OSIS/OBU
Other	0			

*** INCLUDES $30,000 OF RCP FUNDS**

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority)	Workyears	
C^4I (Fixed Ground-Based)	NONE			

3.3.2 Projected Funding

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
C^4I (FIXED GROUND-BASED)	NONE	NONE	NONE	NONE

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
C^4I (FIXED GROUND-BASED)	2.4M	0	0	0

3.4 Facilities and Equipment

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
C^4I (FIXED GROUND-BASED)					
	Cruise Missile/UAV Systems Development & Integration Facility	X	X	X	** See Below (3.4.1)

3.4.1 **Major Equipment and Facilities:**

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III- APPENDIX A - FACILITY PICTURES for photographs.

The $\underline{C^4I}$- Fixed Ground-Based common support function utilizes the following facility:

Cruise Missile/UAV System Development & Integration Facility

The Strike Systems Department OSIS/OBU equipment will be given to NCCOSC/NRad October 1994 as part of SSA function transition. The 3,000 square feet of facility space used to contain these equipment suites is part of the larger Cruise Missile/UAV Ssytem Development Integration Facility, and is already in the process of being used, and will continue to be used by TOMAHAWK and shipboard UAV programs. Our Strike Systems Department is depending on and has planned for this 3000 square feet of facilities to accommodate increasing workyears in the weapons area. If the OSIS/OBU function was not transitioning, NSWCDD would have had to create additional facilities for the TOMAHAWK and shipboard UAV programs. R

Because the equipment suite duplicates an operational suite, it provides a development and test capability unique within DoD, the Federal government, and the U.S. However, the transition mentioned above is the second time that the equipment has been moved between Navy activities within the past 5 years, thus its physical location and usage is not related specifically to NSWCDD and other functions here.

The replacement cost is $3M for the equipment, plus $5M to operate and use the facility to perform the function.

3.5 Expansion Potential

NONE. See 3.4.1 explanation.

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
C4I (FIXED GROUND-BASED)	SEE 3.5				

* Administrative, Technical, Storage, Utility

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

See 3.5

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

NONE

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

SPACE SYSTEMS

SATELLITES

12 Aug 94
Transmittal 1

<u>SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs):</u> Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

In general, the capabilities at the activity which contribute to the <u>Space Systems-Satellites</u> Common Support Function are listed:

. <u>Precise Satellite Orbit Determination</u>

. Supports DMA's global one meter geodetic positioning requirement
. Supports DOD strategic and tactical targeting requirements
. Calibration of C-band radars for space surveillance and test range tracking
. Direct mission support for national satellite systems

. <u>GPS and Satellite geodesy</u>

. World Geodetic System (WGS)-84, largely an NSWCDD product, is the fundamental world reference system for DOD targeting and navigation

. <u>Interconnectivity</u>

This CSF is interconnected with other functions at this activity. Specific examples include the SLBM program, gun systems (guided projectile), TOMAHAWK, surface ship systems, and Theater Ballistic Missile Defense. SLBM interconnectivity includes both the WGS development and GPS. WGS is used as the geodetic reference for both SLBM weapons control software and strategic targeting. GPS activities include support of SLBM flight tests and development of advanced guidance concepts for SLBM. The GPS activities contained within this CSF also support implementation in the guided projectile, TOMAHAWK, and within shipboard systems for surface ships. This CSF supports TBMD (and the surface navy in general) by linking the capability of spacebased assets for cueing and targeting to surface navy requirements. R

The activities associated with this CSF are also linked to a variety of outside activities. These include the Defense Mapping Agency, Naval

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Space Command, SPAWAR, the Naval Research Laboratory, 30th Space Wing USAF and Navy Strategic Systems Programs. R

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

As a result of years of involvement in the space and software development areas, an extensive complex of interconnected facilities has evolved. The resulting complex is essential to the support of this CSF. In addition, the proximity of Dahlgren to tenant activities such as the Naval Space Command and to other Department of Defense

activities in the Washington, DC area allows direct interaction with sponsors and headquarters activities.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

No licenses or permits are held or needed in support of tests, experiments, or other special capabilities in support of this Common Support Function.

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

There are no environmental or land use constraints which limit or restrict the current scope for this Common Support Function.

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

There are no special support infrastructure requirements required for the performance of the activities associated with this Common Support Function.

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
Space Systems (Satellites)	NRL	GOVT	60 MILES	0.5	0.0
	DMA	GOVT	60 MILES	9.6	0.0
	SPAWAR	GOVT	60 MILES	2.1	0.0

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. **(BRAC Criteria I)**

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	18.0	0	0	0
Management (Supv)	0	0	0	0
Other	0	0	0	0

3.2.2 Education: What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	1	0	0
Associates	0	0	0
Bachelor	10	0	0
Masters	6	0	0
Doctorate (include Med/Vet/etc.)	1	0	0

3.2.3 Experience: What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	5	1	2	10
Management (Supv)	0	0	0	0	0
Total	0	5	1	2	10

3.2.4 Accomplishments During FY91-93: For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
SPACE SYSTEMS (SATELLITES)	NONE	NONE	
Total			

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
SPACE SYSTEMS (SATELLITES)	NONE	
TOTAL		

3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.2	0	0	0
Engineering Development	6.8	0	0	0
In-Service Engineering	6.1	0	0	0

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3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority)	Narrative
ACAT IC	0			
ACAT ID	0			
ACAT II	0			
ACAT III/IV	0			
Other	1	6.8	811.2K	Defense Mapping Agency Program support including ASTER, DMA IGS Experiment, GPS Orbital Studies

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3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

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Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority) ($K)	Workyears	
SPACE SYSTEMS (SATELLITES)	Series 1:	72	.6	Series One is the interface equipment used to transfer GPS tracking data from the GPS master control station to DMA for orbit production
	ONMIS Support & Enhancement:	320	2.6	OMNIS is the operational software developed by NSWCDD and used by DMA to produce precise GPS orbits
	GPS Transit Consultation	180	1.5	is support to DMA on operation data processing problems for TRANSIT and GPS
	SMTP:	92.5	.6	Improvements of DMA satellite tracking station coordinates and operations
	RADCAL:	90	.7	Operational orbit determination for the satellite used to calibrate C band radars at test ranges.
	GEOSAT DATA:	14	.1	Provided GEOSAT doppler tracking data to NOAA

3.3.2 Projected Funding

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
SPACE SYSTEMS (SATELLITES)	NONE	NONE	NONE	NONE

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
SPACE SYSTEMS (SATELLITES)	1.0M	1.1M	0.7M	0.7M

3.4 Facilities and Equipment

3.4.1 Major Equipment and Facilities:

See III- APPENDIX A - FACILITY PICTURES for photographs.

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)*
		DOD	Federal Gov't	U. S.	
SPACE SYSTEMS SATELLITES	SCIENTIFIC AND ENGINEERING COMPUTER COMPLEX				13,500.0*

* EQUIPMENT REPLACEMENT COST ONLY.

The Space Systems-Satellites common support function utilizes the following facility:

Scientific and Engineering Computer Complex

The primary purpose of the facility is to provide high performance computing to the scientific and engineering personnel of the laboratory. Classified services up to the SECRET level are offered using a CRAY Y-MP2E supercomputer. Unclassified services are offered using a CDC 995E computer and a CRAY EL98 entry level computer; the CDC 995 will be phased out in FY95/96. Associated with this facility are a series of networks (classified and unclassified) by which this facility can be accessed from the workspace.

The S&E Computer Complex is shared by a number of other functions within the laboratory. In general, any function which requires high performance computing and high fidelity computer simulation uses this facility. Some specific examples include its use by SLBM for weapons control development and testing, trajectory simulation, re-entry aerodynamic, thermal, and material codes, systems analyses and flight test support. The facility is also used for simulation in support of the analysis and design of missiles, guns, and shipboard systems for surface ship based systems. It is also used in support of technology base programs such as materials.

This facility is used by the SLBM program 65%, the STANDARD missile program 2%, the Satellites CSF 1% and all other support functions 32%. R

3.5 Expansion Potential

The majority of the work under this common support function is performed in a general support computer facility. The S&E Computing Facility has capacity to handle more computer workload without facility expansion or additional workyears.

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
SPACE SYSTEMS (SATELLITES)	See 3.5				

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is

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required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

See 3.5

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

NONE

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

WEAPONS

ICBM'S/SLBM'S

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

In general, the capabilities at the activity which contributes to the WEAPONS-ICBM's/SLBM's common support function follow.

- SLBM Weapons Control
    - **Weapons control software development, testing, and logistics**
    - **Fleet media production and verification**

SLBM Targeting
- **Realtime operational targeting support**
- **Development of SLBM mission planning software**
- **Development of SLBM Re-targeting System**
- **Targeting analyses for USSTRATCOM, SSP, and OPNAV staff**

Re-entry Systems
- **Design, analysis, and testing**
- **High temperature materials**
- **Ground and underground testing for re-entry bodies and components**
- **Aerodynamic, aerothermal, and structural analysis and predictive capability for re-entry bodies**

SLBM Systems Engineering and Lifecycle Support
- **Performance evaluation and testing**
- **Flight test planning and GPS postflight analysis**
- **Fleet support and training**
- **Modernization of SLBM weapons control system hardware and software**
- **Research and technology development in materials, software engineering, computer systems, and geoballistic and geophysical sciences**

U.K. SLBM Support
- **Weapons control software development and testing**
- **Development of SLBM mission planning software**
- **Development of support software for fleet media production and logistics**
- **Systems engineering support for facility development**

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SLBM Guidance System Software Independent Verification and Validation

Interconnectivity

This CSF is largely independent of other functions at this activity. However, there are and have been interconnections and relationships with other functions at this activity. Specific examples include targeting and mission planning for systems such as Tomahawk, development of weapons control and software development methodology, materials for space and TBMD related applications, and kinetic energy penetrator warhead analysis and preliminary design.

The activities associated with this CSF are also linked to a variety of outside activities. These include Navy Strategic Systems Programs, U.S. Strategic Command, the Command Task Forces (CTF), the Defense Mapping Agency, many activities related to the testing and environmental support of the SLBMs, the Ministry of Defense (U.K.), the applied Physics Laboratory, and all SLBM industrial contractors. Many of the re-entry related capabilities are directly applicable to materials, aero, and structures technology applied to theater ballistic missile interceptors and other hypersonic vehicles which fly through the atmosphere. Thus, these activities are linked to other government organizations such as NASA, BMDO, and the Army as well as universities and contractors. the most significant of these may be the direct operational support of the SLBM force that is provided to USSTRATCOM and to the CTFs. R

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The relative proximity of Dahlgren Laboratory to the Washington, DC Department of Defense complex (55 miles) enables personal interaction with customers to occur as frequently as is necessary with minimum notification or travel arrangements.

Dahlgren customers benefit extensively from the clustering of complex weapons systems programs and tenant commands which complement the Dahlgren mission areas. Tenants such as AEGIS Training Command, Joint Warfare Analysis Center, and Naval Space Command provide synergism in technical activities and technical expertise directed at the development of Surface Ship Combat Systems, Mission Control Systems, Strategic

and Space Systems, and Surface Ship Defense Systems. The opportunity for interaction with major Fleet customers is also enhanced by the clustering of commands.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

NONE

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

NONE

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The facilities used to support these activities require special support infrastructure. Specifically, they must be located in alarmed strongrooms, must provide a satisfactory TEMPEST environment, and must have raised floors to allow for cabling in the test berths. Further, they require specialized power supplies associated with using shipboard systems. The function requires 400 Hz delta power; 440V power; 115V delta power; physical security approval for SECRET, TOP SECRET, and SCI facilities; classified and unclassified data links and networks with other on-base facilities; classified and unclassified data links and networks with operational units afloat and ashore worldwide; and classified and unclassified data links and networks with other weapons development and acquisition activities and facilities ashore worldwide.

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
WEAPONS (ICBM'S /SLBM'S)	SSP/DC	GOVT PROJECT OFFICE	55 mi	253	0
	CINCLANT	GOVT	150 mi	0	0
	E G & G	CONTRACTOR	5 mi		28.0
	ASG	CONTRACTOR	5 mi		29.0

Movement of the Weapons-ICBM'S/SLBM'S CSF or the nearby activities listed in the above table would reduce communication and close coordination and have an adverse impact on the development and fielding of Navy weapon systems.

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	258	1	0	12
Management (Supv)	11	0	0	0
Other	14	0	0	0
	283	1	0	12

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	29	0	7
Associates	11	0	3
Bachelor	166	5	4
Masters	42	5	0
Doctorate (include Med/Vet/etc.)	10	1	0

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	1	116	43	28	70
Management (Supv)	0	0	2	3	6
Total	1	116	45	31	76

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
Weapons (ICBM'S/SLBM'S)	NONE	NONE	

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Number Published	Paper Titles (List)
Weapons (ICBM'S/SLBM'S)	IEEE Transactions on Aerospace and Electronic Systems (July 93)	"Pure Cartesian Formulation for Tracking Filters
	Proceedings of the NSWCDD Neural Networks Symposium (January 92)	"Dynamic Climatology with Neural Networks Meteorological Forecast Extension"
	Proceedings of the IEEE 1994 Position Location and Navigation Symposium (April 94)	"Tactical Ballistic Missiles Trajectory State & Error Covariance Propagation"
	Proceedings of the 49th Annual Meeting of the Institute of Navigation: Future Global Navigation and Guidance (June 93)	"Investigating the GPS Aided Precision Missile Concept Via Explorer and TBPEX Satellite Data"
	IEEE Computer Society POSIX Security Working Group Draft Standard #13 (November 92)	"Draft Standard For Information Technology Portable Operating System Interface (POSIX) Part I"
	Proceedings to the AIG Symposium 110, XX General Assembly of the International Union of Geodesy & Geophysics (August 1991)	Performance of Recent Gravity Field Models in Precision Orbit Determination Using Doppler Observations
	Journal of the American Congress on Surveying and Mapping (June 92)	Summary of the Sixth International Geodetic Symposium on Satellite Positioning
TOTAL	7	

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3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0.5	0	0	0
Engineering Development	235.2	1.0	0	12.0
In-Service Engineering	28.7	0	0	0

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
ACAT I	SLBM	264.4	43500	SLBM Weapon System; Full Scale Software Development and Testing; Life-cycle Support; Strategic Testing Support for USSTRATCOM
ACAT IC	0			
ACAT ID	0			
ACAT II	0			
ACAT III/IV	0			
Other	0			

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority) ($K)	Workyears	
Weapons (ICBM'S/SLBM'S)				
	GPS TRANSPONDER	294	2.3	TRIDENT II
	Strategic Capability Preservation	673	3.5	C4, D5
	TRIDENT I	1828	11.86	C4
	TRIDENT II	2137	10.75	D5
	TRIDENT II/UK	33	0.27	D5/UK

3.3.2 Projected Funding

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (ICBM's/SLBM'S)	NONE	NONE	NONE	NONE

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (ICBM's/SLBM'S)	$49.3M	$51.0M	$50.1M	$51.4M

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III- APPENDIX A - FACILITY PICTURES for photographs.

Common Support Function	Major Facility or Equipment Description	Unique To DOD	Unique To Federal Gov't	Unique To U. S.	Replacement Cost ($M)
WEAPONS (ICBM'S/SLBM'S)	SLBM Weapons Control Facility	X	X	X	108
	SLBM Strategic Systems Operational Support Facility	X	X	X	72
	S&E Computing Facility				13.5*

* Replacement cost for equipment cost only. R

SLBM Weapons Control Facility:

The SLBM Weapons Control Facility is used for development and testing of SLBM weapons control software, fleet problem investigation, fleet procurement development, technology and obsolescence studies and for the production and quality control of fleet media (i.e., magnetic media containing weapons control software and data and strategic targeting data). It also provides contingency systems for the targeting support performed in the SLBM Strategic Systems Operations Support Facility.

The facility consists of a general purpose computing complex, weapons control system test berths (and supporting equipment, SLBM guidance systems, parts and documentation storage and commercial computers) for UK POLARIS, C4 TRIDENT I, D5 TRIDENT II, and UK D5 TRIDENT II, and a secure network connecting the computer complex and the test berths to each other and to office spaces. The facility also includes a secure (to the SECRET level) communications room and facilities that support the development, integration and testing of new technologies for SLBM weapons control systems prior to possible incorporation into the deployed SSBNs. Each test berth is located in an alarmed strongroom and supports normal operations at the SECRET level. When used as a contingency system for targeting support, it allows operation at the TOP SECRET level.

This facility is not shared with any other function. R

SLBM Strategic Systems Operational Support Facility:

The SLBM Strategic Systems Operational Support Facility is designed for 24 hour per day operation in high defcon conditions. The facility is used, in accordance with the SLBM Software Development MOA between U.S. Strategic Command (USSTRATCOM) and Strategic Systems Programs (SSP), as an integral part of the process for the retargeting of the SLBM systems by USSTRATCOM and for the system level testing and validation of all SLBM strategic targeting data. It consists of a dedicated TOP SECRET computer system for SIOP targeting processing, SLBM weapons control test berths (and associated equipment) for the processing, and validation of SLBM targeting data for all deployed U.S. SLBM systems.

The facility also includes a secure (at the TOP SECRET SIOP/ESI level) communications room for the transfer of data and documentation among USSTRATCOM, NSWCDD and the CTFs, and a facility for the development of graphical user interfaces for NSWCDD strategic targeting software developed for USSTRATCOM. Each test berth is located in an alarmed strongroom and supports normal operation at the TOP SECRET SIOP/ESI level. In order to provide 24 hour per day operation, the facility also includes an uninterruptable power supply and a 2 megawatt diesel generator.

This facility is not shared with any other function. R

S&E Computing Facility:

The primary purpose of the facility is to provide high performance computing to the scientific and engineering personnel of the laboratory. Classified services up to the SECRET level are offered using a CRAY Y-MP2E supercomputer. Unclassified services are offered using a CDC 995E computer and a CRAY EL98 entry level computer; the CDC 995 will be phased out in FY95/96.

The S&E Computer Complex is shared by a number of other functions within the laboratory. In general, any function which requires high performance computing and high fidelity computer simulation uses this facility. Some specific examples include its use by SLBM for weapons control development and testing; trajectory simulation; re-entry aerodynamic, thermal, and material codes; systems analyses; and flight test support. The facility is also used for simulation in support of the analysis and design of missiles, guns, and shipboard systems for surface ship based systems. It also supports technology base programs such as materials. R

3.5 Expansion Potential

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons (ICBM'S/SIBM'S)	SLBM Weapons Control	Tech	18.0	18.0	0
	SLBM Operational SPT	Tech	12.6	12.6	0
	S&E Computing	Tech	13.9	13.9	0

*** Administrative, Technical, Storage, Utility**

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

A significant amount of work under this common support function is performed in a general support computer facility. The S&E Computing Facility has capacity to handle more work without facility expansion.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5.1.1

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

No impact.

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

WEAPONS

CRUISE MISSILES

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

In general, the capabilities at the activity which contribute to the Weapons-Cruise Missiles common support function follow.

This activity is the principle support laboratory for the Tomahawk Weapon System and back-up site for CINCLANT's Tomahawk Theater Mission Planning Center. Examples of support functions for the Tomahawk Weapon System are as follows.

TOMAHAWK Weapon Control

- **Weapon control system requirements specification**
- **Weapon control software development, testing, and logistics in shipboard duplicated environment**
- **Ship's media production and verification**
- **Shipboard problem research and software life support**

TOMAHAWK Mission Planning

- **Software requirements specification**
- **Software development, testing, and logistics**
- **System integration testing and validation in ship and shore operational environment**
- **Operational software media production and verification**
- **Ships and shore site problem research and software life support**

TOMAHAWK Mission Planning Operational Support

- **Real-time operational support in unique facility with total system shipboard and shore environment**
- **Missions and data production for ships and shore sites**
- **Back-up site for mission planning center at CINCLANT**
- **Development Test (DT)**
- **Crew training for ships and shore sites**

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TOMAHAWK Weapon System (TWS)

- Exploratory research and development of new concepts for ship employment of TOMAHAWK missiles
- Performance evaluation and system engineering of TWS
- End-to-end TWS system testing in unique facility reproducing shipboard and operational environment
- Exploratory development of new concepts for shipboard integration of TWS with AEGIS Combat System
- Interoperability research and testing of TWS with Combat System in shipboard environment

Strike Planning Systems

- Exploratory development for strike planning concepts, particularly as related to shipboard employment
- Modeling and simulation of strike weapon concepts
- Modeling and simulation of strike planning systems

Connectivity with other CSFs:

NSWCDD is uniquely positioned to research, engineer, develop, validate, and maintain ships strike weapons employment as a result of our full-spectrum activities in numerous ships' strategic, strike, and conventional weapon systems. Only at NSWCDD does total ship combat system environment exist to perform research, development, and life cycle support on each weapon system and their subsystems independently, and more importantly, integrated and interoperable together to form the Combat System. This physically interrelated ship environment, including the over-water river range; the HERO and EMC/E^3 facilities; live, classified, ship Communications and Data Links; and the SLBM, TOMAHAWK, UAV, Vertical Launching System, and AEGIS Combat System facilities, allows NSWCDD to support the Weapons function, particularly ship weapons, as no one else can. R

Furthermore, NSWCDD has physical classified data links with afloat and ashore operating forces, used by NSWCDD personnel uniquely knowledgeable in shipboard strike warfare (as well as surface warfare in general), to directly support those units. NSWCDD provides unique operational support, including data and software, to afloat combatants and to the Cruise Missile Support Activities at the CINCs.

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Additional connectivities and relationships between the "Weapons-Cruise Missiles" function and other CSFs at NSWCDD are the following:

- Common system safety evaluation and analysis methods are used for the fire/launch control function of the TOMAHAWK Cruise Missile and other missiles and rockets.

- Similar real-time computer engineering and space-based technology are involved in the mission planning and targeting of TOMAHAWK Land Attack Missiles (TLAM) and the Submarine Launched Ballistic Missile (SLBM).

- Related mathematics and computer science technology are common to the shipboard mission planning, launch, and control of Unmanned Aerial Vehicles (UAV) and the TOMAHAWK Cruise Missile. R

- Common disciplines for real-time shipboard system engineering, software engineering, and system test and evaluation have been used for many years at NSWCDD to design, produce and deploy the TOMAHAWK Weapon System, the AEGIS Combat System, the Vertical Launching System, the SLBM Weapon System, the shipboard UAV system and others.

It is because of the relationships and interconnectivities among these systems and their technology as well as NSWCDD's high quality research and products in these functional areas that sponsors continue to task us to conceive and produce the technology and systems to meet fleet needs.

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The relative proximity of Dahlgren Laboratory to the Washington, DC Department of Defense complex (55 miles) enables personal interaction with customers to occur as frequently as is necessary with minimum notification or travel arrangements.

Dahlgren customers benefit extensively from the clustering of complex weapons systems programs and tenant commands which complement the Dahlgren mission areas. Tenants such as AEGIS Training Command, Naval Warfare Analysis Center, and Naval Space Command provide synergism in technical activities and technical expertise directed at the development of Surface Ship Combat Systems, Mission Control Systems, Strategic and Space Systems, and Surface Ship Defense Systems. The opportunity for interaction with major Fleet customers is also enhanced by the clustering of commands.

The Potomac River provides a unique geographic environment that allows the Potomac River Test Range (PRTR) to take advantage of the best features of both land and water ranges to provide the Navy with a controlled maritime environment bounded by land. The PRTR is the only facility in the United States that has the capability of meeting the accuracy requirements for testing Navy fuzes and sensors in a maritime environment without requiring on board telemetry systems.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

NONE

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

NONE

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The facilities used to support these activities require special support infrastructure. Specifically, they must be located in alarmed strongrooms, must provide a satisfactory TEMPEST environment, and must have raised floors to allow for cabling in the test berths. Further, they require specialized power supplies associated with using shipboard systems. The function requires 400 Hz delta power; 440V power; 115V delta power; physical security approval for SECRET, TOP SECRET, and SCI facilities; classified and unclassified data links and networks with other on-base facilities; classified and unclassified data links and networks with operational units afloat and ashore worldwide; and classified and unclassified data links and networks with other weapons development and acquisition activities and facilities ashore worldwide.

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
WEAPONS					
	CINCLANT	GOVT	150 mi	181	0
	VITRO	CONTRACTOR	5 mi		70
	E G & G	CONTRACTOR	5 mi		15
	TRW	CONTRACTOR	5 mi		10
	LOGICON	CONTRACTOR	5 mi		20

Movement of the Weapon CSF or the nearby activities listed in the above table would

reduce communication and close coordination and have an adverse impact on the development and fielding of Navy weapon systems.

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	166	0	0	0
Management (Supv)	7	0	0	0
Other	8	0	0	0

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3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	27	0	7
Associates	2	0	0
Bachelor	104	7	0
Masters	30	0	1

Doctorate (include Med/Vet/etc.)	3	0	0

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	46	63	15	7	36
Management (Supv)				2	5
Total	46	68	18	8	41

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

NONE

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Publication Reference	Paper Titles (List)
WEAPONS (CRUISE MISSILES)	SPIE Proceedings on Hybrid Image & Signal Processing III, April 1992	"Performance Comparison for two Digital Scene Matching Processes: Algorithmic and Artifical Neural Network Based"

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CSF	Publication Reference	Paper Titles (List)
	Proceedings of the Intelligent Preparation of the Battlefield Workshop, May 1992	"The Tactical Movement Analyzer"
	Naval Engineers Journal, May 1991	"Concept for a Force Level Combat System"
	Proceedings of the Precision Strike Symposium, Oct 1993	"Ship Combat System Integration of Unmanned Aerial Vehicles"
	SPIE Proceedings on Sensors and Sensor Systems for Guidance and Navigation, April 1991	"Time-Optimal Maneuver Guidance Design with Sensor Line of Sight Constraint"
	Proceedings of the Precision Strike Symposium, Oct 1993	"Tactical Triad, A New Weapon and a Ship Loadout Concept"
	Proceedings of the 1993 MATHLAB Conference, Oct 1993	"Notch Filter Simulator for a Dynamic Plant Model"
TOTAL	7	

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3.3 Workload

3.3.1 **FY93 Workload**

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	16*	0	0	0
Engineering Development	165	0	0	0
In-Service Engineering	0	0	0	0

***Includes 14.66 wkyrs for shipboard UAV office. No ACAT # yet, funding was "Congressional plus-up", work is 6.3 type prototyping.**

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
ACAT I				
ACAT IC				
ACAT ID				
ACAT II	Cruise Missiles	165	32,330.0* *Includes 2,194.4 of RCP Funds	Prin Support Lab for TOMAHAWK Wpn Sys; Full Scale Software Development and Test, Software Life Cycle Support; Back-up for CINCLANT Theater Mission Planning Center
ACAT III/IV				

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority) ($K)	Workyears	
Weapons (Cruise Missiles)	NONE			

3.3.2 **Projected Funding**

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Cruise Missiles)	NONE	NONE	NONE	NONE

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Cruise Missiles)	41.7M*	37M	40M	40.5M

***includes $3.5M RCP**

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III- APPENDIX A - FACILITY PICTURES for photographs.

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Common Support Function	Major Facility or Equipment Description	Unique To DOD	Unique To Federal Gov't	Unique To U. S.	Replacement Cost ($M)
WEAPONS (Cruise Missile)	Sea Launched Cruise Missile/Shipboard UAV System Development & Integration Facility	X	X	X	100

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Shipboard Cruise Missile/UAV System Development & Integration Facility:

Conduct of concept development, software development, and system integration and test, to accomplish full spectrum end-to-end development, integration, and life cycle support of all elements of the Ship TOMAHAWK Weapon System, and all elements of the shipboard Unmanned Aerial Vehicle (UAV) system, as well as the development and integration of interfaces between these systems and with the AEGIS Combat System.

The Facility is unique in that it duplicates the classified, tactical, operational environment, including computer software, computer hardware, and operational data links with other tactical systems and with other national systems throughout the Country. It is the only facility where the entire Shipboard TOMAHAWK Weapon System can be integrated and tested, and where TOMAHAWK Weapon System can be tested with AEGIS and other surface ship weapon systems. The ability to evaluate these systems together ashore is a vital part of the cost avoidance of expensive shipboard time and crew use.

Due to operational equivalency of the facility, it is used for formal Navy Developmental Testing (DT), and by ships' crews for training. It also uniquely allows realistic experimentaiton and concept development of emerging technology for joint strike systems. The facility has been in daily use, at a rate greater than one shift per day, and growing and evolving since 1980.

The facility is not shared with other functions in the traditional method of other equipment and personnel being located in it or using the equipment. However, the facility is connected via classified and unclassified data links and fiber optics with numerous on-base and off-base facilities, systems, and functions (as described in question 3.0), and this linkage is actively utilized daily. R

3.5 Expansion Potential

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons (Cruise Missile)	**Cruise Missile/UAV Dev. & Integ. Facility**	**Tech**	**27.4**	**27.4**	**0**

*** Administrative, Technical, Storage, Utility**

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

Facility is currently at capacity. A MILCON project would be required to support additional similiar workyears.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5.1.1

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

No impact.

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
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Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

WEAPONS

CONVENTIONAL MISSILES/ROCKETS

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

The capabilities at the activity which contribute to the Weapons-Conventional Missles/Rockets common support function are as follows:

- **Surface ship launched missile systems engineering and integration**
- **Technology, design and development of warheads, ammunition and fuzes, surface-ship launchers and ship gun systems, decoy and obstacle clearing systems, telemetry systems, amphibious weapons, and special operations weapons.**
- **Weapon performance assessment**
- **Weapons/ship combat systems safety engineering**
- **Littoral Warfare Land-Sea Interface Weapons concepts, assessments, and technology transitions.**
- **Test and evaluation activity for missile warheads.**
- **Technology development in engineering design, analysis, prototype fabrication, and T&E to support ship weapons systems development.**
- **Exploratory development of new concepts to establish the technical basis for the formation of development programs**
- **Technical direction of demonstration/validation and engineering and manufacturing development programs in partnership with industry ready for production approval to ensure highly effective weapon systems in minimum time at the lowest cost**
- **Ballistic and system analysis, system engineering and system integration to optimize system cost effectiveness through technical direction of supporting contractors and government activities**
- **Development of weapon system concepts for Naval Surface Fire Support, Anti-Surface Warfare, Anti-Air Warfare and Amphibious Warfare to meet emerging warfare requirements**
- **Technical control of the designs of Navy fuzes to ensure that design changes are cost-effective and avoid adverse impacts on operational performance, safety and producibility**

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Relationship and Interconnectivity with other Functions:

Weapon systems R&D is integrally related to R&D of naval Surface and Strategic Warfare because weapons are a key component of the critical sequence: detect, control, and engage. The common support function of Weapons is a key element in NSWCDD's systems engineering mission. The inherently governmental function of determining what warfighting functions get performed on which platforms and in which equipments and computer programs in those platforms, requires competency in systems knowledge. It is essential that this knowledge include the "engage" element of the "detect-control-engage" sequence. Weapons, and their connectivity to sensors and control systems work, are the means for NSWCDD to execute this Systems Engineering mission. Only at NSWCDD do we bring together all of the combat systems elements necessary to perform the research, development, and systems engineering integration functions needed to ensure an effective ship combat system. NSWCDD expertise and facilities include the AEGIS Combat System facilities, TOMAHAWK, STANDARD Missile, CIWS, 5"/54 and 76MM Gun Weapon Systems and all of the necessary HERO, E[3], Ordnance and Safety/Environmental test facilities. The relationship and interconnectivity between the weapons common support function and these other functions is critical to NSWCDD's mission in that weapons systems must be fully integrated with other key mission areas including: surface warfare systems, surface ship combat systems, special warfare systems, and strategic systems. In the Navy consolidation decisions of 1991, the Dahlgren Division was assigned responsibility for all Navy missile warheads and surface launched missile system engineering. R

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The relative proximity of Dahlgren Laboratory to the Washington, DC Department of Defense complex (55 miles) enables personal interaction with customers to occur as frequently as is necessary with minimum notification or travel arrangements.

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Dahlgren customers benefit extensively from the clustering of complex weapons systems programs and tenant commands which complement the Dahlgren mission areas. Tenants such as AEGIS Training Command, Naval Warfare Analysis Center, and Naval Space Command provide synergism in technical activities and technical expertise directed at the development of Surface Ship Combat Systems, Mission Control Systems, Strategic and

Space Systems, and Surface Ship Defense Systems. The opportunity for interaction with major Fleet customers is also enhanced by the clustering of commands.

The Potomac River provides a unique geographic environment that allows the Potomac River Test Range (PRTR) to take advantage of the best features of both land and water ranges to provide the Navy with a controlled maritime environment bounded by land. The PRTR is the only facility in the United States that has the capability of meeting the accuracy requirements for testing Navy fuzes and sensors in a maritime environment without requiring on board telemetry systems. This range, in combination with Dahlgren's explosive test facilities allow cost effective weapons testing to be accomplished.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

NSWCDD has an interim Resource Conservation and Recovery Act (RCRA) permit for the open burn & open detonation of propellants and explosives at three locations at the Dahlgren site. The permit from the State of Virginia is interim only because the state has not issued any final permits at this time.

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

Although not a legal environmental constraint, NSWCDD has a policy of restricting testing when the atmospheric conditions intensify the far field noise above certain levels which are below OSHA standards. This policy is in place to maintain good relations with the communities on both sides of the river and sometimes delays tests but very seldom (2 to 3 times a year) cancels testing.

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The facilities used to support these activities require special support infrastructure. Specifically, they must be located in alarmed strongrooms, must provide a satisfactory TEMPEST environment, and must have raised floors to allow for cabling in the test berths. Further, they require specialized power supplies associated with using shipboard systems. The function requires 400 Hz delta power; 440V power; 115V delta power; physical security approval for SECRET; classified and unclassified data links and networks with other on-base facilities; and classified and unclassified data links and networks with other weapons development and acquisition activities and facilities ashore worldwide.

The successful performance of the Weapons mission requires the coexistence of the following infrastructure:

- **Properly instrumented explosive test and research facilities,**
- **Facilities to conduct target vulnerability tests,**
- **State-of-the-art prototyping facility,**
- **Contracting support with unlimited procurement authority,**
- **Public Works support with heavy equipment to adequately support development, test and evaluation needs,**
- **Security forces commensurate with development program classification and access needs,**
- **State-of-the-art technical library and information access and retrieval systems.**
- **Computer to computer networks installed base-wide with connections to Internet are required to support the development of warheads and to perform missile system engineering. Computer hosts on the network are accessed by desktop computers and workstations for data intensive simulations in support of structural, aerodynamic, thermal and hydrodynamic analyses. Lack of this infrastructure would greatly hamper timely development of weapons, increase testing costs, and reduce weapon system effectiveness.**

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
WEAPONS (Conventional Missiles/Rockets)	Systems Commands OPNAV	GOVT PROJECT OFFICE	55 mi	170	0
	APL	GOVT	70 mi		0
	VITRO	CONTRACTOR	5 mi		31
	CSC	CONTRACTOR	5 mi		16
	ATR	CONTRACTOR	5 mi		12.0

Movement of the Weapon CSF or the nearby activities list in the above table would reduce communication and close coordination and have an adverse impact on the development and fielding of Navy weapon systems.

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	193	1	0	0
Management (Supv)	18	0	0	0
Other	15	0	0	0

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	68	3	14
Associates	5	0	1
Bachelor	88	8	0
Masters	19	5	0
Doctorate (include Med/Vet/etc.)	13	2	0

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3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	8	51	18	21	95
Management (Supv)	0	0	1	2	15
Total	8	51	19	23	110

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3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
WEAPONS (Conventional Missiles/Rockets)	4949317	8/14/90	Compliant Underwater Acoustic Baffle
	5160802	11/3/92	PRESTRESSED COMPOSITE GUN TUBE
	5229541	7/20/93	TORPEDO SAFETY SYSTEM
	4939995	7/10/90	IMPROVED INTEGRATOR AND FIRING CIRCUIT FOR PROXIMITY
	5147975	9/15/92	remotely settable, multi-output, electronic time fuze and method
	4974514	12/4/90	Explosive Safety Junctions
	4998963	3/12/91	Explosive Logic Clock
	5009162	4/23/91	Explosive Logic Resolver Network
	5022326	6/11/91	Asynchronous Explosive Logic Safing Device

CSF	Disclosures	Awarded	Patent Titles (List)
	4989516	2/5/91	Safe Explosive Delay Path
	4961383	10/9/90	composite tungsten-steelarmor penetrators
	5046427	9/10/91	differential pressure sensor
	5025728	6/25/91	a selective point detonation delay explosive train device
	5005482	4/9/91	combined mine safety deployment and activation system
	4991509	2/12/91	optical proximity detector
	5175694	12/29/92	Centroid Target Tracking System Utilizing Parallel Processing of
	4975602	12/4/90	logic level data conversion system
	5020400	6/4/91	Wing Fold Tool
	5237441	8/17/93	microprocessor chip incorporating optical signal coupling transceiver
	5119730	6/5/92	Composite Sheet Stringer Ordnance Section
	5214433	5/15/93	Target Tracking Device
	5214483	5/25/93	Digital Laser Range Finder Emulator
	5220124	6/15/93	Launching System
Total	23		

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Publication Reference	Paper Titles (List)
Weapons (Conventional Missiles/Rockets)	IEEE Position, Location & Navigation Symposium April 1994	"Tactical Ballistic Missiles Trajectory State & Error Covariance Propagation"
	First NAVSWC Neural Network Symposium, November 1991	Application of Neural Nets to Weapons Control

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CSF	Publication Reference	Paper Titles (List)
	Journal of Spacecraft and Rockets Vol 30, No. 1, Jan - Feb 1993	A New Approximate Method for Calculating Real Gas Effects on Missile Configurations
	Journal of Spacecraft and Rockets Vol 30. No. 6, Nov - Dec 1993	A New Semiempirical Method For Computing Nonlinear Angle-of-Attack Aerodynamics on Wing Body Tail Configurations
	AIAA Paper No. 93-3629 Journal of Spacecraft and Rockets, Sept - Oct 1994	Base Drag Prediction on Missile Configurations
	AIAA Paper No. 94-0026 Journal of Spacecraft and Rockets, Sept - Oct 1994	A Planar Nonlinear Missile Aeroprediction Code For All MACH Numbers
	AIAA Paper No. 2001 June 1994	Incorporation of Boundary Layer Heating Predictive Methodology Into the NAVSWC Aeroprediction Code
	AGARD Invited Lectures AGARD - Report -R - 804, June 1994	Engineering Codes: State-Of-The-Art and New Methods
	42nd ADPA Bomb & Warhead Technical Meeting May 1992	Development of STANDARD Missile Composite Structures Warhead
	42nd ADPA Bomb & Warhead Technical Meeting May 1992	Deformable Warhead Development: An Aimable Warhead
	ADPA IM Symposium June 1994	Mitigation of Sympathetic Detonation in 5"/54 Ammunition
	JANNAF Propulsion Systems Conference, August 1994	Examination of Common Assumptions Used in Fragment Impact Analysis
	JANNAF Propulsion Systems Conference, August 1994	Three Dimensional Fragmentation Effects

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CSF	Publication Reference	Paper Titles (List)
	ADPA IM Symposium June 1994	IM Demonstration of a General Purpose/Blast Fragmentation Warhead
	ADPA IM Symposium June 1994	Design of a Composite Fragmentation Warhead for Anti-Air Missiles
	ADPA IM Symposium June 1994	An Evaluation of a Dual Explosive Warheads for Sympathetic Detonation Mitigation
	Australasian Explosive Ordnance Symposium October 1993	Ordnance Technology Research - A US Navy Insensitive Munitions Initiative
	NIMIC Workshop on Cook-off, Brussels, Belgium, June 1993	Cook-off Mitigation Concepts for Ordnance System Applications
	Shock Compression of Condensed Matter 1993	Dislocation Mechanics Based Constitutive Relations For Plastic Flow and Strength of HY Steels
	Shock Compression of Condensed Matter 1993	Gas/Gun Reverse-Ballistic Impact Deformation and Fracture of Armco Iron of Differing Grain Sizes
	Microstructure/Property Relationships in Titanium Aluminides and Alloys (Book) The Minerals, Metals, and Materials Society, 1991	Shear Banding in Ti6A14V Alloy via Reverse-Ballistic Impacts
	Tungsten and Tungsten Alloys - Recent Advances (Book) The Mineral, Metals, and Materials Society, 1991	Dynamic Deformation of W7Ni3Fe Alloy Via Reverse-Ballistic Impact
	AIAA Journal of Spacecraft and Rockets, Nov - Dec 1990	Energy Management for Multiple Pulse Rockets

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CSF	Publication Reference	Paper Titles (List)
	Innovative Anti-Air Weapons System Conference January 1992	Preliminary Missile Autopilot Design Using Mu-Synthesis
	AIAA Paper #91-0588 January 1991	Computational Method for Determining Missile Engagement Envelopes
	AIAA Paper #92-3741 Aerospace Science Meeting January 1992	An Improved Gain-Stabilized Mu-Controller for a Flexible Missile
	AIAA Paper #93-3741 Guidance, Navigation, & Control Conference, August 1993	Preliminary Pulse Motor Optimization for a Surface-to-Air Missile
	NSWCDD Technical Digest Report, January 1994	Robust Flight Control for Surface-Launched Tactical Missiles
	GPS-93 Proceedings of the ION Conference, September 1993	A Kalman Filter Implementation for a Dual-Antenna GPS Receiver and an Inertial Navigation System
	NSWCDD Technical Digest January 1994	Short Range Anti-Air Warfare Analysis
	AIAA Guidance Navigation & Control Conference, August 1994	Terminal Homing Performance of Semi-Active Missiles, Against Multi-Target Raids
	5th AIAA/USAF/NASA/ISSMO Symposium or Multidisciplinary Analysis and Optimization, September 1994	Trajectory Optimization for a Surface-to-Air Missile Using a Multi-Tier Approach
	IANNAF Exhaust Plume Technology Subcommittee Meeting, February 1993	"Plume Flowfield Measurements and Simulation of a Four Nozzle Rocket Motor"
	Deckplate September - October 1993	"U.S. Navy Pointing and Firing Cutout Program"

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CSF	Publication Reference	Paper Titles (List)
	AIAA/SAE/ASME/ASEE 28th Joint Propulsion Conf. and Exhibit, July 1992	"Evaluation of Fiber-Reinforced Composite Ablators Exposed to a Solid Rocket Motor Exhaust"
	AIAA 30th Aerospace Sciences Meeting & Exhibit, January 1992	"Navier Stokes Simulation of Plume/Vertical Launching system Interaction, Flowfields"
	63rd Shock & Vibration Symposium, October 1992	"Air Blast Test of US Navy Collective Protection System"
	Naval Engineers Journal May 1992	"New Techniques in Weapon Firing Cutout Zone Design"
	Battle Damage and Repair Symposium, National Institute for Standards & Technology, September 1991	"Concepts for a Surface Ship Protection Warfare Systems"
	62nd Shock and Vibration Symposium Defense Nuclear Agency, October 1991	"Ship Protection Technology Development"
TOTAL	40	

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3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	30.9	0	0	0
Engineering Development	142.7	1.0	0	0
In-Service Engineering	53.7	0	0	0

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3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:

- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
ACAT IC	SM-2 BLK IIIA	3.3	1,537.1	Evolution of SM-2 to address very low altitude anti-ship missile threats.
ACAT ID	SM-2 BLK IV	3.0	2,229.2	Evolution of SM-2 to address very high altitude anti-ship cruise missile threats.
	AQM-37C/EP Aerodynamics	0.0	154.1	Evolution of SM-2 to address very high altitude anti-ship cruise missile threats.
	EX-72 Booster Shock Qual	0.0	154.1	Evolution of SM-2 to address very high altitude anti-ship cruise missile threats.
	SM-1 BLK V Target	0.2	458.6	Lightweight Exoatmospheric Projectile.
	AEGIS ER	0.9	129.7	Evolution of SM-2 to address very high altitude anti-ship countermeasures.
ACAT II	SM-2 BLK IIIB	3.5	1,584.2	Missile homing improvement to address electronic countermeasures.
	ESSM	0.3	65.8	Improves SEASPARROW for ship-defense VLS engineering.
	ESSM Support	0.8	120.9	Improves SEASPARROW for ship-defense VLS engineering. Prin Support Lab for
ACAT III/IV	Two Programs	48.3	15,199.6	LAV 105, JAVELIN VLS Program

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
Other	8 Programs	82.4	12,759.7	SMAW HEAA Space Shuttle Standard Missile Vertical Launch System Lightweight Exoatmospheric Projectile SM-1 Blk V as a target VLS/NATO MK 41 Engineering SRAW

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3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority) ($K)	Workyears	
Weapons (Conventional Missiles/Rockets)	Warheads, Telemetry, Missile, System Sustaining Engineering	10,341.4	35.8	STANDARD Missile-2
	Foreign Military Sales Support	196.4	0.1	SM-1 Blk VI, German
	VLS WPN/OPN	795.2	5.4	Vertical Launching System
	Foreign Military Sales Launcher	1,396.9	6.3	Vertical Launching System

	SMAW/HEAA	2,425.7	5.5	Shoulder-Launched Multipurpose Assault Weapon
	DRAGON MOD	40.2	0.1	DRAGON Weapon
	Ship Blast Area Inspection	75.0	0.5	For both programs, all Naval surface combat and weapon systems, e.g., TOMAHAWK, SM, VLS, CIWS, RAM, MK 45 gun, MK 75 gun, NSSM

3.3.2 Projected Funding

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Conventional Missiles/Rockets)	**NONE**	**NONE**	**NONE**	**NONE**

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Conventional Missiles/Rockets)	**42.2M**	**36.3M**	**37.1M**	**36.6M**

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III- APPENDIX A - FACILITY PICTURES for photographs.

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Common Support Function	Major Facility or Equipment Description	Unique To			Replacement* Cost ($M)
		DOD	Federal Gov't	U. S.	
WEAPONS (Conventional Missile/Rockets)	Shock Lab	X			1.6
	Computer Aided Engineering & Performance Assessment Facility				8.2
	Prototype Fabrication Facility				3.3
	Ship Weapons Systems Safety Analysis & Evaluation Laboratory				0.8
	Warhead Development Facility				3.2
	Potomac River Test Range	X	X	X	250
	Search and Track Sensor Test Site	X	X	X	8

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	Explosive Environmental Area				25
	Electromagnetic Vulnerability Assessment Facility	X	X	X	20
	Warheads Research Test Facility				5

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* Replacement cost for equipment cost only.

Shipboard Weapons Systems Safety Analysis & Evaluation Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (50%), Guns and Ammunition (35%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%). R

The Ship Weapons Systems Safety and Evaluation Facility (WSSAEF) is a state-of-the-art network of computers used for safety-related calculations and software analysis. The facility supports complex and sophisticated computational efforts, e.g. fluid dynamics, structures, systems and software safety that assess system vulnerabilities and specify, design and develop means to remove failure modes, control environments, limit damage, or otherwise reduce loss of combat capability. Programs supported by the facility include TOMAHAWK, Vertical Launch System, STANDARD Missile Program, Structural Test Firing Program, and Pointing and Firing Cutout Program. All of them are located at the Dahlgren Site. The Naval Ordnance Center (NAVORDCEN) Safety of Ordnance (SAFEORD) database, supporting the NAVORDCEN Safety Office (N71) and the Weapon System Explosives Safety Review Board (WSESRB), is also hosted on one of the microVAX computers. A vital adjunct to this, facility is the explosive experimental Area (EEA) facility for the conduct or weapons safety test and evaluation.

Shipboard Search & Track Sensor Test Site:

This facility is shared between the CSF elements : Conventional Missiles/Rockets (10%) and Guns and Ammunition (10%). Additionally, this facility (often in conjunction with the Potomac R

River Test Range) supports Combat System Sensor R&D (35%) and Sensor System Integration (35%). Many of the algorithms developed in this facility are also directed applicable to the element: Space (e.g. Theater Ballistic Missile) and Special Projects (e.g., Desert Storm) (10%).

The Shipboard STSTS allows over water testing of individual Radio Frequency (RF) and Electro-Optical sensors or complex sensor systems during and/or at the completion of their development cycle. This facility is used in conjunction with the Potomac River Test Range (PRTR), can provide an 80,000 yard over-water, littoral, laser certified, instrumented range capability. The Shipboard STSTS provides the ability to fly subsonic static, manned, towed, and gun launched targets at altitutdes down to the surface for sensor performance evaluations.

The equipment within the Shipboard STSTS is portable. The buildings and towers which are utilized at the Shipboard STSTS are fixed. In addition, the unique location of the Shipboard STSTS to the restricted over-water range on the Potomac River is also fixed.

Shipboard Shock Laboratory:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (90%), Guns and Ammunition (6%) and Guided Projectiles (4%). R

Provides the Navy with full spectrum environmental shipboard shock simulation support. The Shock Laboratory consists of the following: (1) High Shock Test Complex, consisting of several gas launchers, a 26" air gun, a Light Weight Shock Machine (LWSM901), and the WOX7B shock machine; and (2) Shock Instrumentation/ Analysis Facility, consisting of high volume high frequency digital and analog data acquisition equipment, analog to digital converters, electronic conditioners, a variety of transducers, and a computer complex.

Computer Aided Engineering & Performance Assessment Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (65%), Guns and Ammunition (20%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%).

The purpose of this facility is to support the development of weapon systems in the phases of concept development, engineering design, analysis, documentation, and prototyping. This facility contains high performance graphics computers and engineering workstations in a networked

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"engineering environment" that links multiple users to a common set of engineering tools for structural, mechanical, aerodynamic, thermal, and performance assessment. Product development is also supported with virtual prototypes and simulations. Full interconnectivity has been achieved in that this engineering environment is accessed by multiple users in three of the divisions of the Weapons Systems Department at NSWCDD. Access to the same network of engineering data and tools is available by this network which is shared between the Dahlgren and White Oak sites of NSWCDD. These facilities also include specialized labs containing system specific hardware and measuring equipment for performance assessment and system integration in support of the Vertical Launching System and Surface Launched Missile Systems.

Prototype Fabrication Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (50%), Guns and Ammunition (35%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%). R

The purpose of this facility is to fabricate one-of-a-kind models and prototypes for a wide variety of R&D programs at NSWCDD. This facility includes a state-of-the-art design and manufacturing support capability with (a) an "engineering environment" that offers advanced tools for concept development, modeling, virtual prototyping, simulation, engineering analysis, and detailed design; and (b) fabrication facilities integrated into the engineering environment to provide rapid prototyping of engineering concepts, and allow "lessons learned" in prototype fabrication to be incorporated into production data packages. Fabrication facilities include: precision machining, precision gaging, sheet metal and composites fabrication, and welding. As required by BRAC 91, substantial actions have been completed in an effort to consolidate and "right size" this capability to the minimum needed for future Division R&D support requirements. From FY93 through FY94, prototype fabrication personnel were reduced from 88 to 40; and in FY94, equipment is being reduced from 450 items to less than 200 items; and space is being reduced from 90,000 sq ft to less than 30,000 sq ft.

Warhead Development Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (85%), and Guns and Ammunition (10%). Remaining facility utilization is miscellaneous non-Navy (e.g., Army Patriot Missile, Marine Corps weapons) (5%). R

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The Warhead Development Facility is utilized to support the research, development, assembly, and test of warhead materials, components and assemblies for missile warheads. This facility consists of five sub-facilities each of which provide a unique support function in the Research and Development of Missile Warheads. These facilities include:

a. Warhead Assembly Laboratory. The primary purpose of this facility is to provide tools, equipment, and meters to clean, inspect, measure, test, and assemble inert warhead components and units. The facility also includes space for ready storage of classified warhead components.

b. Warhead Structural Laboratory. The purpose of this laboratory is to provide equipment to assess the structural characteristics of inert warhead components and assemblies.

c. Warhead Analysis Laboratory. This laboratory houses equipment necessary to conduct data reduction and analysis of warhead designs and test results.

d. Gas Gun Research Laboratory. This is a multi-purpose experimental facility used for the characterization and optimization of warhead materials and components, to develop shock wave equation of state data, and to conduct precision impact experiments over a wide range of velocities.

e. Material Test Laboratory. These laboratories are used to conduct mechanical strength, physical properties, metallurgy and microscope studies and evaluations for warheads and weapons systems. The test instruments are used to characterize new materials, new compositions, lot acceptance for procurement, and for failure and safety analyses.

These facilities are generally multi-purpose for the ordnance and missile field. They are used to support missiles, warheads, and gun and projectile programs. They support basic research, development, and the resolution of in-service problems. In addition to these facilities reported in this module, the warheads Branch heavily relies in other facilities at the Dahlgren site including, Computer Aided Engineering, performance assessment, Prototype Fabrication, and the Weapons Systems Safety Analysis and Evaluation Facility. All of these facilities are extensively used by the U. S. Army for warhead development (e.g. current activity is concentrated on the Patriot missile).

Potomac River Test Range:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (5%), Guns and Ammunition (85%), and Guided Projectiles (5%). Additionally, this facility (often used R
in conjunction with the Search and Track Sensor Test Site) supports Space and Combat Systems

Sensor and Control elements (5%).

The Naval Surface Warfare Center, Dahlgren Division maintains a complex of land and water ranges at the Dahlgren site known as the Potomac River Test Range (PRTR) for the test and evaluation of live or inert ordnance, weapon systems, and weapons system components. The water range is approximately three nautical miles wide and sixteen miles long. Restricted air space over the test range can be obtained to an altitude of 60,000 feet. A gunnery complex facing down the river has 42 gun enplacements for firing all types of Naval guns up to and including 16 inch caliber. Included is a small caliber indoor range with multiple test bays.

The PRTR has a comprehensive instrumentation system, both fixed and mobile. a telemetry receiving system is available as well as a wide band multi-fiber data communications system at numerous test ranges and instrumentation sites. This system can pass simultaneous video and data. The Range Control and Analysis Center is the hub of this system allowing data to be passed from remote sites to a central location or from site to site. Six down-river sites to 21K yards are connected to this link. Survey land stations along the PRTR provide for accurate instrumentation sites to support range testing, fuze function (burst height), target miss detection over water, and over water targets.

Explosive Experimental Area:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (85%), Guns and Ammunition (10%), and Guided Projectile (5%). R

The Naval Surface Warfare Center, Dahlgren Division maintains an Explosive Experimental Area (EEA) which consists of 1640 acres. The site includes an extensively instrumented site for conducting explosive tests such as blast measurements, target lethality testing, arena testing, and live fire tests. Instrumentation includes high speed photography, pressure gages, flash X-ray, data reduction (optical and computer) facilities. In addition, the site is capable of various safety testing such as: bullet and fragment impact, slow cook-off, and sympathetic detonation testing. Also conducted in this area are environmental tests such as: temperature and humidity, salt, fog, and MIL-STD-901C vibration and shock testing. These facilities are capable of testing full-up missiles including the Navy STANDARD missile. The testing facility has a central control complex that is connected via fiber optic link. The static fire blast arena is fully instrumented with camera coverage located at 22.5 degree intervals around the perimeter. High speed camera coverage (20K images/sec.) is provided. Complete instrumentation is provided (pressure, velocity, etc.). A

UD4000 vibration system provides sine random, sine on random, sine on sine, and random on random testing capabilities. Five temperature and humidity chambers are available for testing between the limits of minus 65 to plus or minus 65 degrees F. The facility possesses unique equipment to conduct near miss shipboard shock tests on full-up missile systems.

Electromagnetic Vulnerability Assessment Facility (EMVAF):

This facility is shared between the CSF elements: Conventional Missiles/Rockets (35%), Guns and Ammunition (5%), and Guided Projectile (30%). Remaining support is in Aircraft Avionic Systems EMV (30%). R

Complete electromagnetic test facility used to simulate the high-power full-threat operational electromagnetic environment (EME) in which the Armed Forces must operate. Evaluation of the effects of a joint U.S. Armed Forces tactical EME upon electro-explosive, electronic, electrical, and electro-mechanical systems. Perform electromagnetic (EM) susceptibility and Hazards of Electromagnetic Radiation to Ordnance (HERO) in a simulated "real world" near-field environment. Conduct missile electromagnetic vulnerability (ENV) to the extended launch-to-target operational (friendly and hostile) EME.

Warheads Research Test Facility:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (80%), and Guns and Ammunition (10%). In addition, miscellaneous commercial and government space functions (e.g., radiography of hardware) (10%).

The warheads research test facility includes areas for testing explosive devices up to 100 pounds of high explosive. Unique instrumentation includes flash x-ray and ultra high speed framing cameras. A naturally unique steel barbette test fixture allows the instrumentation to operate within the blast raduis of the explosive device. The facility also has an installation for radiographic inspection of ordnance items. The test facility operates ultra high speed framing cameras capable of providing 2.5 million frames per second. The facility has over twenty channels of flash x-ray equipment with energy levels up to 1000 KV. The ordnance radiography facility has constant potential x-ray machines in 150KV, 320 KV and 4MeV energy levels. The facility also has a prototype digital tangential x-ray scanning system.

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons (Conventional Missiles/Rockets)	Weapons System Test Complex	Admin	6.8	6.8	0
		Tech	47.9	47.9	0
		Stor	177.9	169.9	8.0
		Util	66.6	66.6	0

*** Administrative, Technical, Storage, Utility**

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears ıs your requirement) (BRAC Criteria III)

With appropriate adjustments to end strength this facility could absorb an additional 150 WY of weapons testing workload and another 50 workyears of weapons development workload, with no facility modification. This is based upon the projected FY97 staffing requirements as compared with the previous peak staffing for test operations in existing facilities. Since this facility is unique and cost prohibitive to relocate, absorbing additional work at this facility would result in increased efficiency. This increased efficiency is attributed to increased utilization of the minimum assets that continue to be required to operate this unique facility. Components of the Weapons systems test complex are fully described in para 3.4 of this data call.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5.1.1

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

No impact.

3.5.2 Land Use: Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres

3.5.3 Utilities: Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

WEAPONS

GUNS AND AMMUNITION

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

The capabilities at the activity which contribute to the Weapons-Guns & Ammunition common support function are as follows:

- **Technology, design and development of ammunition and fuzes, surface ship gun systems, decoy and obstacle clearing systems, telemetry systems, amphibious weapons, and special operations weapons.**
- **Weapon performance assessment**
- **Weapons/ship combat systems safety engineering**
- **Littoral Warfare Land-Sea Interface Weapons concepts, assessments, and technology transitions.**
- **Test and evaluation activity for Naval gun weapon systems and components.**
- **Technology development in engineering design, analysis, prototype fabrication, and T&E to support ship weapons systems development.**
- **Exploratory development of new concepts to establish the technical basis for the formation of development programs**
- **Technical direction of demonstration/validation and engineering and manufacturing development programs in partnership with industry ready for production approval to ensure highly effective weapon systems in minimum time at the lowest cost**
- **Ballistic and system analysis, system engineering and system integration to optimize system cost effectiveness through technical direction of supporting contractors and government activities**
- **Development of weapon system concepts for Naval Surface Fire Support, Anti-Surface Warfare, Anti-Air Warfare and Amphibious Warfare to meet emerging warfare requirements**
- **Technical control of the designs of the Navy's surface ammunition and fuzes to ensure that design changes are cost-effective and avoid adverse impacts on operational performance, safety and producibility**

Relationship and Interconnectivity with other Functions:

Weapon systems R&D is integrally related to R&D of naval Surface and Strategic Warfare because weapons are a key component of the critical sequence: detect, control, and engage. The common support function of Weapons is a key element in NSWCDD's systems engineering mission. The inherently governmental function of determining what warfighting functions get performed on which platforms and in which equipments and computer programs in those platforms, requires competency in systems knowledge. It is essential that this knowledge include the "engage" element of the "detect-control-engage" sequence. Weapons, and their connectivity to sensors and control systems work, are the means for NSWCDD to execute this Systems Engineering mission. The Weapons Systems Department is one of the largest organizational elements at NSWCDD. The relationship and interconnectivity between the weapons common support function and other functions is critical to NSWCDD's mission in that weapons systems must be fully integrated with other key mission areas including: surface warfare systems, surface ship combat systems, special warfare systems, and strategic systems. In terms of other common support functions at NSWCDD there are important relationships between the weapons and Air Vehicles and Space Systems.

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The relative proximity of Dahlgren Laboratory to the Washington, DC Department of Defense complex (55 miles) enables personal interaction with customers to occur as frequently as is necessary with minimum notification or travel arrangements.

Dahlgren customers benefit extensively from the clustering of complex weapons systems programs and tenant commands which complement the Dahlgren mission areas. Tenants such as AEGIS Training Command, Naval Warfare Analysis Center, and Naval Space Command provide synergism in technical activities and technical expertise directed at the development of Surface Ship Combat Systems, Mission Control Systems, Strategic and Space Systems, and Surface Ship Defense Systems. The opportunity for interaction with major Fleet customers is also enhanced by the clustering of commands.

The Potomac River provides a unique geographic environment that allows the Potomac River Test Range (PRTR) to take advantage of the best features of both land and water ranges to provide the Navy with a controlled maritime environment bounded by land. The PRTR is the only facility in the United States that has the capability of meeting the accuracy requirements for testing Navy fuzes and sensors in a maritime environment without requiring on board telemetry systems.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

NSWCDD has an interim Resource Conservation and Recovery Act (RCRA) permit for the open burn & open detonation of propellants and explosives at three locations at the Dahlgren site. The permit from the State of Virginia is interim only because the state has not issued any final permits at this time.

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

Although not a legal environmental constraint, NSWCDD has a policy of restricting testing when the atmospheric conditions intensify the far field noise above certain levels which are below OSHA standards. This policy is in place to maintain good relations with the communities on both sides of the river and sometimes delays tests but very seldom (2 to 3 times a year) cancels testing.

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The facilities used to support these activities require special support infrastructure. Specifically, they must be located in alarmed strongrooms, must provide a satisfactory TEMPEST environment, and must have raised floors to allow for cabling in the test berths. Further, they require specialized power supplies associated with using shipboard systems. The function requires 400 Hz delta power; 440V power; 115V delta power; physical security approval for SECRET, TOP SECRET, and SCI facilities; classified and unclassified data links and networks with other on-base facilities; classified and unclassified data links and networks with operational units afloat and ashore worldwide; and classified and unclassified data links and networks with other weapons development and acquisition activities and facilities ashore worldwide.

The successful performance of the Weapons mission requires the coexistence of the following infrastructure:

- **Properly instrumented Naval gun test and evaluation ranges,**
- **State-of-the-art prototyping facility,**
- **Contracting support with unlimited procurement authority,**
- **Public Works support with heavy equipment to adequately support development, test and evaluation needs,**
- **Security forces commensurate with development program classification and access needs,**
- **State-of-the-art technical library and information access and retrieval systems.**
- **Computer to computer networks installed base-wide with connections to Internet are required to support the development of Naval Guns, Ammunition and Guided Munitions. Computer hosts on the network are accessed by desktop computers and workstations for data intensive simulations in support of structural, aerodynamic, thermal and hydrodynamic analyses. Lack of this infrastructure would greatly hamper timely development of weapons, increase testing costs, and reduce weapon system effectiveness.**

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
WEAPONS (Guns & Ammunition)					
	VITRO	CONTRACTOR	5 mi		45
	ATR	CONTRACTOR	5 mi		12

Movement of the Weapon CSF or the nearby activities list in the above table would reduce communication and close coordination and have an adverse impact on the development and fielding of Navy weapon systems.

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	263	30	0	0
Management (Supv)	26	1	0	0
Other	21	0	0	0

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3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	114	11	18
Associates	5	0	2
Bachelor	103	10	1
Masters	36	4	0
Doctorate (include Med/Vet/etc.)	5	1	0

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3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	9	69	34	31	120
Management (Supv)	0	2	1	2	21
Total	9	71	35	33	141

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3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
WEAPONS (GUNS & AMMUNITION)			
	5160802	11/3/92	PRESTRESSED COMPOSITE GUN TUBE
	4939995	7/10/90	IMPROVED INTEGRATOR AND FIRING CIRCUIT FOR PROXIMITY
	5147975	9/15/92	remotely settable, multi-output, electronic time fuze and method
	4974514	12/4/90	Explosive Safety Junctions
	4998963	3/12/91	Explosive Logic Clock
	5009162	4/23/91	Explosive Logic Resolver Network
	5022326	6/11/91	Asynchronous Explosive Logic Safing Device
	4989516	2/5/91	Safe Explosive Delay Path
	4961383	10/9/90	composite tungsten-steelarmor penetrators
	5046427	9/10/91	differential pressure sensor
	4991509	2/12/91	optical proximity detector
	4975602	12/4/90	logic level data conversion system
	4991513	2/12/91	Safety Vents for Expulsion System Cargo Dispensing Ammunition
	4953475	9/4/90	safety arming system for launched projectiles
	5237441	8/17/93	microprocessor chip incorporating optical signal coupling transceiver
	5131328	7/21/92	safety and arming system for tube launched projectiles
	5289304	2/22/94	Variable rate Transfer of Optical Information
Total	17		

3.2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Publication Reference	Paper Titles (List)
Weapons (Guns & Ammunition)	Proceedings of 2nd Government Neural Network Application Workshop 10-12 September 1991	Application of Neural Networks To Kill Assessment
	Proceedings of Twenty-third Southeastern Symposium on System Theory, March 1991	The Response of the Transfer Function on an Alpha-Beta Filter to Various Measurement Models
	Proceedings of NSWCDD Neural Network Symposium November 1991	Application of Neural Nets to Weapons Control
	Modern Casting March 1992	Navy Program Advances Casting Technology
	MTAG/IMIP 91 Conference, Los Angeles, CA November 1991	Advancements in Computer Thermal Analysis for Cast Projectiles
	Proceedings of TTCP Weapons Conference November 1992	Mitigation of Sympathetic Detonation in 5"/54 Ammunition
	Proceedings of the Australasian Explosive Ordnance Symposium October 1993	Ordnance Technology Research - A US Navy Insensitive Munitions Initiative
	Proceedings of the NIMIC Workshop, June 1993	Cook-off Mitigation Concepts for Ordnance System Applications

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CSF	Publication Reference	Paper Titles (List)
	Shock Compression of Condensed Matter 1993 May 1994	Dislocation Mechanics Based Constitutive Relations For Plastic Flow and Strength of HY Steels
	Shock Compression of Condensed Matter 1993 May 1994	Gas/Gun Reverse-Ballistic Impact Deformation and Fracture of Armco Iron of Differing Grain Sizes
	Proceedings of a Symposium by the Refractory Metals Committee, New Orleans, LA 17-22 February 1991	Impact Deformation and Fracture of Commercially Pure Tungsten Cylinders
	Proceedings of a Symposium by the Refractory Metals Committee, New Orleans, LA 17-22 February 1991	Dynamic Deformation of W7Ni3Fe Alloy Via Reverse-Ballistic Impact
	NSWCDD Technical Digest January 1994	Short Range Anti-Air Warfare Analysis
	NAVSEA Publication - Deckplate, Sept/Oct 1993	"U.S. Navy Pointing and Firing Cutout Program"
	63rd Shock & Vibration Symposium, Las Cruces, NM October 1992	"Air Blast Test of US Navy Collective Protection System"
	Naval Engineer's Journal May 1991	"New Techniques in Weapon Firing Cutout Zone Design"
	Battle Damage and Repair Symposium, National Institute for Standards & Technology, September 1991	"Concepts for a Surface Ship Protection Warfare Systems"
	62nd Shock and Vibration Symposium Defense Nuclear Agency, October 1991	"Ship Protection Technology Development"

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CSF	Publication Reference	Paper Titles (List)
	SPIE Proceedings on Hybrid image and Signal Proceeding III, April 1992	"Performance Comparison for two Digital Scene Matching Processes: Algorithmic and Artificial Neural Network Based"
	Naval Engineers Journal May 1991	"Concept for a Force Level Combat System"
TOTAL	20	

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3.3 Workload

3.3.1 FY93 Workload

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	19.2	0	0	0
Engineering Development	274.9	31.0	0	0
In-Service Engineering	15.7	0	0	0

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3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g. airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
ACAT I	0			
ACAT IC	0			
ACAT ID	0			
ACAT II	0			
ACAT III/IV	0			

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
Other	24 Programs	306.1	55,101.2	Proof and Acceptance Ammunition LAT Dev & Test Joint Technical Coordinating Group Ballistics/Battleship Accuracy Topside Design Eng Ammo Design Agent Surface Launched Fuzes Air Launched Fuzes Systems Safety Eng GWSATP Blast Effects Environmental Engineering ET Gun Gun Engr 20mm/30mm (HC) Printed Circuit Board Hamilton Web Currency Environmental Performance Special Projects Cast Projectiles IMAD General Mission Support SSVP G13 Intelligence G1B WSESRB SWPS

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Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
				Eng Design & Drafting - FPS **Electronic Development - FPS** **SWPS** **Master Document**

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	In-Service Engineering Efforts (List)	FY93 Actual		Weapon System(s) Supported
		Funds Received (Obligation Authority) ($K)	Workyears	
Weapons (Guns & Ammunition)	Production Engineering	1,330.2	7.5	Ammunition (20mm - 5")

	Product Improvements	1,046.9	5.4	Ammunition (20mm -5")
	NATO Support	9.8	0.1	Ammunition (20mm - 5")
	Gun Launcher Industrial Base Study	101.0	0.7	Guns in all calibers
	Ship P&FCO Determination	300.0	2.0	

3.3.2 **Projected Funding**

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Guns & Ammunition)	NONE	NONE	NONE	NONE

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Guns & Ammunition)	52.0M	44.7M	45.8M	45.2M

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III- APPENDIX A - FACILITY PICTURES for photographs.

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement* Cost ($M)
		DOD	Federal Gov't	U. S.	
WEAPONS (GUNS & AMMUNITION)					
	Fuze Devel Lab	X	X	X	3
	Shock Lab	X			1.6
	Computer Aided Engineering & Performance Assessment Facility				8.2
	Prototype Fabrication Facility				3.3
	Ship Weapons Systems Safety Analysis & Evaluation Laboratory				0.8
	Smart Munitions Development Laboratory				3.8
	Potomac River Test Range	X	X	X	250
	Explosive Environmental Area				25

x.15
= 37.5

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	Electromagnetic Vulnerability Assessment Facility	**X**	**X**	**X**	**20**
	Electromagnetic Pulse Facility				**3**
	Search and Track Sensor Test Site	**X**	**X**	**X**	**8**

*** Replacement cost for equipment cost only.**

<u>Shipboard Weapons Systems Safety Analysis & Evaluation Facility</u>:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (50%), Guns and Ammunition (35%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%). R

The Ship Weapons Systems Safety and Evaluation Facility (WSSAEF) is a state-of-the-art network of computers used for safety-related calculations and software analysis. The facility supports complex and sophisticated computational efforts, e.g. fluid dynamics, structures, systems and software safety that assess system vulnerabilities and specify, design and develop means to remove failure modes, control environments, limit damage, or otherwise reduce loss of combat capability. Programs supported by the facility include TOMAHAWK, Vertical Launch System, STANDARD Missile Program, Structural Test Firing Program, and Pointing and Firing Cutout Program. All of them are located at the Dahlgren Site. The Naval Ordnance Center (NAVORDCEN) Safety of Ordnance (SAFEORD) database, supporting the NAVORDCEN Safety Office (N71) and the Weapon System Explosives Safety Review Board (WSESRB), is also hosted on one of the microVAX computers. A vital adjunct to this, facility is the explosive experimental Area (EEA) facility for the conduct or weapons safety test and evaluation.

<u>Naval Projectile Fuze Development Laboratory</u>:

This facility is shared between the CSF elements: Guns and Ammunition (95%), and Guided Projectiles (5%). R

Provides the Navy with full spectrum support for fuzes. The Naval Projectile Fuze Development Laboratory consists of the following: (1) Electronics Radio Frequency (RF) Laboratory, consisting of secure RF shielded space containing various RF test chambers and associated equipment; (2) Open Air RF Test Site with ground plane, consisting of various Navy unique standardized equipment; (3) Electronics and Countermeasures Laboratory, consisting of a variety of electronics design, fabrication, and test equipment; (4) Fuze and Ordnance Laboratory, consisting of mechanical design, fabrication, and test equipment, spin equipment, spin fire equipment, very high G shock equipment, a 2" and a 5" air gun internal ballistics simulator, and classified explosive storage, handling, and testing facilities; (5) Infrared (IR) Laboratory, consisting of IR fuze spinners, radiometers, optical rails, IR viewer, and a variety of target.

Shipboard Shock Laboratory:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (90%), Guns and Ammunition (6%), and Guided Projectiles (4%). R

Provides the Navy with full spectrum environmental shipboard shock simulation support. The Shock Laboratory consists of the following: (1) High Shock Test Complex, consisting of several gas launchers, a 26" air gun, a Light Weight Shock Machine (LWSM901), and the WOX7B shock machine; and (2) Shock Instrumentation/ Analysis Facility, consisting of high volume high frequency digital and analog data acquisition equipment, analog to digital converters, electronic conditioners, a variety of transducers, and a computer complex.

Computer Aided Engineering & Performance Assessment Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (65%), Guns and Ammunition (20%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%).

The purpose of this facility is to support the development of weapon systems in the phases of concept development, engineering design, analysis, documentation, and prototyping. This facility contains high performance graphics computers and engineering workstations in a networked "engineering environment" that links multiple users to a common set of engineering tools for structural, mechanical, aerodynamic, thermal, and performance assessment. Product development is also supported with virtual prototypes and simulations. Full interconnectivity has been achieved in that this engineering

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environment is accessed by multiple users in three of the divisions of the Weapons Systems Department at NSWCDD. Access to the same network of engineering data and tools is available by this network which is shared between the Dahlgren and White Oak sites of NSWCDD. These facilities also include specialized labs containing system specific hardware and measuring equipment for performance assessment and system integration in support of the Vertical Launching System and Surface Launched Missile Systems.

Prototype Fabrication Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (50%), Guns and Ammunition (35%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%). R

The purpose of this facility is to fabricate one-of-a-kind models and prototypes for a wide variety of R&D programs at NSWCDD. This facility includes a state-of-the-art design and manufacturing support capability with (a) an "engineering environment" that offers advanced tools for concept development, modeling, virtual prototyping, simulation, engineering analysis, and detailed design; and (b) fabrication facilities integrated into the engineering environment to provide rapid prototyping of engineering concepts, and allow "lessons learned" in prototype fabrication to be incorporated into production data packages. Fabrication facilities include: precision machining, precision gaging, sheet metal and composites fabrication, and welding. As required by BRAC 91, substantial actions have been completed in an effort to consolidate and "right size" this capability to the minimum needed for future DD R&D support requirements. From FY93 through FY94, prototype fabrication personnel were reduced from 88 to 40; and in FY94, equipment is being reduced from 450 items to less than 200 items; and space is being reduced from 90,000 sq ft to less than 30,000 sq ft.

Smart Munitions Development Laboratory:

This facility is shared between the CSF elements: Guns and Ammunition (10%), and Guided Projectiles (80%). Additionally, this facility supports Sensor and Combat and Control System Elements (10%). R

The Smart Munitions Development Laboratory is located in Buildings 221, 462 and 150. This laboratory supports the development of guidance and control electronics for smart weapons and the development of advanced sensors for various Marine Corps 6.2/6.3A programs including the Advanced Sensor for Air Defense, the Forward Observer/Forward

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Air Controller, the Advanced Processors for Weapon Sensor Fusion and the Expendable Acoustic Remote Sensor (EARS). The facility is also used to support the Predator program (a shoulder-launched anti-tank weapon) and the development of radar absorbent materials (RAM).

Shipboard Search & Track Sensor Test Site:

This facility is shared between the CSF elements: Conventional Missiles/Rockets(10%), and Guns and Ammunition (10%). Additionally, this facility (often in conjunction with the Potomac River Test Range) supports Combat System Sensor Integration (35%) and Sensor R&D (35%). Many of the algorithms developed in this facility are also directed applicable to the elements: Space (e.g., Theater Ballistic Missile) and Special Projects (e.g., Desert Storm) (10%). R

The Shipboard STSTS allows over water testing of individual Radio Frequency (RF) and Electro-Optical sensors or complex sensor systems during and/or at the completion of their development cycle. This facility is used in conjunction with the Potomac River Test Range (PRTR), can provide an 80,000 yard over-water, littoral, laser certified, instrumented range capability. The Shipboard STSTS provides the ability to fly subsonic static, manned, towed, and gun launched targets at altitutdes down to the surface for sensor performance evaluations.

The equipment within the Shipboard STSTS is portable. The buildings and towers which are utilized at the Shipboard STSTS are fixed. In addition, the unique location of the Shipboard STSTS to the restricted over-water range on the Potomac River is also fixed.

Potomac River Test Range:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (5%), Guns and Ammunition (85%), and Guided Projectiles (5%). Additionally, this facility (often used in conjunction with the Search and Track Sensor Test Site) supports Space and Combat Systems Sensor and Control elements (5%). R

The Naval Surface Warfare Center, Dahlgren Division maintains a complex of land and water ranges at the Dahlgren site known as the Potomac River Test Range (PRTR) for the test and evaluation of live or inert ordnance, weapon systems, and weapons system components. The water range is approximately three nautical miles wide and sixteen miles long. Restricted air space over the test range can be obtained to an altitude of 60,000 feet.

A gunnery complex facing down the river has 42 gun enplacements for firing all types of Naval guns up to and including 16 inch caliber. Included is a small caliber indoor range with multiple test bays.

The PRTR has a comprehensive instrumentation system, both fixed and mobile. a telemetry receiving system is available as well as a wide band multi-fiber data communications system at numerous test ranges and instrumentation sites. This system can pass simultaneous video and data. The Range Control and Analysis Center is the hub of this system allowing data to be passed from remote sites to a central location or from site to site. Six down-river sites to 21K yards are connected to this link. Survey land stations along the PRTR provide for accurate instrumentation sites to support range testing, fuze function (burst height), target miss detection over water, and over water targets.

Explosive Experimental Area:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (85%), Guns and Ammunition (10%), and Guided Projectiles (5%). R

The Naval Surface Warfare Center, Dahlgren Division maintains an Explosive Experimental Area (EEA) which consists of 1640 acres. The site includes an extensively instrumented site for conducting explosive tests such as blast measurements, target lethality testing, arena testing, and live fire tests. Instrumentation includes high speed photography, pressure gages, flash X-ray, data reduction (optical and computer) facilities. In addition, the site is capable of various safety testing such as: bullet and fragment impact, slow cook-off, and sympathetic detonation testing. Also conducted in this area are environmental tests such as: temperature and humidity, salt, fog, and MIL-STD-901C vibration and shock testing. These facilities are capable of testing full-up missiles including the Navy STANDARD missile. The testing facility has a central control complex that is connected via fiber optic link. The static fire blast arena is fully instrumented with camera coverage located at 22.5 degree intervals around the perimeter. High speed camera coverage (20K images/sec.) is provided. Complete instrumentation is provided (pressure, velocity, etc.). A UD4000 vibration system provides sine random, sine on random, sine on sine, and random on random testing capabilities. Five temperature and humidity chambers are available for testing between the limits of minus 65 to plus or minus 65 degrees F. The facility possesses unique equipment to conduct near miss shipboard shock tests on full-up missile systems.

Electromagnetic Vulnerability Assessment Facility (EMVAF):

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (35%), Guns and Ammunition (5%), and Guided Projectiles (30%). In addition, support is provided for Aircraft Avionic Systems EMV (30%). R

Complete electromagnetic test facility used to simulate the high-power full-threat operational electromagnetic environment (EME) in which the Armed Forces must operate. Evaluation of the effects of a joint U.S. Armed Forces tactical EME upon electro-explosive, electronic, electrical, and electro-mechanical systems. Perform electromagnetic (EM) susceptibility and Hazards of Electromagnetic Radiation to Ordnance (HERO) in a simulated "real world" near-field environment. Conduct missile electromagnetic vulnerability (ENV) to the extended launch-to-target operational (friendly and hostile) EME.

Electromagnetic Pulse Test Facility:

This facility is shared between the CSF elements: Conventional Missiles/Rockets (30%), Guns and Ammunition (3%), and Guided Projectiles (7%). In addition, the facility supports Ship Topside Electronic Systems EMP (60%). R

This is a free-field electromagnetic pulse (EMP) facility that simulates the waveform of MIL-STD 461D RS-105. It is used to conduct research to determine the effects of EMP to fleet electronic

systems and assess system survivability. Also includes an 8 channel data acquisition and processing system (DAAPS).

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons (Guns & Ammunition)	Weapons System Test Complex	Admin	6.8	6.8	0
		Tech	47.9	47.9	0
		Stor	177.9	169.9	8.0
		Util	66.6	66.6	0

*** Administrative, Technical, Storage, Utility**

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

With appropriate adjustments to end strength this facility could absorb an additional 150 WY of weapons testing workload and another 50 workyears of weapons development workload, with <u>no</u> facility modification. This is based upon the projected FY97 staffing requirements as compared with the previous peak staffing for test operations in existing facilities. Since this facility is unique and cost prohibitive to relocate, absorbing additional work at this facility would result in increased efficiency. This increased efficiency is attributed to increased utilization of the minimum assets that continue to be required to operate this unique facility. The uniqueness of the Weapons Systems Test Complex is fully described in data call 13. Components of the Weapons systems test complex are fully described in para 3.4 of this data call.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5.1.1

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

No impact.

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II)

175 Acres

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units -- e.g. KWH of electricity. (BRAC Criteria II)

With the compleltion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

SECTION III

WEAPONS

GUIDED PROJECTILES

SECTION III: CAPABILITY OF ACTIVITIES TO PERFORM COMMON SUPPORT FUNCTIONS (CSFs): Provide the information described for each common support function listed in Appendix C in which you are actively engaged.

3.0 Mission: Describe the major capabilities at your activity contributing to the common support function in bulletized format. Describe any relationship and interconnectivity with other functions (common or otherwise) in support of the overall activity mission.

The capabilities at the activity which contribute to the Weapons-Guided Projectiles common support function are as follows:

- **Technology, design and development of ammunition and fuzes, surface ship gun systems, and telemetry systems.**
- **Weapon performance assessment**
- **Weapons/ship combat systems safety engineering**
- **Littoral Warfare Land-Sea Interface Weapons concepts, assessments, and technology transitions.**
- **Test and evaluation activity for Naval gun weapon systems and components.**
- **Technology development in engineering design, analysis, prototype fabrication, and T&E to support ship weapons systems development.**
- **Exploratory development of new concepts to establish the technical basis for the formation of development programs**
- **Technical direction of demonstration/validation and engineering and manufacturing development programs in partnership with industry ready for production approval to ensure highly effective weapon systems in minimum time at the lowest cost**
- **Ballistic and system analysis, system engineering and system integration to optimize system cost effectiveness through technical direction of supporting contractors and government activities**
- **Development of weapon system concepts for Naval Surface Fire Support, Anti-Surface Warfare, Anti-Air Warfare and Amphibious Warfare to meet emerging warfare requirements**
- **Technical control of the designs of the Navy's surface ammunition and fuzes to ensure that design changes are cost-effective and avoid adverse impacts on operational performance, safety and producibility**

Relationship and Interconnectivity with other Functions:

Weapon systems R&D is integrally related to R&D of naval Surface and Strategic Warfare because weapons are a key component of the critical sequence: detect, control, and engage. The common support function of Weapons is a key element in NSWCDD's systems engineering mission. The inherently governmental function of determining what warfighting functions get performed on which platforms and in which equipments and computer programs in those platforms, requires competency in systems knowledge. It is essential that this knowledge include the "engage" element of the "detect-control-engage" sequence. Weapons, and their connectivity to sensors and control systems work, are the means for NSWCDD to execute this Systems Engineering mission. The Weapons Systems Department is one of the largest organizational elements at NSWCDD. The relationship and interconnectivity between the weapons common support function and other functions is critical to NSWCDD's mission in that weapons systems must be fully integrated with other key mission areas including: surface warfare systems, surface ship combat systems, special warfare systems, and strategic systems. In terms of other common support functions at NSWCDD there are important relationships between the weapons and Air Vehicles and Space Systems.

3.1 Location

3.1.1 **Geographic/Climatological Features:** Describe any geographic/climatological features in and around your activity that are relevant to each CSF. Indicate and justify those that are required versus those that just serve to enhance accomplishing the mission of the activity. For example, clear air at high altitude that increases quality of atmospheric, ground-based laser experiments in support of the weapons CSF. (BRAC Criteria I)

The relative proximity of Dahlgren Laboratory to the Washington, DC Department of Defense complex (55 miles) enables personal interaction with customers to occur as frequently as is necessary with minimum notification or travel arrangements.

Dahlgren customers benefit extensively from the clustering of complex weapons systems programs and tenant commands which complement the Dahlgren mission areas. Tenants such as AEGIS Training Command, Naval Warfare Analysis Center, and Naval Space Command provide synergism in technical activities and technical expertise directed at the development of Surface Ship Combat Systems, Mission Control Systems, Strategic and Space Systems, and Surface Ship Defense Systems. The

opportunity for interaction with major Fleet customers is also enhanced by the clustering of commands.

The Potomac River provides a unique geographic environment that allows the Potomac River Test Range (PRTR) to take advantage of the best features of both land and water ranges to provide the Navy with a controlled maritime environment bounded by land. The PRTR is the only facility in the United States that has the capability of meeting the accuracy requirements for testing Navy fuzes and sensors in a maritime environment without requiring on board telemetry systems.

3.1.2 **Licenses & permits:** Describe and list the licenses or permits (e.g., environmental, safety, etc.) that your activity currently holds and justify why they are required to allow tests, experiments, or other special capabilities at your location for each CSF. For example, permit to store and use high explosives. (BRAC Criteria I)

NSWCDD has an interim Resource Conservation and Recovery Act (RCRA) permit for the open burn & open detonation of propellants and explosives at three locations at the Dahlgren site. The permit from the State of Virginia is interim only because the state has not issued any final permits at this time.

3.1.3 **Environmental constraints:** Describe and list the environmental or land use constraints present at your activity which limit or restrict your current scope for each CSF, i.e., would not allow increased "volume" or "spectrum" for the CSF. Example -- Volume: frequency of a type of experiment. Example -- Spectrum: Current permit to detonate high explosives will not allow detonation or storage of increased quantity of explosives without legal waiver (state law) or relocation of surrounding (non-govt) buildings. (BRAC Criteria II)

Although not a legal environmental constraint, NSWCDD has a policy of restricting testing when the atmospheric conditions intensify the far field noise above certain levels which are below OSHA standards. This policy is in place to maintain good relations with the communities on both sides of the river and sometimes delays tests but very seldom (2 to 3 times a year) cancels testing.

3.1.4 **Special Support Infrastructure:** List and describe the importance of any mission related special support infrastructure (e.g. utilities) present at your location for your activity. (BRAC Criteria I)

The facilities used to support these activities require special support infrastructure. Specifically, they must be located in alarmed strongrooms, must provide a satisfactory TEMPEST environment, and must have raised floors to allow for cabling in the test berths. Further, they require specialized power supplies associated with using shipboard systems. The function requires 400 Hz delta power; 440V power; 115V delta power; physical security approval for SECRET, TOP SECRET, and SCI facilities; classified and unclassified data links and networks with other on-base facilities; classified and unclassified data links and networks with operational units afloat and ashore worldwide; and classified and unclassified data links and networks with other weapons development and acquisition activities and facilities ashore worldwide.

The successful performance of the Weapons mission requires the coexistence of the following infrastructure:

- **Properly instrumented Naval gun test and evaluation ranges,**
- **State-of-the-art prototyping facility,**
- **Contracting support with unlimited procurement authority,**
- **Public Works support with heavy equipment to adequately support development, test and evaluation needs,**
- **Security forces commensurate with development program classification and access needs,**
- **State-of-the-art technical library and information access and retrieval systems.**
- **Computer to computer networks installed base-wide with connections to Internet are required to support the development of Naval Guns, Ammunition and Guided Munitions. Computer hosts on the network are accessed by desktop computers and workstations for data intensive simulations in support of structural, aerodynamic, thermal and hydrodynamic analyses. Lack of this infrastructure would greatly hamper timely development of weapons, increase testing costs, and reduce weapon system effectiveness.**

3.1.5. **Proximity to Mission-Related organizations:** List and describe the importance and impact of not having nearby organizations which facilitate accomplishing or performing your mission -- e.g. operational units, FFRDCs, universities/colleges, other government organizations, and commercial activities. Restrict your response to the top five. Complete the following: (BRAC Criteria I)

Common Support Functions	Name	Type of Organization	Distance	Workyears Performed by Your Activity	Workyears Funded by Your Activity
WEAPONS (Guided Projectiles)	NAVSEA-91W2	GOVT PROJECT OFFICE	55 mi	7.3	0

Movement of the Weapon CSF or the nearby activities list in the above table would reduce communication and close coordination and have an adverse impact on the development and fielding of Navy weapon systems.

3.2 Personnel:

3.2.1 **Total Personnel:** What is the total number of government (military and civilian), on-site federally funded research and development center (FFRDC), and on-site system engineering technical assistance (SETA) personnel engaged in science and technology (S&T), engineering development and in-service engineering activities as of end FY93? For individuals that predominantly work in CSFs, involved in more than one CSF, account for those individuals in the CSF that represents the preponderance of their effort. (BRAC Criteria I)

Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	7	0	0	0
Management (Supv)	0	0	0	0
Other	0	0	0	0
	7	0	0	0

3.2.2 **Education:** What is the number of government personnel actively engaged in S&T, engineering development and in-service engineering activities by highest degree and type of position? Provide the data in the following table: (BRAC Criteria I)

Type of Degree/ Diploma	Number of Government Personnel by Type of Position		
	Technical	Management (Supv)	Other
High School or Less	3	0	0
Associates	0	0	0
Bachelor	3	0	0
Masters	1	0	0
Doctorate (include Med/Vet/etc.)	0	0	0

3.2.3 **Experience:** What is the experience level of government personnel? Fill in the number of government personnel in the appropriate boxes of the following table. (BRAC Criteria I)

Type of Position	Years of Government and/or Military Service				
	Less than 3 years	3-10 years	11-15 years	16-20 years	More than 20 years
Technical	0	0	1	1	5
Management (Supv)	0	0	0	0	0
Total	0	0	1	1	5

3.2.4 **Accomplishments During FY91-93:** For government personnel answer the following questions.

3.2.4.1 How many patents were awarded and patent disclosures (only count disclosures with issued disclosure numbers) were made? (BRAC Criteria I)

CSF	Disclosures	Awarded	Patent Titles (List)
WEAPONS (Guided Projectiles)	5175694	12/29/92	Centroid Target Tracking System Utilizing Parallel Processing of
	5020400	6/4/91	Wing Fold Tool
	5237441	8/17/93	microprocessor chip incorporating optical signal coupling transceiver
	5214433	5/15/93	Target Tracking Device
	5214483	5/25/93	Digital Laser Range Finder Emulator
	5289304	2/22/94	Variable rate Transfer of Optical Information
	5051751	9/24/91	"A Method of Kalman Filtering for Estimating the Position and Velocity of a Tracted Object"
	5071087	12/91	"A Method of Guiding an Inflight Vehicle Toward a Target.
	5082220	1/92	"A Method of Guiding an Inflight Vehicle Toward a Desired Flight Path"
Total	9		

3:2.4.2 How many papers were published in peer reviewed journals? (BRAC Criteria I)

CSF	Publication Reference	Paper Titles (List)
Weapons (Guided Projectiles)	IEEE Transactions on Aerospace and Electronic Systems, July 1993	"Pure Cartesian Formulation for Tracking Filters
	Proceedings of the Annual Meeting - Institute of Navigation Cambridge MA 1993, June 1993	"Investigating the GPS Aided Precision Missile Concept Via Explorer and TBPEX Satellite Data"

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CSF	Publication Reference	Paper Titles (List)
	Sixth International Geodetic Symposium on Satellite Positioning, Columbia, OH March 1992	Summary of the Sixth International Geodetic Symposium on Satellite Positioning
	Proceedings of NSWCDD Neural Network Symposium November 1991	Neural Networks, Path Planning and Guidance
	Proceeding of NSWCDD Neural Network Symposium November 1991	Connectionist Expert System
	Proceeding of Acquisition and Tracking V, April 1992	Analysis of Asynchronous Data Fusion for Target Tracking with Multi-tasking Radar and Optical Sensor
	Proceedings of NSWDD Neural Network Symposium November 1991	Application of Neural Nets to Weapons Control
	AIAA Paper No. 2001 June 1994	Incorporation of Boundary Layer Heating Predictive Methodology Into the NAVSWC Aeroprediction Code
	Journal of Spacecraft and Rockets and AIAA Paper No. 93-0034, Nov/Dec1993 and January 1993	A New Semiempirical Method for Computing Nonlinear Angle-of-Attack Aerodynamics on Wing-Body-Tail Configurations
	Sixth International Technical Meeting of the Satellite Division of the Institutes of Navigation, Salt Lake City, Utah, September 1993	A Kalman Filter Implementation for a Dual-Antenna GPS Receiver and an Inertial Navigation System
	NSWCDD Technical Digest January 1994	Short Range Anti-Air Warfare Analysis

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CSF	Publication Reference	Paper Titles (List)
	AIAA/SAE/ASME/ASEE 28th Joint Propulsion Conference & Exhibit 6-8 July 1992	"Evaluation of Fiber-Reinforced Composite Ablators Exposed to a Solid Rocket Motor Exhaust"
	62nd Shock and Vibration Symposium Defense Nuclear Agency, October 1991	"Ship Protection Technology Development"
TOTAL	13	

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3.3 Workload

3.3.1 **FY93 Workload**

3.3.1.1 **Work Year and Lifecycle:** Identify the number of actual workyears executed for each applicable CSF in FY93 for each of the following: government civilian; military; on-site FFRDCs; and on-site SETAs. (BRAC Criteria I)

"LAB"	Fiscal Year 1993 Actual			
	Civilian	Military	FFRDC	SETA
Science & Technology	0	0	0	0
Engineering Development	7.3	0	0	0
In-Service Engineering	0	0	0	0

3.3.1.2 **Engineering Development By ACAT:** For each Common Support Function (e.g.

airborne C4I) at each activity engaged in engineering development, provide:
- For each ACAT IC, ID, and II program (as defined in DODI 5000.2):
  - The name of the program
  - A brief program description
- For each ACAT III and IV programs:
  - The number of such programs
  - A list of program names
- For each program not an ACAT I, II, III, IV:
  - The number of such programs
  - A list of program names
- For the purpose of this question, any program between Milestone I and IV and containing demonstration and validation (Dem/Val 6.4)/Engineering and Manufacturing Development (EMD 6.5) funds in the FY95 PBS is considered to be engaged in engineering development (BRAC Criteria I).

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
ACAT I	0			
ACAT IC	0			
ACAT ID	0			
ACAT II	0			
ACAT11I/IV	0			
OTHER	3	7.3	1,303.5	ET PROJECTILE SMART MUNITIONS TDR

3.3.1.3 **In-Service Engineering:** For each Common Support Function at each activity engaged in in-service engineering, list the in-service engineering efforts, the FY93 funds (from all sources) obligated for these efforts, the FY93 workyears for these efforts, and the weapon system(s) supported by these efforts. In-service engineering consists of all engineering support of fielded and/or out of production systems and includes efforts to improve cost, throughput, and schedule to support customer requirements as well as mods and upgrades for reliability, maintainability, and performance enhancements. (BRAC Criteria I)

Common Support Functions	**In-Service Engineering Efforts (List)**	**FY93 Actual**		**Weapon System(s) Supported**
		Funds Received (Obligation Authority) ($K)	**Workyears**	
Weapons (Guided Projectile)	**NONE**			

3.3.2 Projected Funding

3.3.2.1 **Direct Funding:** For each applicable CSF, identify direct mission funding by appropriation from FY94 to FY97. Use FY95 PBS for FY95-FY97. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Guided Projectiles)	NONE	NONE	NONE	NONE

3.3.2.2 **Other Obligation Authority:** For each applicable CSF, identify reimbursable and direct-cite funding (other obligation authority expected) from FY94 to FY97. Funding allocation must be traceable to FY95 PBS. (BRAC Criteria I)

CSF	FY94	FY95	FY96	FY97
Weapons (Guided Projectile)	5.75M	14.2M	16.0M	24.7M

3.4 Facilities and Equipment

3.4.1 **Major Equipment and Facilities:** Describe major facilities and equipment necessary to support each Common Support Function (include SCIFs). If the facilities and equipment are shared with other functions, identify those functions and the percentage of total time used by each of the functions. Provide labeled photographs that picture the breadth and scope of the equipment and facilities described. If it is unique to DOD, to the Federal Government, or to the US, describe why it is unique. Insert the replacement cost. For this exercise, Replacement cost = (Initial cost + capital investment) multiplied by the inflation factor for the original year of construction. (BRAC Criteria II)

See III- APPENDIX A - FACILITY PICTURES for photographs.

Common Support Function	Major Facility or Equipment Description	Unique To: DOD	Unique To: Federal Gov't	Unique To: U. S.	Replacement* Cost ($M)
WEAPONS (Guided Projectiles)	Fuze Devel Lab	X	X	X	3
	Shock Lab	X			1.6
	Computer Aided Engineering & Performance Assessment Facility				8.2
	Prototype Fabrication Facility				3.3
	Ship Weapons Systems Safety Analysis & Evaluation Laboratory				0.8
	Smart Munitions Development Laboratory				3.8
	Potomac River Test Range	X	X	X	250 x.95 =237.5
	Explosive Environmental Area				25 x?
	Electromagnetic Vulnerability Assessment Facility	X	X	X	20 x?
	Electromagnetic Pulse Facility				3

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* Replacement cost for equipment cost only.

Shipboard Weapons Systems Safety Analysis & Evaluation Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (50%), Guns and Ammunition (35%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%). R

The Ship Weapons Systems Safety and Evaluation Facility (WSSAEF) is a state-of-the-art network of computers used for safety-related calculations and software analysis. The facility supports complex and sophisticated computational efforts, e.g. fluid dynamics, structures, systems and software safety that assess system vulnerabilities and specify, design and develop means to remove failure modes, control environments, limit damage, or otherwise reduce loss of combat capability. Programs supported by the facility include TOMAHAWK, Vertical Launch System, STANDARD Missile Program, Structural Test Firing Program, and Pointing and Firing Cutout Program. All of them are located at the Dahlgren Site. The Naval Ordnance Center (NAVORDCEN) Safety of Ordnance (SAFEORD) database, supporting the NAVORDCEN Safety Office (N71) and the Weapon System Explosives Safety Review Board (WSESRB), is also hosted on one of the microVAX computers. A vital adjunct to this facility is the explosive experimental Area (EEA) facility for the conduct or weapons safety test and evaluation.

Naval Projectile Fuze Development Laboratory:

This facility is shared between the CSF elements: Guns and Ammunition (95%), and Guided Projectiles (5%). R

Provides the Navy with full spectrum support for fuzes. The Naval Projectile Fuze Development Laboratory consists of the following: (1) Electronics Radio Frequency (RF) Laboratory, consisting of secure RF shielded space containing various RF test chambers and associated equipment; (2) Open Air RF Test Site with ground plane, consisting of various Navy unique standardized equipment; (3) Electronics and Countermeasures Laboratory, consisting of a variety of electronics design, fabrication, and test equipment; (4) Fuze and Ordnance Laboratory, consisting of mechanical design, fabrication, and test equipment, spin equipment, spin fire equipment, very high G shock equipment, a 2" and a 5" air gun internal ballistics simulator, and classified explosive storage, handling, and testing facilities; (5) Infrared (IR) Laboratory, consisting of IR fuze spinners, radiometers, optical rails, IR viewer, and a variety of targets.

Shipboard Shock Laboratory:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (90%), Guns and Ammunition (6%), and Guided Projectiles (4%). R

Provides the Navy with full spectrum environmental shipboard shock simulation support. The Shock Laboratory consists of the following: (1) High Shock Test Complex consisting of several gas launchers, a 26" air gun, a Light Weight Shock Machine (LWSM901), and the WOX7B shock machine; and (2) Shock Instrumentation/ Analysis Facility, consisting of high volume high frequency digital and analog data acquisition equipment, analog to digital converters, electronic conditioners, a variety of transducers, and a computer complex.

Computer Aided Engineering & Performance Assessment Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (65%), Guns and Ammunition (20%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%).

The purpose of this facility is to support the development of weapon systems in the phases of concept development, engineering design, analysis, documentation, and prototyping. This facility contains high performance graphics computers and engineering workstations in a networked "engineering environment" that links multiple users to a common set of engineering tools for structural, mechanical, aerodynamic, thermal, and performance assessment. Product development is also supported with virtual prototypes and simulations. Full interconnectivity has been achieved in that this engineering environment is accessed by multiple users in three of the divisions of the Weapons Systems Department at NSWCDD. Access to the same network of engineering data and tools is available by this network which is shared between the Dahlgren and White Oak sites of NSWCDD. These facilities also include specialized labs containing system specific hardware and measuring equipment for performance assessment and system integration in support of the Vertical Launching System and Surface Launched Missile Systems.

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Prototype Fabrication Facility:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (50%), Guns and Ammunition (35%), and Guided Projectiles (5%). Additionally, this facility supports Space and Combat System Control elements (10%). R

The purpose of this facility is to fabricate one-of-a-kind models and prototypes for a wide variety of R&D programs at NSWCDD. This facility includes a state-of-the-art design and manufacturing support capability with (a) an "engineering environment" that offers advanced tools for concept development, modeling, virtual prototyping, simulation, engineering analysis, and detailed design; and (b) fabrication facilities integrated into the engineering environment to provide rapid prototyping of engineering concepts, and allow "lessons learned" in prototype fabrication to be incorporated into production data packages. Fabrication facilities include: precision machining, precision gaging, sheet metal and composites fabrication, and welding. As required by BRAC 91, substantial actions have been completed in an effort to consolidate and "right size" this capability to the minimum needed for future DD R&D support requirements. From FY93 through FY94, prototype fabrication personnel were reduced from 88 to 40; and in FY94, equipment is being reduced from 450 items to less than 200 items; and space is being reduced from 90,000 sq ft to less than 30,000 sq ft.

Smart Munitions Development Laboratory:

This facility is shared between the CSF elements: Guns and Ammunition (10%), and Guided Projectiles (80%). Additionally, this facility supports Sensor and Combat and Control Systems (10%). R

The Smart Munitions Development Laboratory is located in Buildings 221, 462 and 150. This laboratory supports the development of guidance and control electronics for smart weapons and the development of advanced sensors for various Marine Corps 6.2/6.3A programs including the Advanced Sensor for Air Defense, the Forward Observer/Forward Air Controller, the Advanced Processors for Weapon Sensor Fusion and the Expendable Acoustic Remote Sensor (EARS). The facility is also used to support the Predator program (a shoulder-launched anti-tank weapon) and the development of radar absorbent materials (RAM).

Potomac River Test Range:

This facility is shared among the following CSF elements: Conventional Missiles/Rockets (5%), Guns and Ammunition (85%), and Guided Projectiles (5%). Additionally, this facility (often used in conjunction with the Search and Track Sensor Test Site) supports Space and Combat Systems Sensor and Control elements (5%).

The Naval Surface Warfare Center, Dahlgren Division maintains a complex of land and water ranges at the Dahlgren site known as the Potomac River Test Range (PRTR) for the test and evaluation of live or inert ordnance, weapon systems, and weapons system components. The water range is approximately three nautical miles wide and sixteen miles long. Restricted air space over the test range can be obtained to an altitude of 60,000 feet. A gunnery complex facing down the river has 42 gun enplacements for firing all types of Naval guns up to and including 16 inch caliber. Included is a small caliber indoor range with multiple test bays.

The PRTR has a comprehensive instrumentation system, both fixed and mobile. a telemetry receiving system is available as well as a wide band multi-fiber data communications system at numerous test ranges and instrumentation sites. This system can pass simultaneous video and data. The Range Control and Analysis Center is the hub of this system allowing data to be passed from remote sites to a central location or from site to site. Six down-river sites to 21K yards are connected to this link. Survey land stations along the PRTR provide for accurate instrumentation sites to support range testing, fuze function (burst height), target miss detection over water, and over water targets.

Explosive Experimental Area:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (85%), Guns and Ammunition (10%), and Guided Projectiles (5%). R

The Naval Surface Warfare Center, Dahlgren Division maintains an Explosive Experimental Area (EEA) which consists of 1640 acres. The site includes an extensively instrumented site for conducting explosive tests such as blast measurements, target lethality testing, arena testing, and live fire tests. Instrumentation includes high speed photography, pressure gages, flash X-ray, data reduction (optical and computer) facilities. In addition, the site is capable of various safety testing such as: bullet and fragment impact, slow cook-off, and sympathetic detonation testing. Also conducted in this area are environmental tests such as: temperature and humidity, salt, fog, and MIL-STD-901C vibration and shock testing. These facilities are capable of testing full-up missiles including the Navy STANDARD missile. The testing facility has a central control complex that is connected via fiber optic link. The static fire blast arena is fully instrumented with camera coverage located at 22.5 degree intervals around the perimeter. High speed camera coverage (20K images/sec.) is provided. Complete instrumentation is provided (pressure, velocity, etc.). A UD4000 vibration system provides sine random, sine on random, sine on sine, and random on random testing capabilities. Five temperature and humidity chambers are available for testing between the limits of minus 65 to plus or minus 65 degrees F. The facility possesses unique equipment to conduct near miss shipboard shock tests on full-up missile systems.

Electromagnetic Vulnerability Assessment Facility (EMVAF):

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (35%), Guns and Ammunition (5%), and Guided Projectiles (30%). Additionally, this facility supports Aircraft Avionic Systems EMV (30%). R

Complete electromagnetic test facility used to simulate the high-power full-threat operational electromagnetic environment (EME) in which the Armed Forces must operate. Evaluation of the effects of a joint U.S. Armed Forces tactical EME upon electro-explosive, electronic, electrical, and electro-mechanical systems. Perform electromagnetic (EM) susceptibility and Hazards of Electromagnetic Radiation to Ordnance (HERO) in a simulated "real world" near-field environment. Conduct missile electromagnetic vulnerability (ENV) to the extended launch-to-target operational (friendly and hostile) EME.

Electromagnetic Pulse Test Facility:

This facility is shared between the CSF elements: Conventional Missiles/Rockets (30%), Guns and Ammunition (3%), and Guided Projectiles (7%). Additionally, this facility supports Ship Topside Electronic Systems EMP (60%). R

This is a free-field electromagnetic pulse (EMP) facility that simulates the waveform of MIL-STD-461D RS-105. It is used to conduct research to determine the effects of EMP to fleet electronic

systems and assess system survivability. Also includes an 8 channel data acquisition and processing system (DAAPS).

3.5.1 **Laboratory Facilities:** Use facilities records as of fourth-quarter FY93 in answering the following (in sq ft) for each CSF: (BRAC Criteria II)

Common Support Function	Facility or Equipment Description	Type of Space*	Space Capacity (KSF)		
			Current	Used	Excess
Weapons (Guided Projectiles)	Weapons System Test Complex	Admin	6.8	6.8	0
		Tech	47.9	47.9	0
		Stor	177.9	169.9	8.0
		Util	66.6	66.6	0

*** Administrative, Technical, Storage, Utility**

3.5.1.1 Describe the capacity of your activity to absorb additional similar workyears categorized in the same common support function with minor facility modification. If major modification is required, describe to what extent the facilities would have to be modified. (Use FY97 workyears as your requirement) (BRAC Criteria III)

With appropriate adjustments to end strength this facility could absorb an additional 150 WY of weapons testing workload and another 50 workyears of weapons development workload, with no facility modification. This is based upon the projected FY97 staffing requirements as compared with the previous peak staffing for test operations in existing facilities. Since this facility is unique and cost prohibitive to relocate, absorbing additional work at this facility would result in increased efficiency. This increased efficiency is attributed to increased utilization of the minimum assets that continue to be required to operate this unique facility. The uniqueness of the Weapons Systems Test Complex is fully described in data call 13. Components of the Weapons systems test complex are fully described in para 3.4 of this data call.

3.5.1.2 If there is capacity to absorb additional workyears, how many additional workyears can be supported? (BRAC Criteria III)

See 3.5.1.1

3.5.1.3 For 3.5.1.1 and 3.5.1.2 (above) describe the impact of military construction programs or other alteration projects programmed in the FY95 PBS. (BRAC Criteria II)

No impact.

3.5.2 **Land Use:** Provide number of buildable acres for additional laboratory/administrative support construction at your installation. (BRAC Criteria II) R

175 Acres

3.5.3 **Utilities:** Provide an estimate of your installation's capability to expand or procure additional utility services (electric, gas, water). Estimates should be provided in appropriate units--e.g. KWH of electricty. (BRAC Criteria II)

With the completion of the new sewage upgrade, the Dahlgren site will have sufficient utility capacity to handle twice the current infrastructure.

Table 5.1 Base Infrastructure Capacity & Load

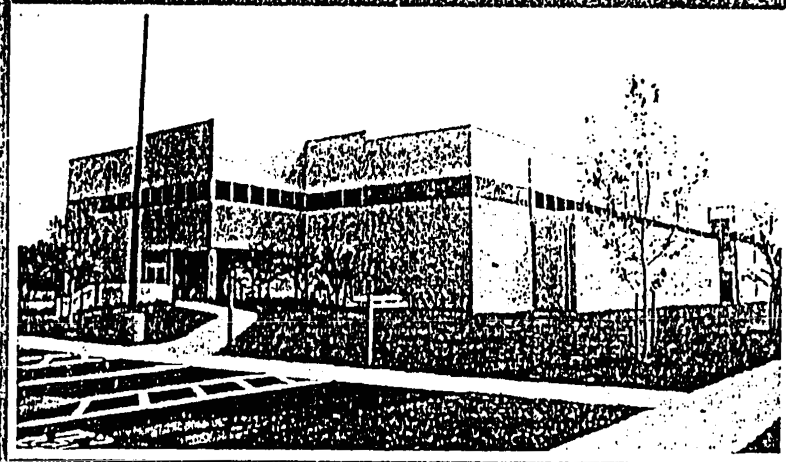
	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Electrical Supply (KWH)	53,870[1]	54,000[2]	9,763	24,377
Natural Gas (CFH)	0	0	0	0
Sewage (GPD)[3]	NOTE[4]	0	364,000	1,010,000
Potable Water (GPD)	2.4M	0	.523M	.868M
Steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

	On Base Capacity	Off base long term contract	Normal Steady State Load	Peak Demand
Short Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

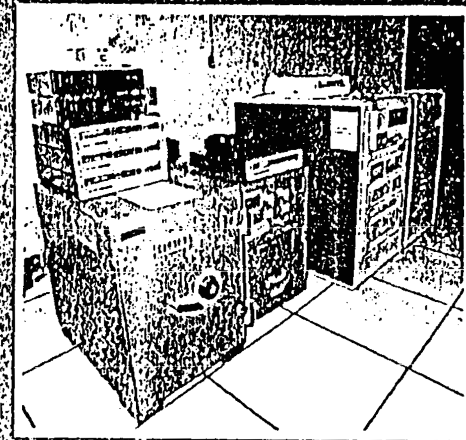
[1] Transformer capacity in KW not GEN capacity
[2] Power company capacity on the circuit in KW
[3] New plant at 720,000 average with 1,400,000 peak
[4] Existing plant at 400,000 average with 700,000 peak
[5] Small system that produces 55,258 MBTU

III- APPENDIX A
FACILITY PICTURES

STRATEGIC TARGETING SIGNIFICANT TECHNICAL FACILITIES



Strategic Systems Operational Support Facility
- Specifically Designed and Built to Satisfy SRS ORD
- Environment for:
  - TS/ESI Operations
  - Computer Intensive Functions
- Around the Clock Operations for High DEFCON Conditions
  - Backup Power Source

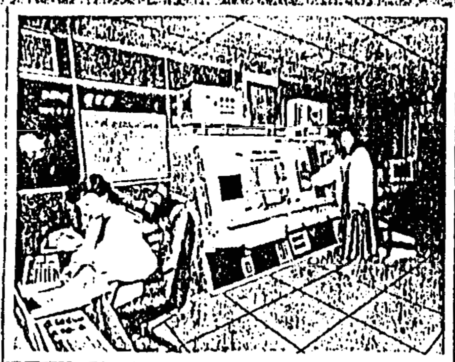


Secure Communication Facilities
- Transfer of Strategic Targets and Documentation
- Connectors to
  - USSTRATCOM
  - Commanders Task Force (LANT & PAC)
- Operates at TS/ESI Levels
- Supports Rapid Communication of Strategic Targets

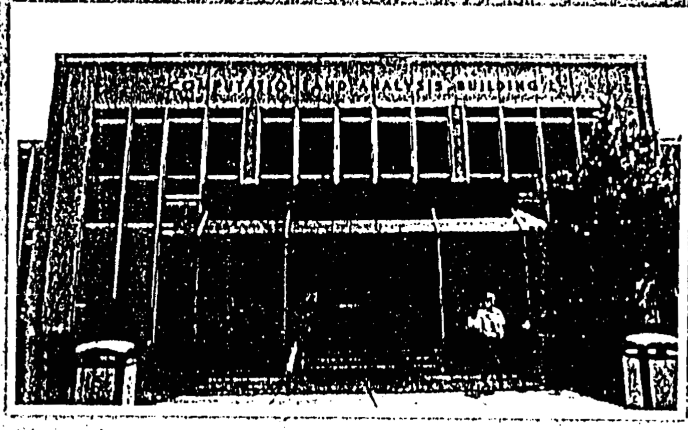
WCS's for C4 Trident I and D5 Trident II
- System Level Testing
  - SLBM Strategic Targets
  - Fleet Procedures
- Backup for WCS Software Development Operations

Scientific & Engineering Computer Complex
- Cray Based Computer Systems
- Strategic Targeting Processing
  - Target Analysis
  - Testing
  - Operational Documentation Development
- Development of Models for USSTRATCOM
- TS ESI OPS
- Backup for WS Software Development

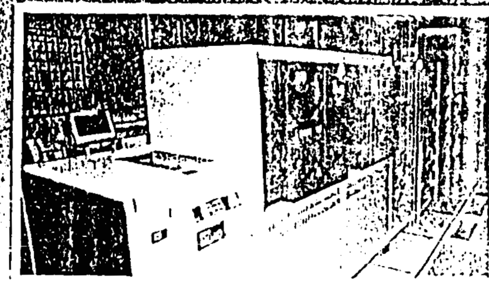
WEAPONS CONTROL SYSTEMS (WCS) SIGNIFICANT TECHNICAL FACILITIES



WCS's for UK, C4 Trident I and D5 Trident II
- Software Development
- Testing
- Formal Qualification
- Fleet Problem Investigations and Resolution
- Fleet Procedure Development
- Technology Studies
- Only Shorebased UK Chevaline WCS in World
- Backup for Targeting Support

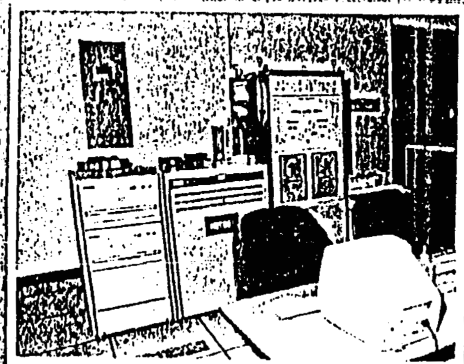


Strategic Systems Computations and Analysis Bldg.

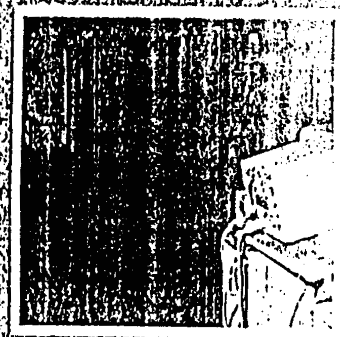


Software Generation System
- Development Tools
- Testing
- Archiving of WCS Software
- Configuration Management
- Nuclear Weapons Safety and Software Security

Advanced Development Laboratory
- Technology Studies
- Proof of Concept Demos
- Future WCS Prototyping

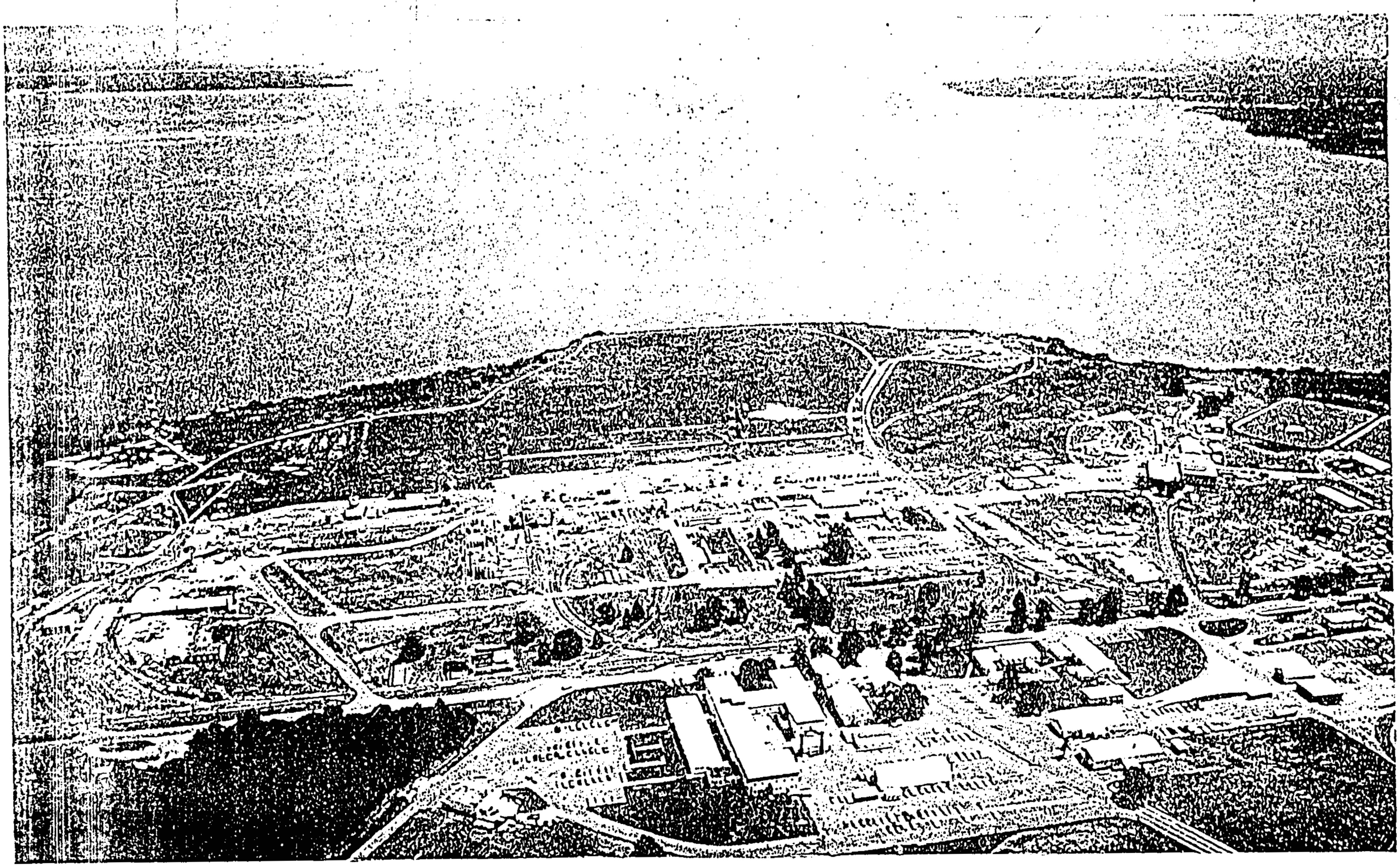


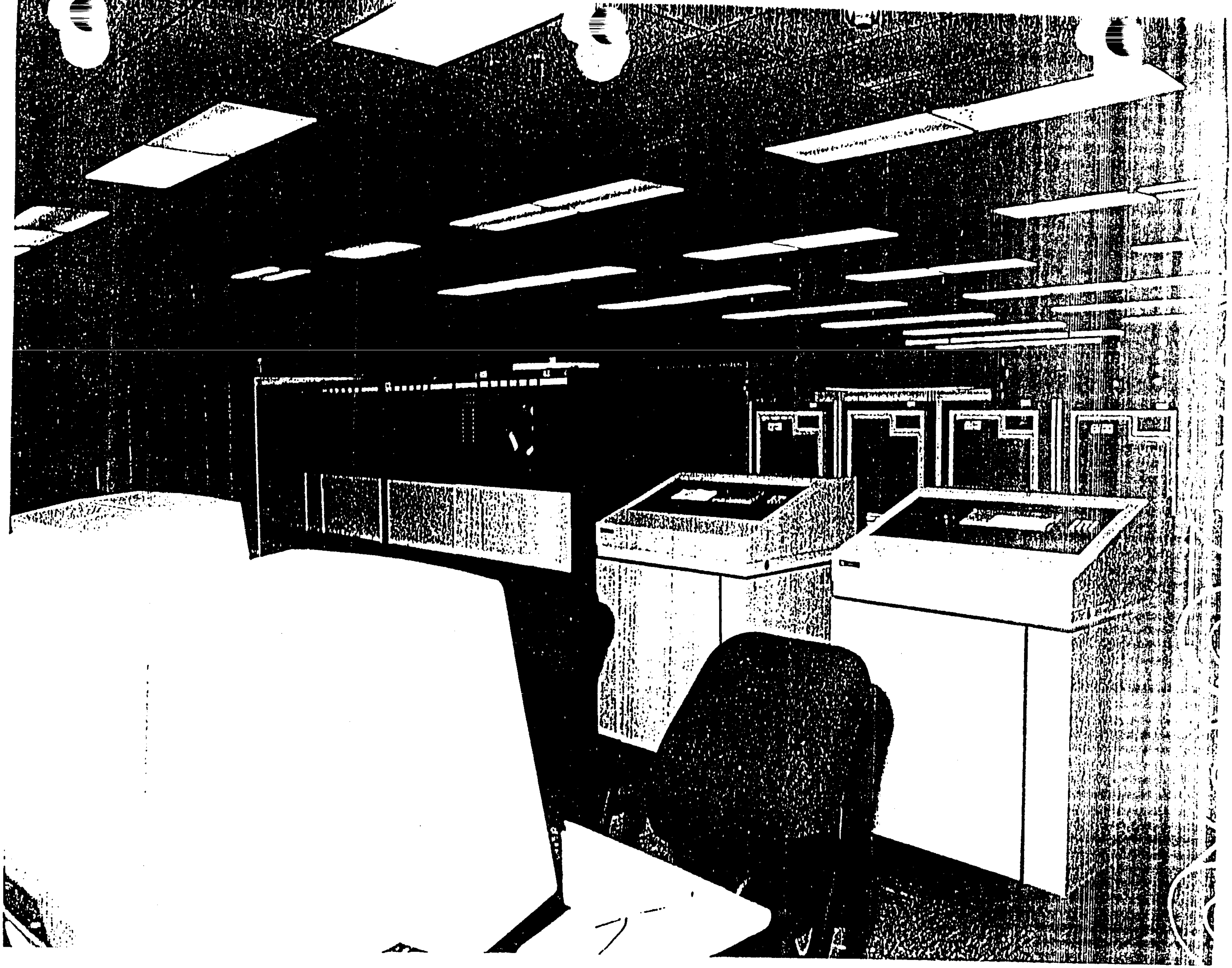
WCS Communication Facility
- Management of Specialized Electronic Media for WCS
- Control of Information to/from SSBN and Developers
- Archive Agent for SSBN



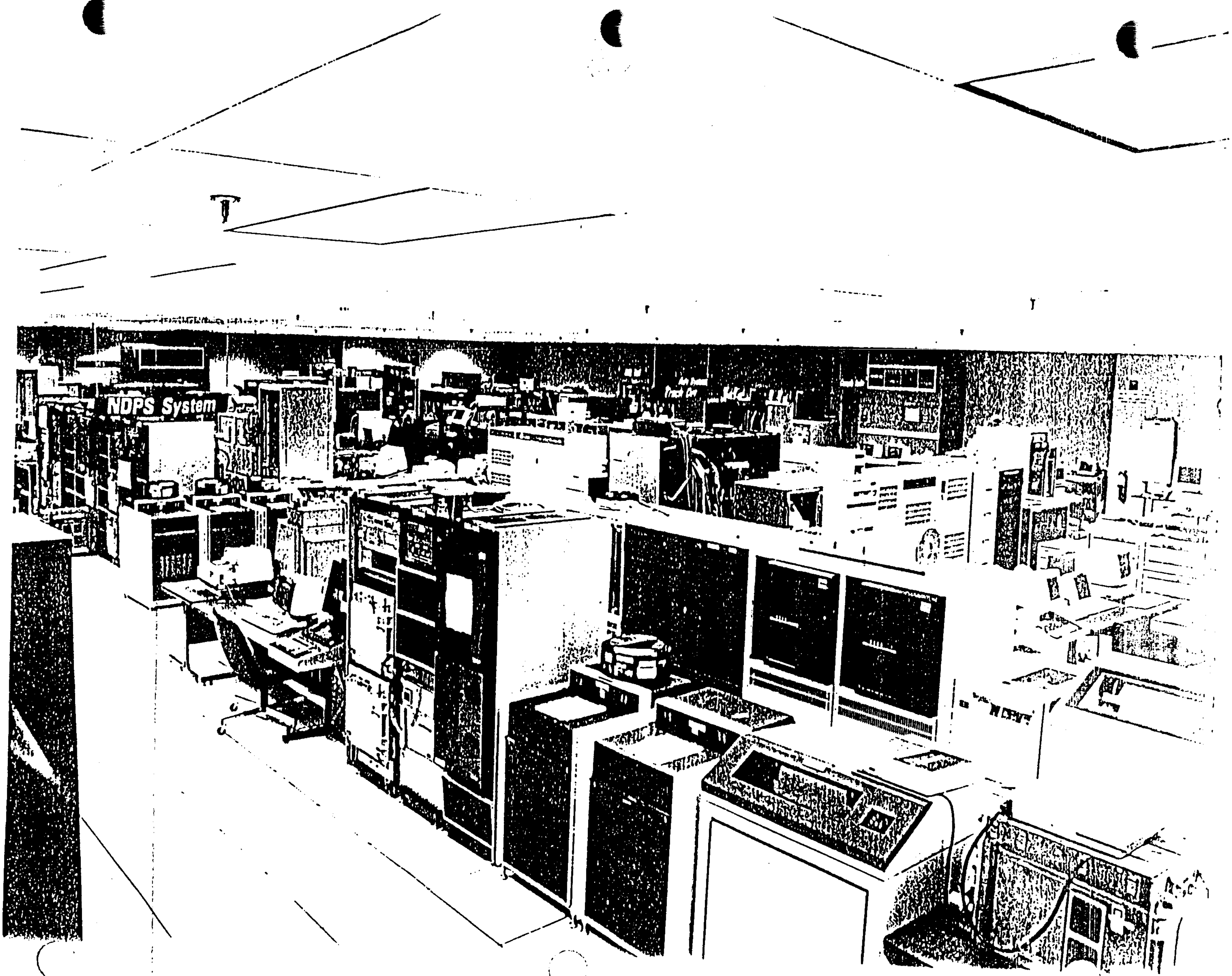
Central S&E Computer Complex
- Cray Based System
- Network, Secret High Ops
- Technology Studies
- Simulation and Modeling
- Algorithm Development
- WCS & USSTRATCOM Support
- Backup for Targeting Support

THE POTOMAC RIVER TEST RANGE (PRTR)

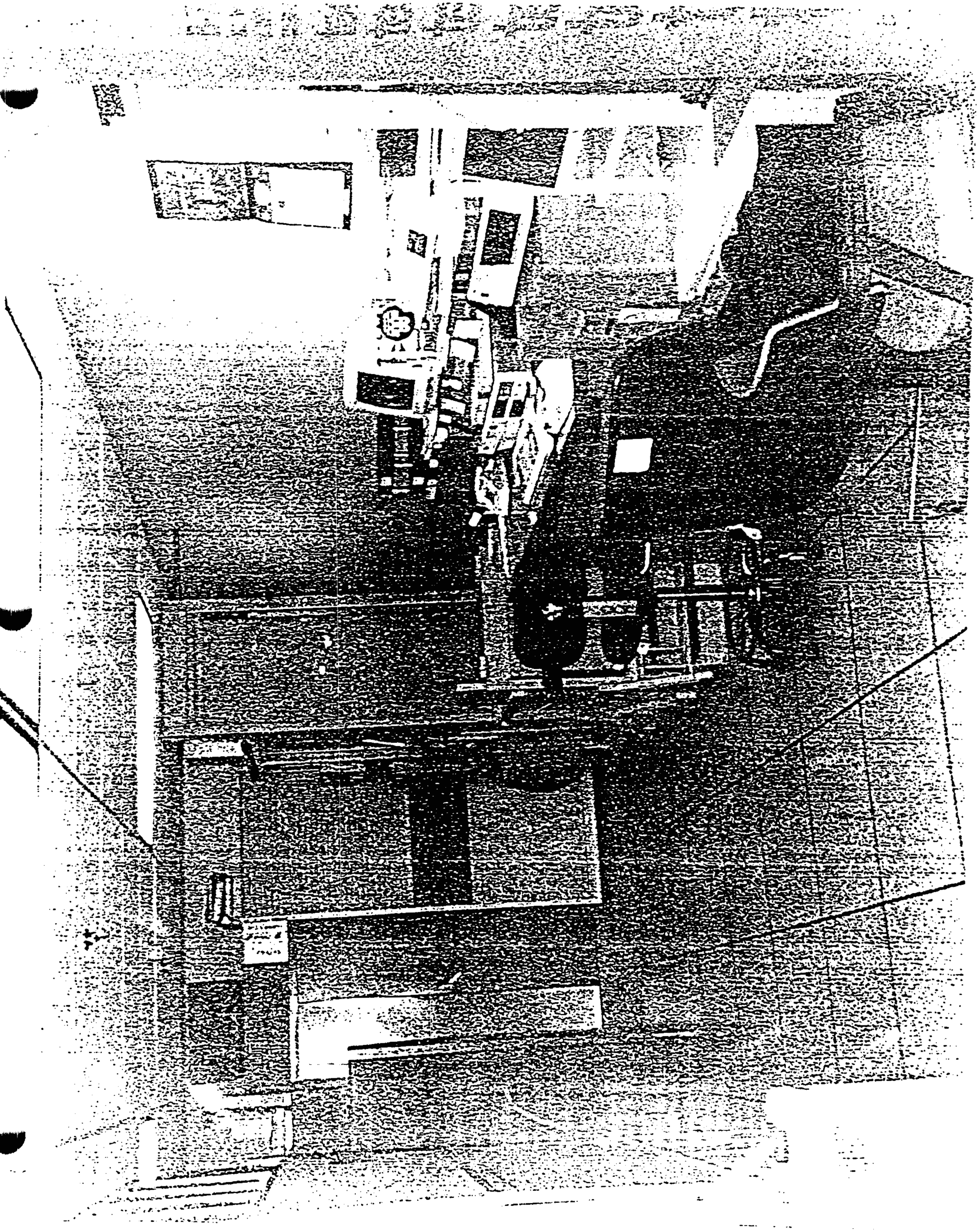


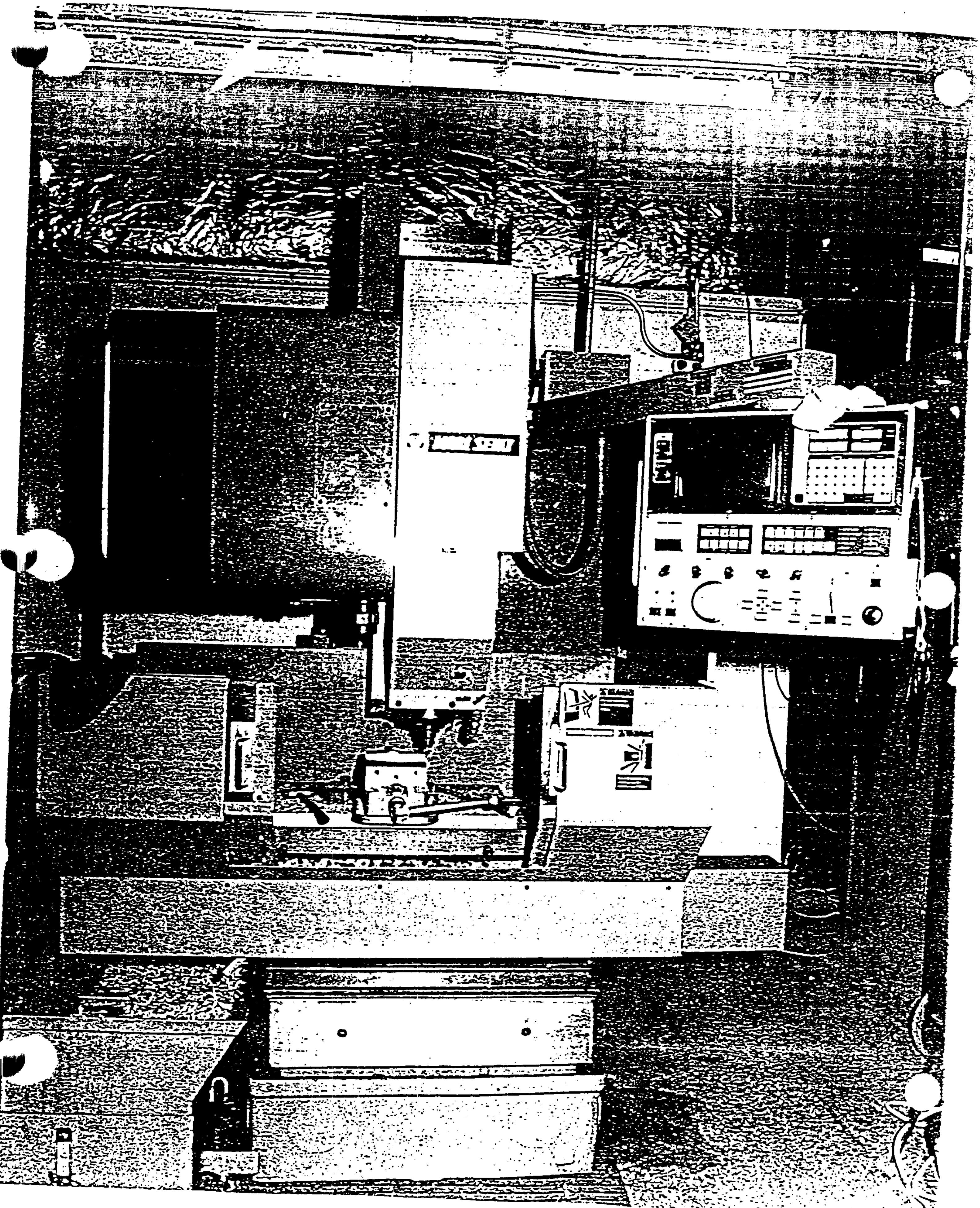


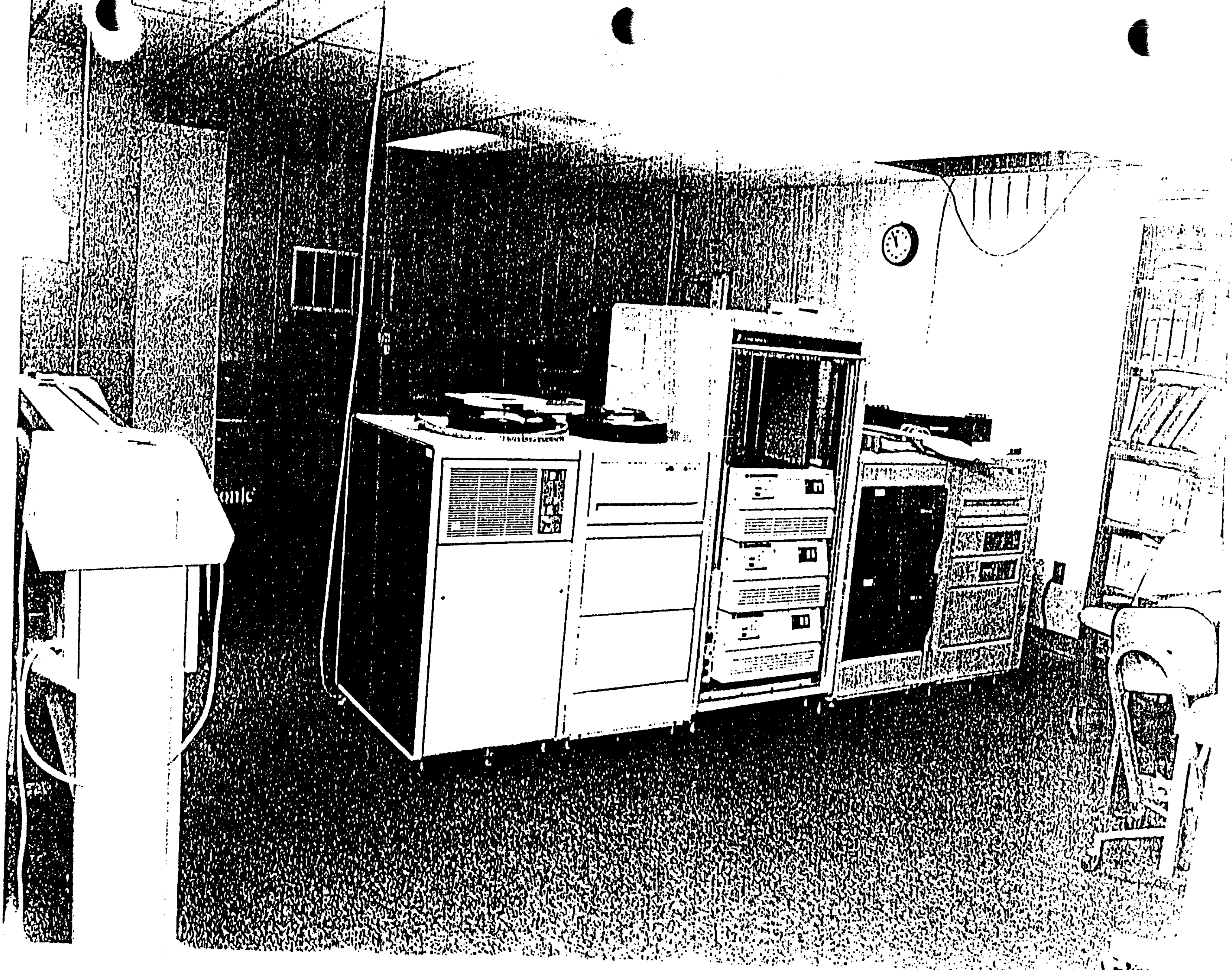
SCIENTIFIC & ENGINEERING COMPUTER COMPLEX



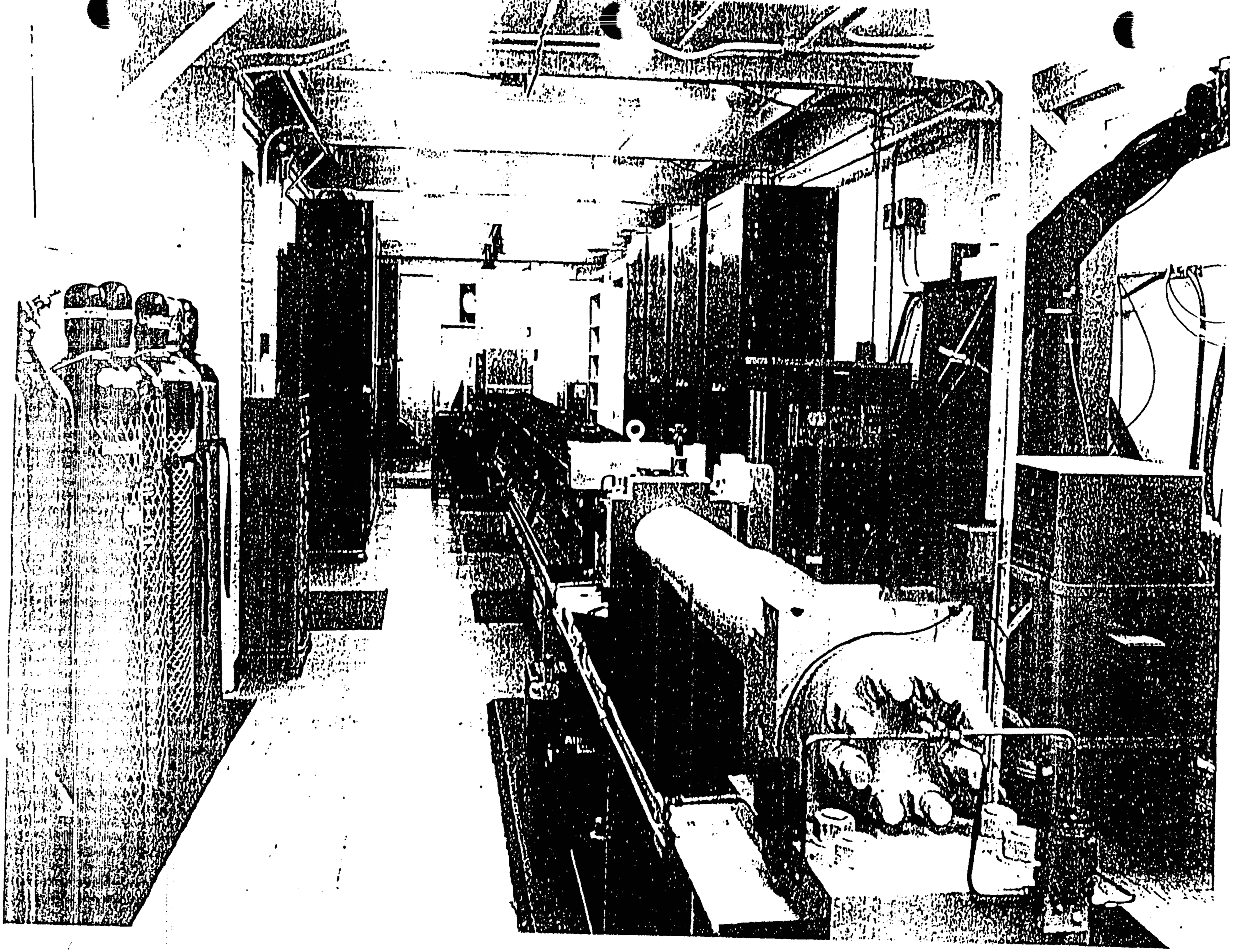
CRUISE MISSILE/UAV SYSTEM DEVELOPMENT & INTEGRATION FACILITY





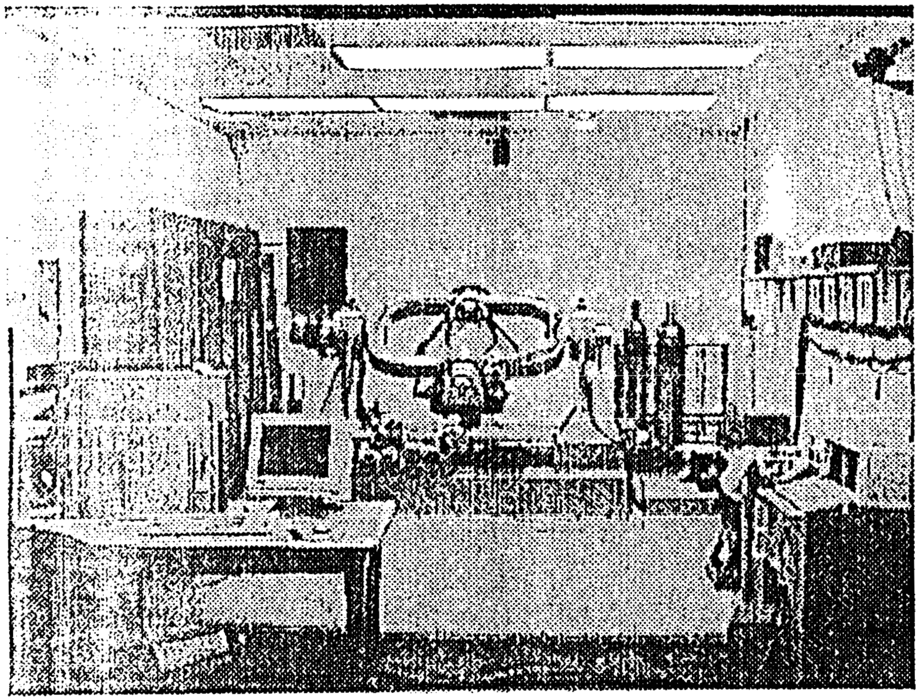


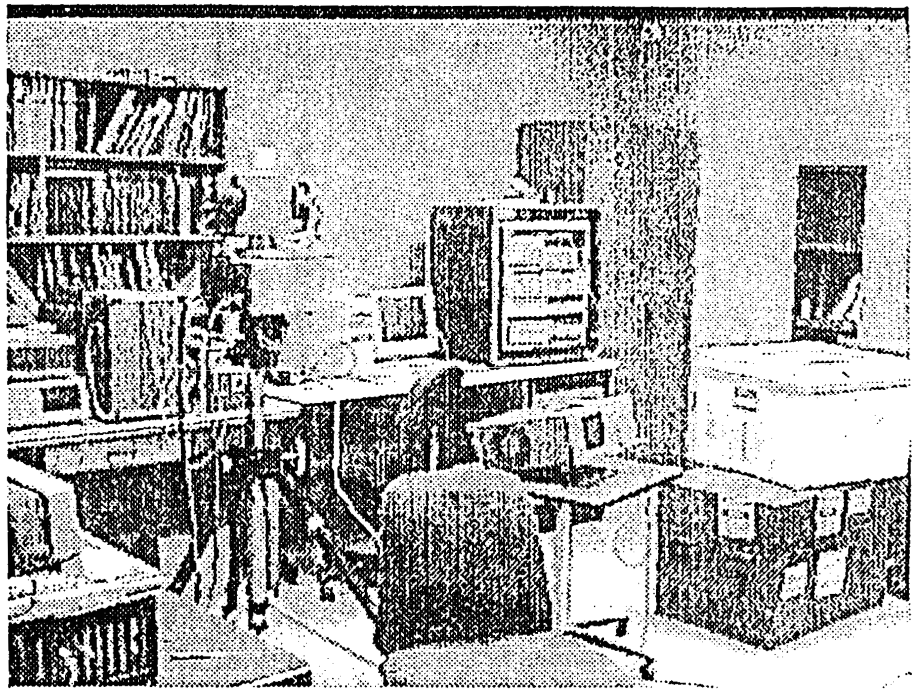
WEAPONS SYSTEMS SAFETY ANALYSIS AND EVALUATION FACILITY

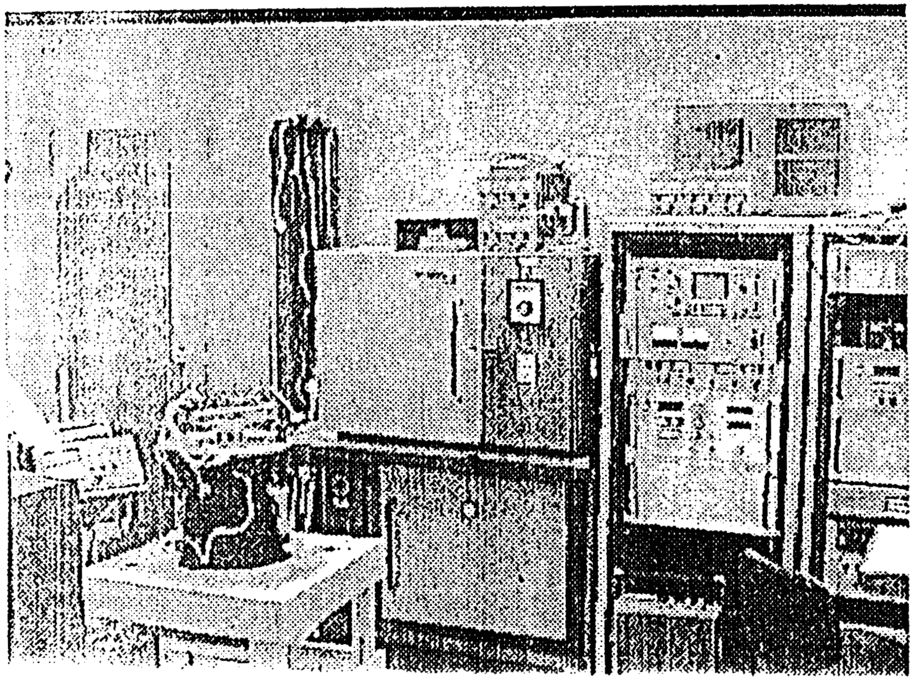


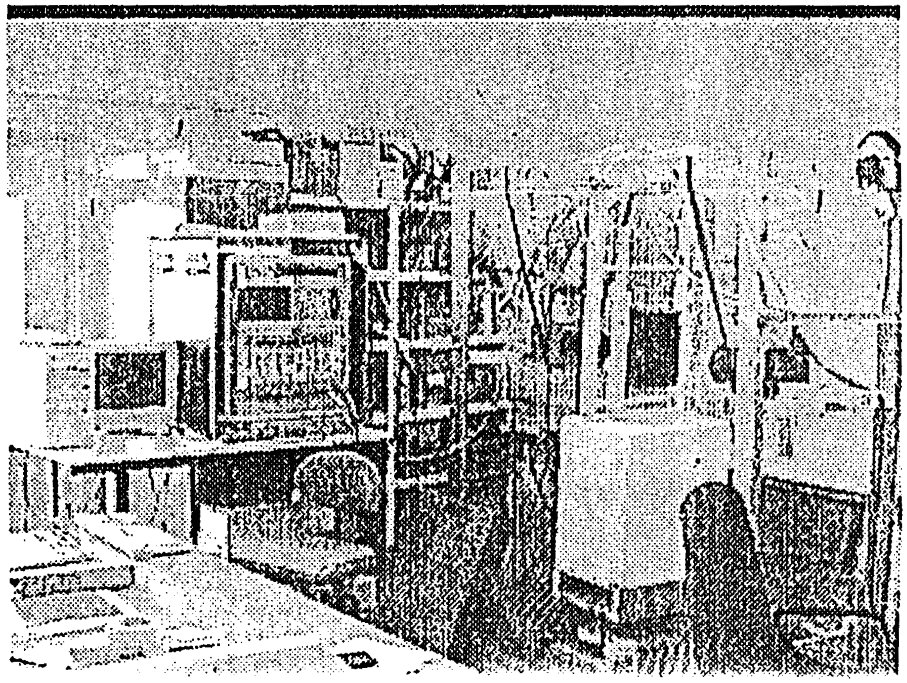
WARHEAD DEVEL(NT FACILITY

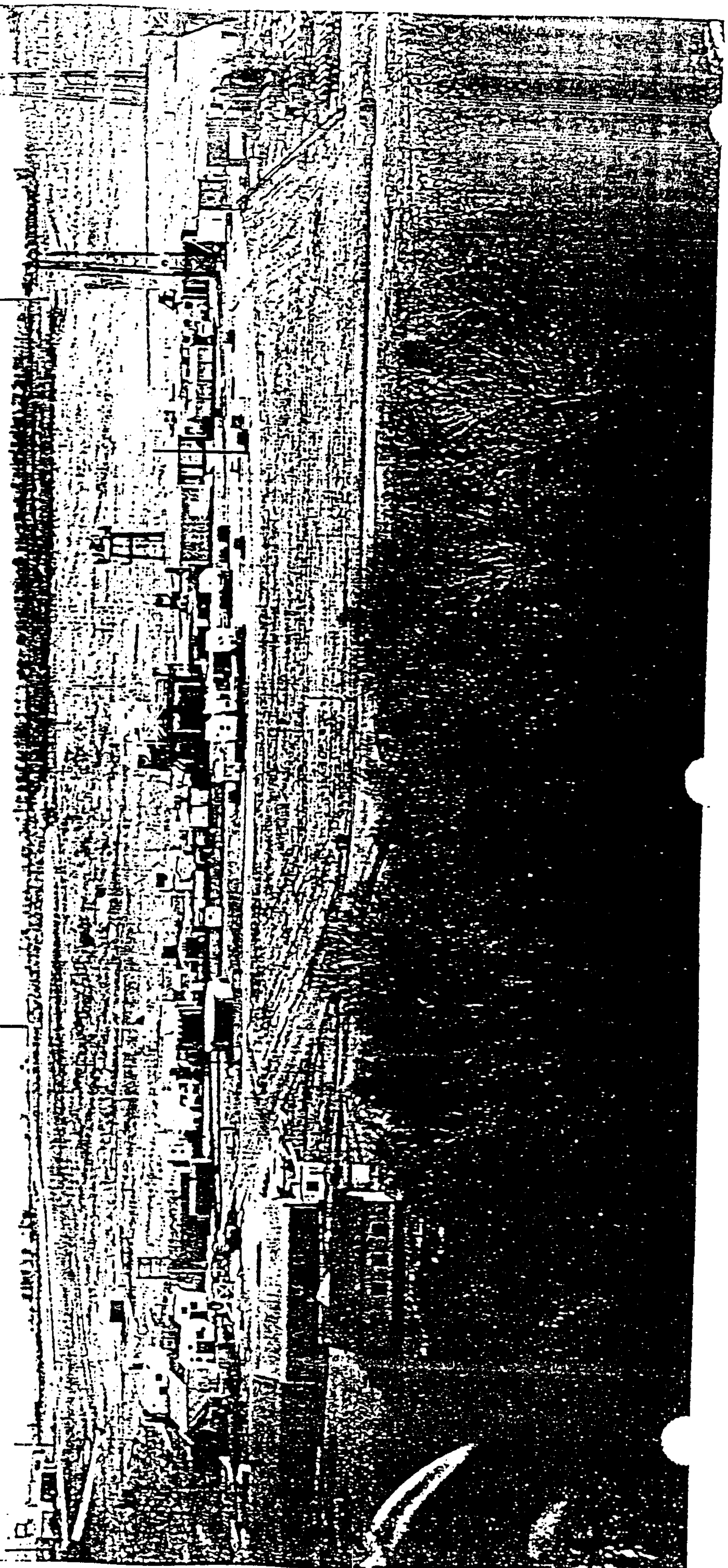
Smart Munitions Development Laboratory



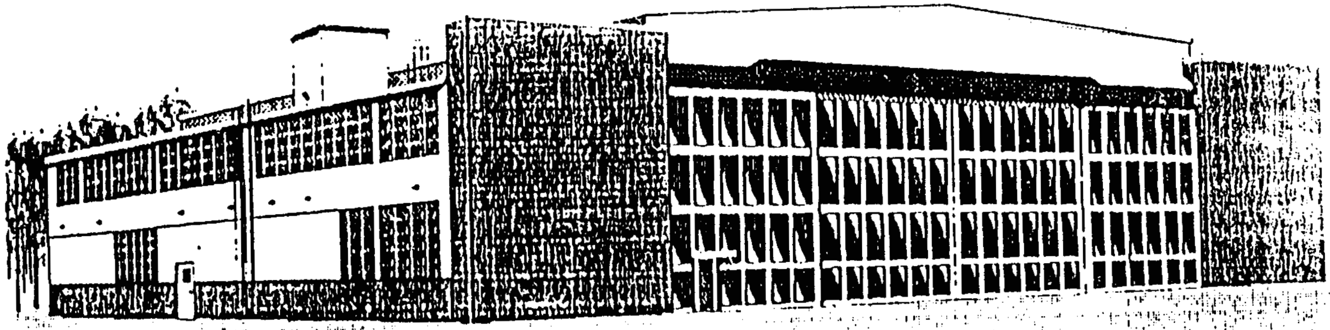


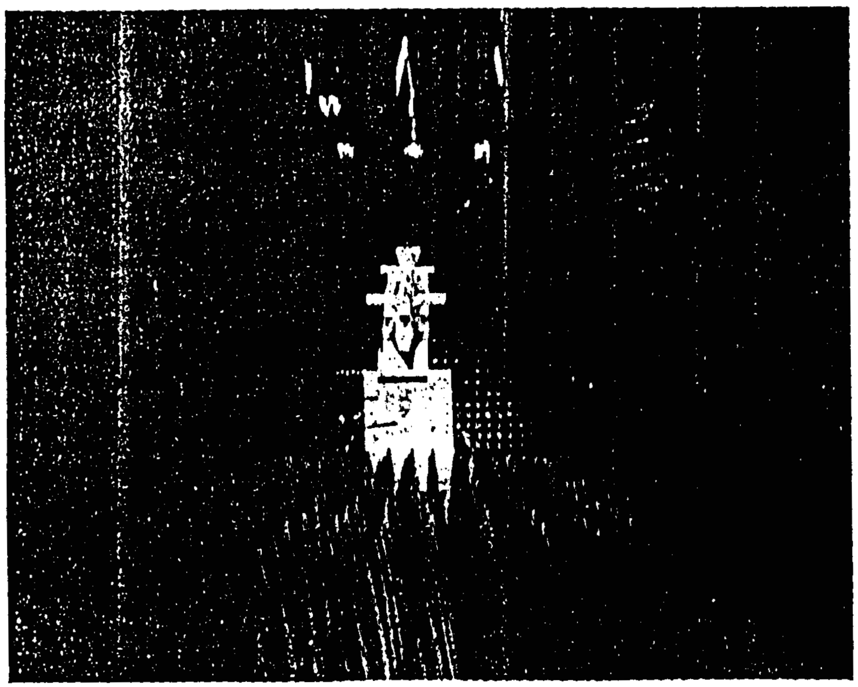


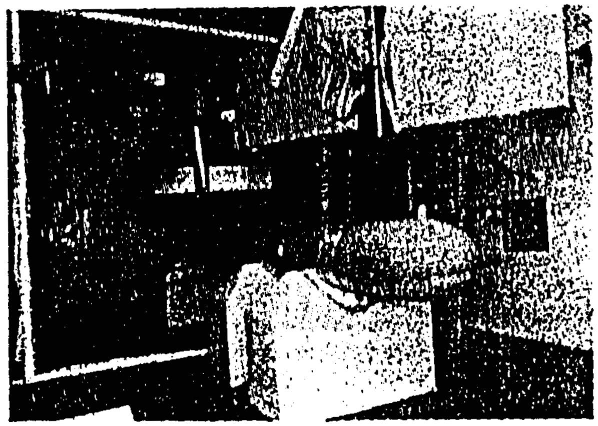


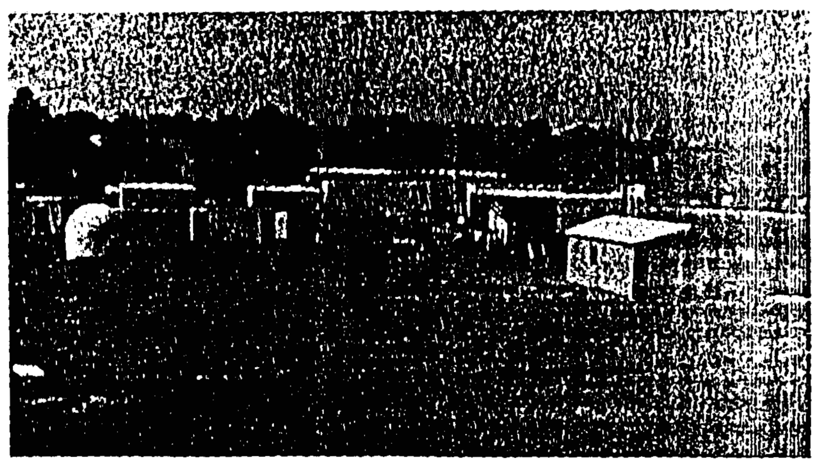


.ECTROMAGNETIC VULNERA TY ASSESSMENT FACILITY (EMV)





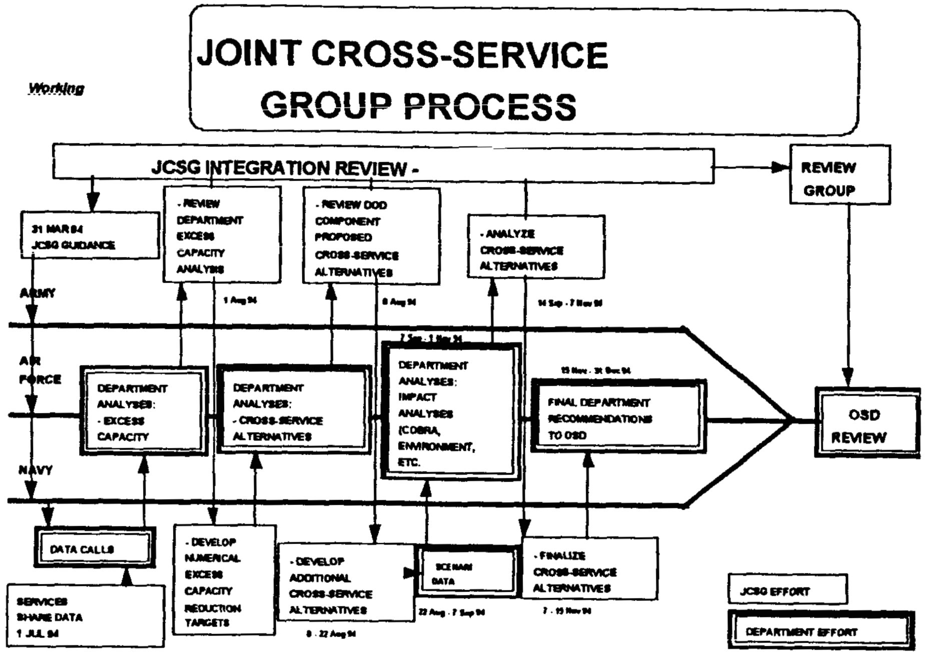




SECTION IV: APPENDICES

A. Macro Process/Schedule
B. List of Activities
C. Common Support Functions

APPENDIX A



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APPENDIX B

LIST OF ACTIVITIES

AIR FORCE

1. Armstrong Lab, Brooks AFB
2. Armstrong Lab, Tyndall AFB
3. Armstrong Lab, Wright-Patterson AFB
4. Armstrong Lab, Williams AFB
5. Human Systems Center, Brooks AFB
6. Wright Lab, Wright-Patterson AFB
7. Wright Lab, Eglin AFB
8. Aeronautical Systems Center, Wright-Patterson AFB
9. Aeronautical Systems Center, Eglin AFB
10. Oklahoma City Air Logistics Center, Tinker AFB (In-service engineering)
11. Ogden Air Logistics Center, Hill AFB (In-service engineering)
12. San Antonio Air Logistics Center, Kelly AFB (In-service engineering)
13. Sacramento Air Logistics Center, McClellan AFB (In-service engineering)
14. Warner-Robins Air Logistics Center, Robins AFB (In-service engineering)
15. Phillips Lab, Kirtland AFB
16. Phillips Lab, Hanscom AFB
17. Phillips Lab, Edwards AFB
18. Space & Missile Center, Los Angeles AFB
19. Space & Missile Center, Norton AFB
20. Sacramento Air Logistics Center, Peterson AFB
21. Rome Lab, Griffiss AFB
22. Rome Lab, Hanscom AFB
23. Electronic Systems Center, Hanscom AFB
24. Sacramento Air Logistics Center, Peterson AFB (In-service engineering)

ARMY

1. Army Research Lab (ARL), Adelphi, MD
2. ARL, Aberdeen Proving Grounds (APG), MD
3. ARL, White Sands Missile Range, NM
4. ARL, NASA Langley, VA
5. ARL, NASA Lewis, OH
6. Natick Research, Development and Engineering Center, Natick, MA
7. Aviation Research, Development and Engineering Center, St Louis, MO
8. Aviation Troop Command, Aeroflight Dynamics Directorate, Moffitt Field, CA

9. Aviation Troop Command, Aviation Applied Technology Directorate, Fort Eustis, VA
10. Edgewood Research, Development and Engineering Center, Aberdeen Proving Ground, MD
11. Communications Electronics Command Research, Development and Engineering Center, Ft Mammoth, NJ
12. Communication Electronics Command Research, Development and Engineering Center - Night Vision EO Directorate, Ft Belvoir, VA
13. Missile Research, Development and Engineering Center, Redstone Arsenal, AL
14. Armaments Research, Development and Engineering Center, Picatinny Arsenal, NJ
15. Armaments Research, Development and Engineering Center, Benet Labs, Watervliet Arsenal, NY
16. Tank-Automotive Command Research, Development and Engineering Center, Warren, MI
17. USA Research Institute of Infectious Diseases, Ft Detrick, MD
18. Walter Reed Army Institute of Research, Washington D.C.
19. USA Institute of Surgical Research, Ft Sam Houston, TX
20. USA Aeromedical Research Lab, Ft Rucker, AL
21. Medical Research Institute of Chemical Defense Aberdeen Proving Grounds, MD
22. USA Research Institute of Environmental Medicine, Natick, MA
23. Construction Engineering Research Laboratory, Champaign, IL
24. Cold Regions Research and Engineering Lab, Hanover, NH
25. Topographic Engineering Center, Alexandria, VA
26. Waterways Experiment Station, Vicksburg, MS
27. USA Research Institute for Behavioral & Social Sciences, Alexandria, VA
28. Simulation, Training and Instrumentation Command (STRICOM), Orlando, FL

NAVY

1. Naval Air Warfare Center, Weapons Division, China Lake
2. Naval Air Warfare Center, Weapons Division, Point Mugu
3. Naval Air Warfare Center, Aircraft Division, Patuxent River
4. Naval Air Warfare Center, Aircraft Division, Indianapolis
5. Naval Air Warfare Center, Aircraft Division, Lakehurst
6. Naval Research Lab, Washington D.C.
7. Naval Research Lab Detachment, Bay St Louis
8. Naval Surface Warfare Center, Carderock Division, Bethesda
9. Naval Surface Warfare Center, Carderock Detachment, Annapolis
10. Naval Surface Warfare Center, Crane Division
11. Naval Surface Warfare Center, Crane Detachment, Louisville
12. Naval Surface Warfare Center, Dahlgren Division
13. Naval Surface Warfare Center, Dahlgren Detachment, Panama City
14. Naval Surface Warfare Center, Indian Head Division
15. Naval Surface Warfare Center, Port Hueneme Division

16. Naval Command, Control, and Ocean Surveillance Center, RDT&E Division, San Diego
17. Naval Command, Control, and Ocean Surveillance Center, In-Service Engineering, West Coast Division, San Diego
18. Naval Command, Control, and Ocean Surveillance Center, In-Service Engineering Division, Charleston
19. Naval Aerospace Medical Research Center, Pensacola
20. Naval Biodynamics Lab, New Orleans
21. Naval Dental Research Lab, Great Lakes
22. Naval Health Research Center, San Diego
23. Naval Medical Research Institute, Bethesda
24. Naval Undersea Warfare Center, Keyport Division, WA
25. Naval Surface Warfare Center, Carderock, Philadelphia Detachment
26. Naval Undersea Warfare Center, Newport, RI
27. Naval Undersea Warfare Center (Newport), New London, CT
28. Naval Personnel Research and Development Center, San Diego, CA

DEPARTMENT OF DEFENSE

1. Armed Forces Radiobiology Research Institute (AFRRI), Bethesda, MD

APPENDIX C

COMMON SUPPORT FUNCTIONS (DEFINITIONS LISTED FOLLOWING PAGES)

Product Functions

1. Air Vehicles
   - Fixed
     -- Structure
     -- Propulsion
     -- Avionics
     -- Flight Subsystems
   - Rotary
     -- Structure
     -- Propulsion
     -- Avionics
     -- Flight Subsystems

2. Weapons
   - ICBMs/SLBMs
   - Conventional Missiles/Rockets
   - Cruise Missiles
   - Guided Projectiles
   - Bombs
   - Guns and Ammunition
   - Directed Energy
   - Chemical/Biological

3. Space Systems
   - Launch Vehicles
   - Satellites
   - Ground Control Systems

4. C4I Systems
   - Airborne C4I
   - Fixed Ground-Based C4I
   - Ground Mobile C4I

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Pervasive Functions

1. Electronic Devices
2. Environmental Sciences
3. Infectious Diseases
4. Human Systems
5. Manpower and Personnel
6. Training Systems
7. Environmental Quality
8. Advanced Materials

DEFINITIONS

COMMON SUPPORT FUNCTIONS

Product Functions

1. Air Vehicles. Air vehicles are broken out into common support functions for fixed wing and rotary wing. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of air vehicles. Included are all air vehicles including their application as UAV's and targets.

- Structures. Includes but not limited to all air vehicles structure technology, engineering and production efforts. Include technology and engineering practices which advance structural design and analysis; advanced structural concepts and fabrication techniques; and structural integrity.

- Propulsion. Includes but not limited to all technology, engineering and production efforts associated with air vehicle propulsion such as turbine engine, rotorcraft power drive, and hypersonic propulsion components. Such components include compressors, inlets and nozzles, turbines, mechanical systems and control, gears, bearings, shafts, and clutches. In addition, include associated subsystems activities such as turborocket, turboramjet and rotorcraft transmissions; and supporting technical and engineering disciplines.

- Avionics. Includes but not limited to all technology, engineering and production efforts associated with the air platform's integrated avionics system. The avionics suite includes but is not limited to weapon delivery systems, electronic warfare, navigation, communications, radar, electro-optic sensors, signal/data processing and associated software system and support. Includes efforts associated with developing the integrated avionics system (i.e. optimizing functional partitioning, distribution and integration of avionics/related functions).

- Flight Subsystems. Includes but not limited to all technology, engineering and production efforts for air vehicle support systems such as landing gear; transparent crew enclosures; egress systems; mechanical equipment integrity; electrical component integrity; subsystem integration; and aircraft power, pressurization, and temperature control systems.

2. Weapons. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of ICBMs/SLBMs, conventional missiles and rockets, cruise missiles, guided projectiles, bombs, guns and ammunition, directed energy and chemical/biological munitions. Include with each weapon as appropriate, all related technology, engineering and production activities such as fusing/safe and arm, missile propulsion, warheads and explosives, and guidance and control.

3. Space. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of launch vehicles, satellites and associated ground control systems (satellite control only; ground systems for telemetry of data included in C4I). Include under satellites, all technology, engineering and production activities associated with space communications and space-based surveillance (and associated sensors) and space-based C4I.

4. C4I. Includes but not limited to all science and technology, demonstration and validation, engineering development, and production activities which support employment and in-service engineering of airborne, fixed ground-based and mobile ground based C4I systems. Include all technology, engineering and production activities associated with communications networks, radios and links, distributed information systems, data fusion, decision aids, and associated computer architectures.

Pervasive Functions (6.1, 6.2, and 6.3)

1. Electronic Devices. Includes but not limited to all science and technology activities supporting development of semiconductor and superconductor materials for optoelectronic, acoustic and microwave devices. Include all associated electronic materials/device fabrication and processing.

2. Environmental Sciences. Includes but not limited to all science and technology activities to improve measurement, characterization and modeling of the earth atmosphere and space environment. Examples include global prediction systems, space effects, and celestial backgrounds/astronomical reference sources.

3. Infectious Diseases. Includes but not limited to all science and technology activities which preserve manpower and performance by the prevention and treatment of militarily important infectious diseases that occur naturally worldwide.

4. Human Systems. Includes but not limited to all science and technology activities to enable, protect, sustain and enhance human effectiveness in DOD operations. The focus of this pervasive, multi-disciplinary area is the human and therefore impacts all DOD systems and operations. This area includes: (1) human performance definition, assessment, and aiding; (2) physiologic bioeffects of toxic hazards, ionizing and non-ionizing radiation, biodynamic (bio-mechanical) stress, and extreme environments; (3) military operational medicine; and (4) generic, human-centered design standards/methodologies for crew station subsystems, information management and display, and life support.

5. **Manpower and Personnel**. Includes but not limited to all science and technology activities which support four broad areas: (1) selection and classification of DOD personnel (including pilots); (2) identification of operational tasks performed and requirements for skills, knowledge,

and aptitudes; (3) matching the right people with the jobs they are best suited for according to the needs of DOD, (4) and developing techniques for measuring and enhancing the productivity of the operational force.

6. **Training Systems**. Includes but not limited to all science and technology which support training of personnel, including training strategies, devices and simulators, and computer aided intelligent tutoring systems.

7. **Environmental Quality.** Includes but not limited to all science and technology activities which support the development of technologies to reduce the environmental costs of DOD operations while ensuring mission accomplishment is not jeopardized by adverse environmental impacts. Specifically, this area encompasses technologies to: (1) identify and cleanup sites contaminated with hazardous materials as a result of DOD operations (cleanup); (2) ensure DOD compliance with current and anticipated local, national, and international environmental laws and treaties (compliance); (3) minimize DOD use of hazardous materials and reduce DOD hazardous waste generation (pollution prevention); and (4) provide for protection of natural resources under DOD stewardship (conservation).

8. **Advanced Materials**. Includes but not limited to all science and technology activities related to structural, high temperature, electromagnetic protection, electronic, magnetic, optical, and biomolecular materials. Note: excludes materials areas which were included in DDR&E decision of 18 Mar 94 related to the Army's Materials Research Facility at Aberdeen Proving Ground and the Navy's Materials Facility at Carderock.

12 Aug 94
Transmittal

Submission of revised pages, Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

N. S. SCOTT, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

28 July 94
Date

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (SEL) D. P. SARGENT, JR.
NAME (Please type or print)

D P Sargent
Signature

COMMANDER
Title

28 July 94
Date

NAVAL SURFACE WARFARE CENTER
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

G. R. STERNER
NAME (Please type or print)

G. R. Sterner
Signature

Title

8/5/94
Date

Commander
Naval Sea Systems Command
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

W. A. EARNER
NAME (Please type or print)

W Earner
Signature

Title

8/8/94
Date

12 Aug 94
Transmittal

BRAC-95 CERTIFICATION

Submission of revised pages, Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

Reference: SECNAVNOTE 11000 of 08 December 1993

In accordance with policy set forth by the Secretary of the Navy, personnel of the Department of the Navy, uniformed and civilian, who provide information for use in the BRAC-95 process are required to provide a signed certification that states "I certify that the information contained herein is accurate and complete to the best of my knowledge and belief."

The signing of this certification constitutes a representation that the certifying official has reviewed the information and either (1) personally vouches for its accuracy and completeness or (2) has possession of, and is relying upon, a certification executed by a competent subordinate.

Each individual in your activity generating information for the BRAC-95 process must certify that information. Enclosure (1) is provided for individual certifications and may be duplicated as necessary. You are directed to maintain those certifications at your activity for audit purposes. For purposes of this certification sheet, the commander of the activity will begin the certification process and each reporting senior in the Chain of Command reviewing the information will also sign this certification sheet. This sheet must remain attached to this package and be forwarded up the Chain of Command. Copies must be retained by each level in the Chain of Command for audit purposes.

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

N. S. SCOTT, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

Date 28 July 94

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

Footnote:

These are the revised pages of Data Call #12 in response to the further guidance provided by the BSAT facsimile of 18 July 1994.

Resubmission of Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

N. S. SCOTT, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

13 June 94
Date

NAVAL SURFACE WARFARE CENTER

DAHLGREN DIVISION
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (SEL) D. P. SARGENT, JR.
NAME (Please type or print)

Signature

COMMANDER
Title

6/14/94
Date

NAVAL SURFACE WARFARE CENTER
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

G. R. STERNER
NAME (Please type or print)

Signature

Title Commander
Naval Sea Systems Command

7-1-94
Date

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

J. B. GREENE, JR.
NAME (Please type or print)

Signature

ACTING
Title

06 JUL 1994
Date

BRAC-95 CERTIFICATION

Resubmission of Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

Reference: SECNAVNOTE 11000 of 08 December 1993

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ACTIVITY COMMANDER

N. S. SCOTT, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

13 June 94
Date

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

Footnote:

This is a complete new submission of Data Call #12 in response to the further guidance provided by the Memorandum MM-0193-F4, BSAT/JT of 2 June 1994. This is a complete resubmission of the data call because the majority of the contents were impacted by the further guidance.

DATA ... DAHLG...

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

J. C. OVERTON, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

22 Aug 94
Date

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (SEL) D. P. SARGENT, JR.
NAME (Please type or print)

D P Sargent
Signature

COMMANDER
Title

8/23/94
Date

NAVAL SURFACE WARFARE CENTER
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

NAME (Please type or print)

G R Sterner
Signature

G. R. STERNER
Commander
Title
Naval Sea Systems Command
Activity

8/27/94
Date

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

W. A. EARNER
NAME (Please type or print)

W A Earner
Signature

Title

9/1/94
Date

BRAC-95 CERTIFICATION

Submission of revised pages, Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

Reference: SECNAVNOTE 11000 of 08 December 1993

In accordance with policy set forth by the Secretary of the Navy, personnel of the Department of the Navy, uniformed and civilian, who provide information for use in the BRAC-95 process are required to provide a signed certification that states "I certify that the information contained herein is accurate and complete to the best of my knowledge and belief."

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I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

J. C. OVERTON, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

22 Aug 94
Date

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

Footnote:

These are the revised pages of Data Call #12 in response to the further guidance provided by the BSAT facsimile of 18 August 1994. Submission of revised pages, Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

Submission of revised pages, Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

J. C. OVERTON, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

9/14/94
Date

NAVAL SURFACE WARFARE CENTER

DAHLGREN DIVISION

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL (if applicable)

RADM (SEL) D. P. SARGENT, JR.
NAME (Please type or print)

Signature

COMMANDER
Title

9/15/94
Date

NAVAL SURFACE WARFARE CENTER
Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

NAME (Please type or print)
G. R. STERNER

Signature

Commander
Title Naval Sea Systems Command

9/19/94
Date

Activity

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

DEPUTY CHIEF OF NAVAL OPERATIONS (LOGISTICS)
DEPUTY CHIEF OF STAFF (INSTALLATIONS & LOGISTICS)

W. A. EARNER
NAME (Please type or print)

Signature

Title

9/19/94
Date

BRAC-95 CERTIFICATION

Submission of revised pages, Data Call #12, Naval Surface Warfare Center, Dahlgren Division, Dahlgren Site

Reference: SECNAVNOTE 11000 of 08 December 1993

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I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

J. C. OVERTON, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

9/14/94
Date

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

Footnote:

These are the revised pages of Data Call #12 in response to the further guidance provided by the BSAT facsimile of 12 September 1994.

Responses to Clarification Questions

1. Page 51 (31 March 1994): We believe the work to be applicable to the WEAPONS - CRUISE MISSILE CSF because the effort is to demonstrate that the functionality of the prototype ship mission planning and control system for UAV could reside within the cruise missile weapon control system. The work is being performed by NSWC Dahlgren.

2. Question 3.2.4.2 Papers published in peer review journals: We are reviewing each of the entries in the tables and removing those which do not meet the criteria. In addition, we are providing new tables with the additional requested information. The new tables are being provided as additional new revision pages.

3. Question 3.3.1.2 Engineering Development by ACAT: We have provided revision pages where changes were made.

4. Question 3.2.1 "Total Personnel": We have reviewed the "OTHER" category in question 3.2.1 and provided revision pages for those CSFs which require change. The increases in "OTHER" and "MANAGEMENT" were the result of including indirect funded personnel when they supported the CSF. The Dahlgren Division performs mainly R&D and as such has a majority of its workforce in the "TECHNICAL" area. The majority of those people at Dahlgren who would be categorized as "OTHER" are in the support functions. These functions support all the efforts at Dahlgren of which the CSFs are but a small part. Because 3.2.1 requires a response in number of personnel we could not justify including support personnel who work mainly on non-CSFs efforts.

Enclosure (1)