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Complete Revision

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"LAB" JOINT CROSS-SERVICE GROUP GUIDANCE PACKAGE

DAHLGREN SITE

DAHLGREN DIVISION

NAVAL SURFACE WARFARE CENTER

31 March 1994

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Submission for
UIC **N00178**

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"LAB" JOINT CROSS-SERVICE GROUP GUIDANCE PACKAGE

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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

- 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 only include 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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SECTION III

AIR VEHICLES

FIXED/AVIONICS

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AIR VEHICLES
Fixed/Avionics

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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.**

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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	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.**

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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	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.**

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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)
AIR VEHICLE (Fixed Wing Avionics)	0	0	
Total	0	0	

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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	

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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	0	0	0	0
In-Service Engineering	4.3	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	**0**			

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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	
AIR VEHICLE (Fixed Wing Avionics)	Production Engineering	365	1.8	AIR FORCE B2 BOMBER NAVY SPECIAL SUPPORT EQUIPMENT

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	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**

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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 VEHICLE (Fixed Wing Avionics)	**NONE**	**NONE**	**NONE**	**NONE**

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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

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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)

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

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*** 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

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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

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*** 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.**

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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

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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

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[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

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SECTION III

AIR VEHICLES

ROTARY/AVIONICS

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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)

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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)

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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.**

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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	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

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

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)

R

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

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

R

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($K)
		DOD	Federal Gov't	U. S.	
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

R

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).

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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

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

C^4I SYSTEMS

FIXED GROUND-BASED

203 R

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 C^{4}1-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 C^{4}I mission area. A signed Memorandum of Understanding (MOU) is in place between the two commands to effect this transition. R

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.

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 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

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 C^{4}1-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**

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 OBU SSA function transitions to NCCOSC/NRaD 1 October 1994 per Department of Navy laboratory mission purificaiton 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
C⁴1 (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
C⁴I (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.	
C⁴I (FIXED GROUND-BASED)					
	Cruise Missile/UAV Systems Development & Integration Facility	X	X	X	** See Below (3.4.1)

R

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 C^{4}1- 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.

3.4.1 **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 C^{4}1- Fixed Ground-Based comon 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 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 these 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.

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
C^4I (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

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 Space Systems-Satellites Common Support Function are listed:

. **Precise Satellite Orbit Determination**

. 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

. **GPS and Satellite geodesy**

. World Geodetic System (WGS)-84, largely an NSWCDD product, is the fundamental world reference system for DOD targeting and navigation

. **Interconnectivity**

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

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

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 Space Systems-Satellites Common Support Function are listed:

. **Precise Satellite Orbit Determination**

. 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

. **GPS and Satellite geodesy**

. World Geodetic System (WGS)-84, largely an NSWCDD product, is the fundamental world reference system for DOD targeting and navigation

The activities associated with this CSF are linked to a variety of other activities, including the Defense Mapping Agency, Naval Space Command, SPAWAR, the Naval Research Laboratory, 30th Space Wing USAF, Strategic Systems Programs, and other activities within NSWCDD.

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)

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	

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	
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

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. R

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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

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

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.

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 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

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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

SLBM Guidance System Software Independent Verification and Validation

The strategic activities associated with this CSF are linked to a variety of other activities, including Strategic Systems Programs, U.S. Strategic Command, the Defense Mapping Agency, the Defense Nuclear Agency, many Navy activities related to the testing and environmental support of the SLBMs, the Command Task Forces, the Ministry of Defense (U.K.), the Applied Physics Laboratory, all SLBM industrial contractors, and other activities within NSWCDD. 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 and the Army as well as universities and contractors.

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

CSF	Number Published	Paper Titles (List)
Weapons (ICBM'S/SLBM'S)		"Pure Cartesian Formulation for Tracking Filters
		"Dynamic Climatology with Neural Networks Meteorological Forecast Extension"
		"Tactical Ballistic Missiles Trajectory State & Error Covariance Propagation"
		"Investigating the GPS Aided Precision Missile Concept Via Explorer and TBPEX Satellite Data"
		"Draft Standard For Information Technology Portable Operating System Interface (POSIX) Part I"
		Performance of Recent Gravity Field Models in Precision Orbit Determination Using Doppler Observations
		Summary of the Sixth International Geodetic Symposium on Satellite Positioning
TOTAL	7	

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			Replacement Cost ($M)
		DOD	Federal Gov't	U. S.	
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.

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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

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement* Cost ($M)
		DOD	Federal Gov't	U. S.	
WEAPONS (ICBM'S/SLBM'S)	SLBM Weapons Control Facility	X	X	X	90
	SLBM Strategic Systems Operational Support Facility	X	X	X	60
	S&E Computing Facility				13.5

* Replacement cost for equipment cost only.

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.

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

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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)

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.

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.

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.

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

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. 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.

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 these units. NSWCDD provides unique operational support, including data and software, to afloat combatants and to the Cruise Missile Support Activities at the CINCs.

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

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	167	0	0	0
Management (Supv)	7	0	0	0
Other	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	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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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**
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NONE

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CSF	**Number Published**	**Paper Titles (List)**
WEAPONS (CRUISE MISSILES)		**"Performance Comparison for two Digital Scene Matching Processes: Algorithmic and Artifical Neutal Network Based"**
		"Terrain Correlation Suitability"

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)

CSF	Number Published	Paper Titles (List)
		"The Tactical Movement Analyzer"
		"Concept for a Force Level Combat System"
		"Ship Combat System Integration of Unmanned Aerial Vehicles"
		"Time-Optimal Maneuver Guidance Design with Sensor Line of Sight Constraint"
		"Software Process Improvement in a Multi Organizational Environment"
		"Tactical Triad, A New Weapon and a Ship Loadout Concept"
		"Notch Filter Simulator for a Dynamic Plant Model"
TOTAL	9	

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.

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($M)
		DOD	Federal Gov't	U. S.	
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**

Common Support Function	Major Facility or Equipment Description	Unique To			Replacement Cost ($M)*
		DOD	Federal Gov't	U. S.	
WEAPONS (Cruise Missile)	Sea Launched Cruise Missile/Shipboard UAV System Development & Integration Facility	X	X	X	50

* Equipment Replacement Costs Only

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.

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
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

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.

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

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 the Navy consolidation decisions of 1991, the Dahlgren Division was assigned responsibility for all Navy missile warheads and surface launched missile system engineering.

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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. 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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Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	193	1	0	0
Management (Supv)	11	0	0	0
Other	1	0	0	0
	205	1	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	1
Associates	5	0	0
Bachelor	89	2	0
Masters	19	5	0
Doctorate (include Med/Vet/etc.)	13	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	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

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	19	21	95
Management (Supv)	0	0	1	2	8
Total	8	51	19	23	103

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
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	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	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	Number Published	Paper Titles (List)
Weapons (Conventional Missiles/Rockets)		"Tactical Ballistic Missiles Trajectory State & Error Covariance Propagation"
		Application of Neural Nets to Weapons Control
		Reverse-Ballistic Taylor Cylinder Impact Experiments on Titanium

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	Number Published	Paper Titles (List)
		Dynamic Deformation of Titanium via Reverse-Ballistic Impact
		A New Approximate Method for Calculating Real Gas Effects on Missile Configurations
		A New Semiempirical Method For Computing Nonlinear Angle-of-Attack Aerodynamics on Wing Body Tail Configurations
		Base Drag Prediction on Missile Configurations
		A Planar Nonlinear Missile Aeroprediction Code For All MACH Numbers
		Incorporation of Boundary Layer Heating Predictive Methodology Into the NAVSWC Aeroprediction Code
		Engineering Codes: State-Of-The-Art and New Methods
		Development of STANDARD Missile Composite Structures Warhead
		Deformable Warhead Development: An Aimable Warhead
		Reverse Ballistic Taylor Cylinder Impact Experiments on Titanium
		Mitigation of Sympathetic Detonation in 5"/54 Ammunition
		Examination of Common Assumptions Used in Fragment Impact Analysis

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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	Number Published	Paper Titles (List)
		Three Dimensional Fragmentation Effects
		IM Demonstration of a General Purpose/Blast Fragmentation Warhead
		Design of a Composite Fragmentation Warhead for Anti-Air Missiles
		An Evaluation of a Dual Explosive Warheads for Sympathetic Detonation Mitigation
		Ordnance Technology Research - A US Navy Insensitive Munitions Initiative
		Cook-off Mitigation Concepts for Ordnance System Applications
		Dislocation Mechanics Based Constitutive Relations For Plastic Flow and Strength of HY Steels
		Gas/Gun Reverse-Ballistic Impact Deformation and Fracture of Armco Iron of Differing Grain Sizes
		Reverse-Ballistic Impact Study of Shear Plug Formation and Displacement in Ti6A14V
		Dislocation Mechanics and Shock Deformation
		Shear Banding in Ti6A14V Alloy via Reverse-Ballistic Impacts

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	Number Published	Paper Titles (List)
		Impact Deformation and Fracture of Commercially Pure Tungsten Cylinders
		Dynamic Deformation of W7Ni3Fe Alloy Via Reverse-Ballistic Impact
		A New Semiempirical Method for Computing Nonlinear Angle-of-Attack Aerodynamics on Wing-Body-Tail Configurations
		Energy Management for Multiple Pulse Rockets
		Preliminary Missile Autopilot Design Using Mu-Synthesis
		Computational Method for Determining Missile Engagement Envelopes
		An Improved Gain-Stabilized Mu-Controller for a Flexible Missile
		Preliminary Pulse Motor Optimization for a Surface-to-Air Missile
		Robust Flight Control for Surface-Launched Tactical Missiles
		A Kalman Filter Implementation for a Dual-Antenna GPS Receiver and an Inertial Navigation System
		Short Range Anti-Air Warfare Analysis
		Terminal Homing Performance of Semi-Active Missiles, Against Multi-Target Raids

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

CSF	Number Published	Paper Titles (List)
		Trajectory Optimization for a Surface-to-Air Missile Using a Multi-Tier Approach
		"Plume Flowfield Measurements and Simulation of a Four Nozzle Rocket Motor"
		"U.S. Navy Pointing and Firing Cutout Program"
		"Evaluation of Fiber-Reinforced Composite Ablators Exposed to a Solid Rocket Motor Exhaust"
		"Navier Stokes Simulation of Plume/Vertical Launching system Interaction, Flowfields"
		"Air Blast Test of US Navy Collective Protection System"
		"New Techniques in Weapon Firing Cutout Zone Design"
		"Concepts for a Surface Ship Protection Warfare Systems"
		"Ship Protection Technology Development"
TOTAL	47	

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).

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	121.7	1.0	0	0
In-Service Engineering	53.7	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 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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Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
Other	7 Programs	61.4	12,759.7	SMAW HEAA Space Shuttle Standard Missile Vertical Launch System Misc Missile Mechanical Fabrication - FPS SRAW

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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Common Support Function	Major Facility or Equipment Description	Unique To			Replacement* Cost ($M)
		DOD	Federal Gov't	U. S.	
WEAPONS (Conventional Missile/Rockets)	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
	Warhead Development Facility				3.2
	Potomac River Test Range	X	X	X	250
	Explosive Environmental Area				25

	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

	Electromagnetic Vulnerability Assessment Facility	**X**	**X**	**X**	**20**
	Warheads Research Test Facility				**5**

*** Replacement cost for equipment cost only.**

Shipboard Weapons Systems Safety Analysis & Evaluation Facility:

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:

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.

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

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%).

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Computer Aided Engineering & Performance Assessment Facility:

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.

Prototype Fabrication Facility:

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

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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

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:

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

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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 in conjunction with the Search and Track Sensor Test Site) supports Space and Combat Systems R

warhead development (e.g. current activity is concentrated on the Patriot missile).

Potomac River Test Range:

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:

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

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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.

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<u>Explosive Experimental Area</u>:

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

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<u>Explosive Experimental Area</u>:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (85%), and Guns and Ammunition (15%). R

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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.

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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 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. 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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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.

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Types of personnel	Number of Personnel			
	Government		On-Site FFRDC	On-Site SETA
	Civilian	Military		
Technical	263	30	0	0
Management (Supv)	17	1	0	0
Other	1	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	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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3.2.2 **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	143	11	0
Associates	5	0	0
Bachelor	104	4	1
Masters	36	2	0
Doctorate (include Med/Vet/etc.)	5	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	9	97	35	33	120
Management (Supv)	0	2	2	2	12
Total	9	99	37	35	132

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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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)		**Reverse Engineering Methods For Navy Tactical Computer Systems**
		Application of Neural Networks To Kill Assessment
		Modeling Technology of Dynamic Systems
		Real-Time RF Spectrum Analyzer
		The Response of the Transfer Function on an Alpha-Beta Filter to Various Measurement Models
		Application of Neural Nets to Weapons Control
		Navy Program Advances Casting Technology
		Advancements in Computer Thermal Analysis for Cast Projectiles
		Engineering Codes: State-Of-The-Art and New Methods
		Mitigation of Sympathetic Detonation in 5"/54 Ammunition
		Ordnance Technology Research - A US Navy Insensitive Munitions Initiative
		Cook-off Mitigation Concepts for Ordnance System Applications
		Dislocation Mechanics Based Constitutive Relations For Plastic Flow and Strength of HY Steels

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	

CSF	Number Published	Paper Titles (List)
		Gas/Gun Reverse-Ballistic Impact Deformation and Fracture of Armco Iron of Differing Grain Sizes
		Impact Deformation and Fracture of Commercially Pure Tungsten Cylinders
		Dynamic Deformation of W7Ni3Fe Alloy Via Reverse-Ballistic Impact
		Short Range Anti-Air Warfare Analysis
		"U.S. Navy Pointing and Firing Cutout Program"
		"Air Blast Test of US Navy Collective Protection System"
		"New Techniques in Weapon Firing Cutout Zone Design"
		"Concepts for a Surface Ship Protection Warfare Systems"
		"Ship Protection Technology Development"
		"Performance Comparison for two Digital Scene Matching Processes: Algorithmic and Artifical Neutal Network Based"
		"Concept for a Force Level Combat System"
		"Ship Combat System Integration of Unmanned Aerial Vehicles"
		"Tactical Triad, A New Weapon and a Ship Loadout Concept"
TOTAL	26	

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).

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	244.9	31.0	0	0
In-Service Engineering	15.7	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	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

R

Engineering Development	Name or Number	Workyears (FY93 Actual)	FY93 Funds Received (Obligation Authority) ($K)	Narrative
Other	32Programs	275.9	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 Decoys Cast Projectiles IMAD General Mission Support Misc Fuzes Misc Ordnance SSVP G13 Intelligence G1B WSESRB Interactive Graphics -FPS

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

	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.**

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

	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.**

Shipboard Weapons Systems Safety Analysis & Evaluation Facility:

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:

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

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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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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.

Prototype Fabrication Facility:

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

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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 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

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.

Warhead Development Facility:

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.

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.

S. Army for warhead development (e.g. current activity is concentrated on the Patriot missile).

Smart Munitions Development Laboratory:

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).

Shipboard Search & Track Sensor Test Site:

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.

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Potomac River Test Range:

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.

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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

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%), and Guns and Ammunition (15%). 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.

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.

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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) in a simulated "real world" near-field environment. Conduct missile electromagnetic vulnerability (EMV) to the extended launch-to-target operational (friendly and hostile) EME.

Electromagnetic Pulse Test Facility:

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

Electromagnetic Vulnerability Assessment Facility (EMVAF):

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (35%), and Guns and Ammunition (35%). 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%), and Guns and Ammunition (10%). 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 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)

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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	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	Number Published	Paper Titles (List)
Weapons (Guided Projectiles)		"Pure Cartesian Formulation for Tracking Filters
		"Dynamic Climatology with Neural Networks Meteorological Forecast Extension"
		"Investigating the GPS Aided Precision Missile Concept Via Explorer and TBPEX Satellite Data"

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	Number Published	Paper Titles (List)
		Summary of the Sixth International Geodetic Symposium on Satellite Positioning
		Neural Networks, Path Planning and Guidance
		Connectionist Expert System
		Analysis of Asynchronous Data Fusion for Target Tracking with Multi-tasking Radar and Optical Sensor
		Application of Neural Nets to Weapons Control
		Incorporation of Boundary Layer Heating Predictive Methodology Into the NAVSWC Aeroprediction Code
		A New Semiempirical Method for Computing Nonlinear Angle-of-Attack Aerodynamics on Wing-Body-Tail Configurations
		A Kalman Filter Implementation for a Dual-Antenna GPS Receiver and an Inertial Navigation System
		Short Range Anti-Air Warfare Analysis
		"Evaluation of Fiber-Reinforced Composite Ablators Exposed to a Solid Rocket Motor Exhaust"
		"Ship Protection Technology Development"

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.

CSF	Number Published	Paper Titles (List)
		"Performance Comparison for two Digital Scene Matching Processes: Algorithmic and Artifical Neutal Network Based"
		"Ship Combat System Integration of Unmanned Aerial Vehicles"
		"Time-Optimal Maneuver Guidance Design with Sensor Line of Sight Constraint"
TOTAL	17	

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			Replacement* Cost ($M)
		DOD	Federal Gov't	U. S.	
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
	Explosive Environmental Area				25
	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.

Shipboard Weapons Systems Safety Analysis & Evaluation Facility:

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:

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:

Provides the Navy with full spectrum environmental shipboard shock simulation support. The

*** 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

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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.

optical rails, IR viewer, and a variety of targets.

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Prototype Fabrication Facility:

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.

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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).

Warhead Development Facility:

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).

R

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

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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.

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Explosive Experimental Area:

This facility is predominately shared between the CSF elements: Conventional Missiles/Rockets (85%), and Guns and Ammunition (15%). 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

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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).

Shipboard Search & Track Sensor Test Site:

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:

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.

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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

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.

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Electromagnetic Pulse Test Facility:

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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:

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.

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Electromagnetic Pulse Test Facility:

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)

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

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 **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)

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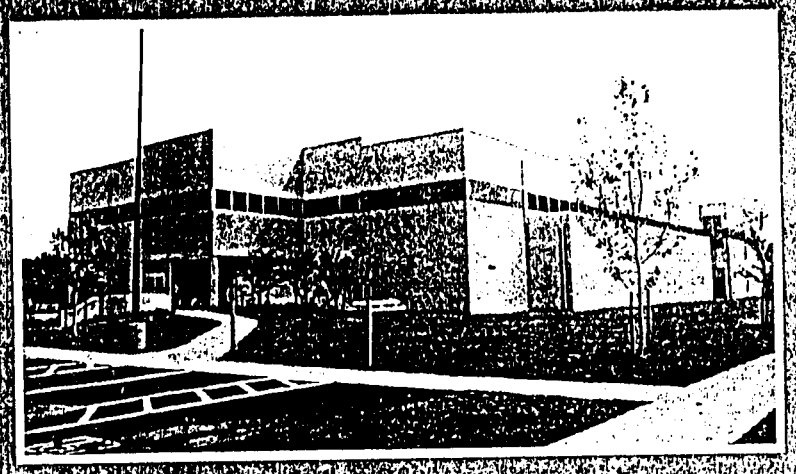
Potable Water (GPD)	2.4M	0	.523M	.868M
steam (PSI & lbm/Hr)	NOTE[5]	N/A	N/A	N/A
Long Term Parking	2500 vehicles	0	2250 vehicles	2500 vehicles

	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



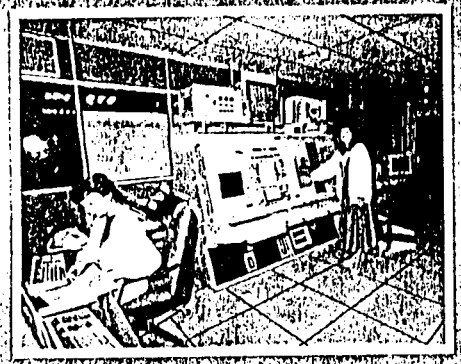
Strategic Systems Operational Support Facility
- Specifically Designed and Built to Satisfy SRS ORD
- Environment for
  - TS/ESI Operations
  - Computer Intensive Functions
- Around the Clock Operations for High DEFCON Conditions
  - Backup Power Source

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

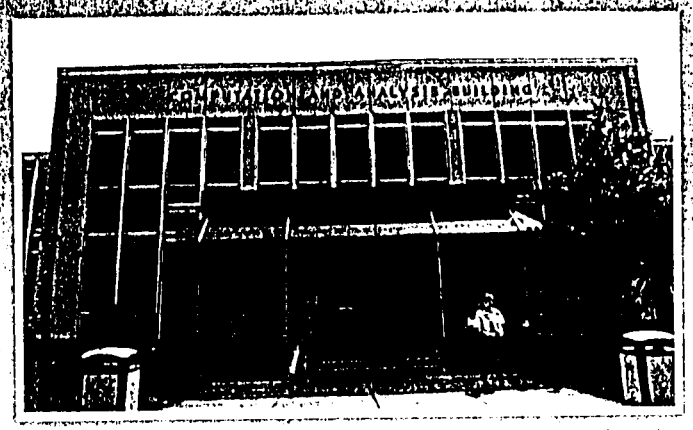
Scientific & Engineering Computer Complex
- Cray Based Computer Systems
- Strategic Targeting Processing
  - Target Analysis
  - Testing
  - Operational Documentation Development
- Development of Models for USSTRATCOM
- TS ESI OPS
- Backup for WS Software Development

WEAPONS CONTROL SYSTEMS (WCS) SIGNIFICANT TECHNICAL FACILITIES

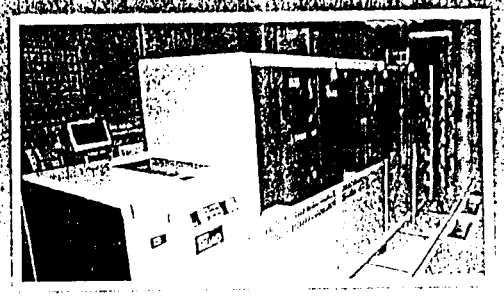


WCS's for UK, C4 Trident I and D5 Trident II

- 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

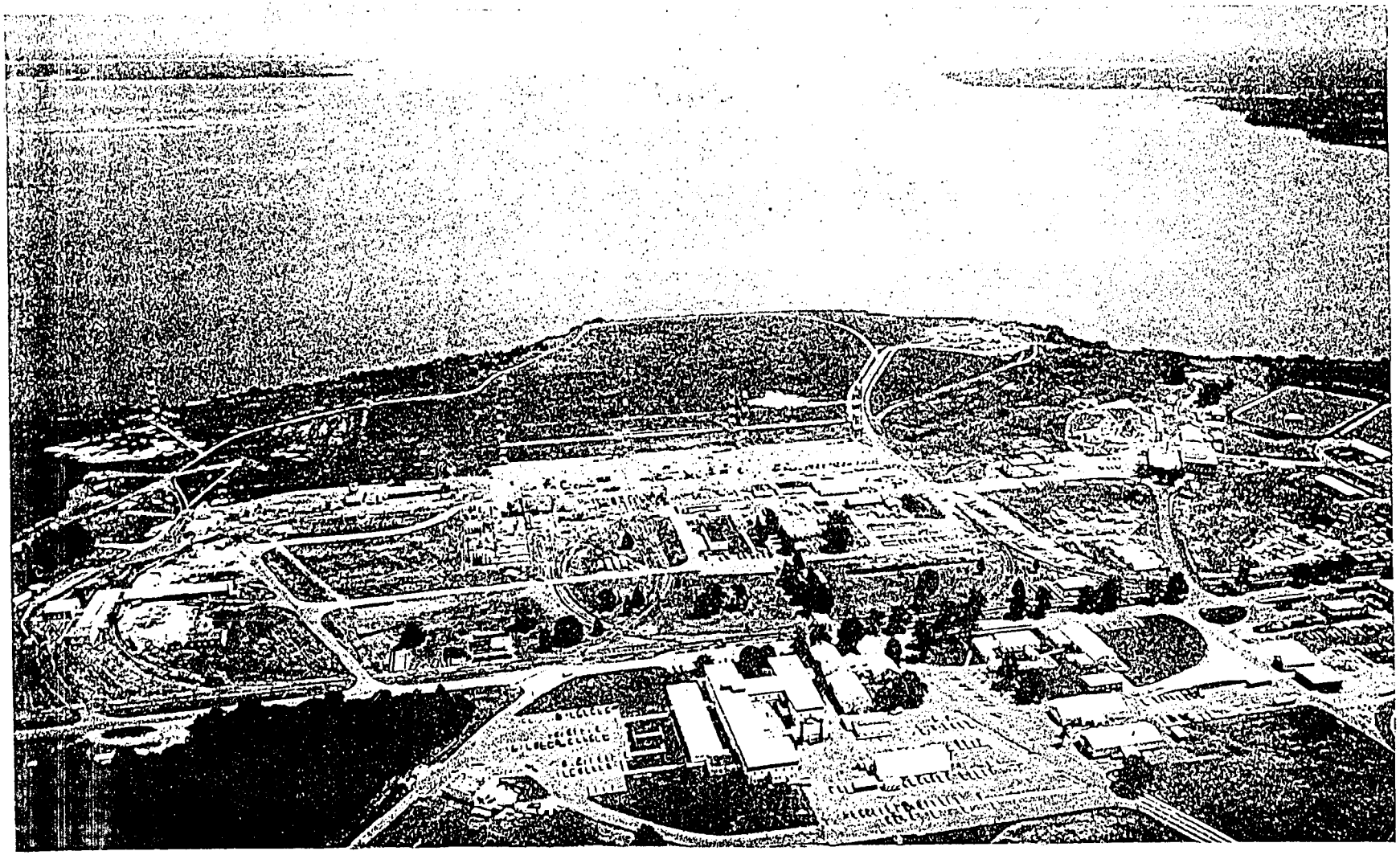
WCS Communication Facility

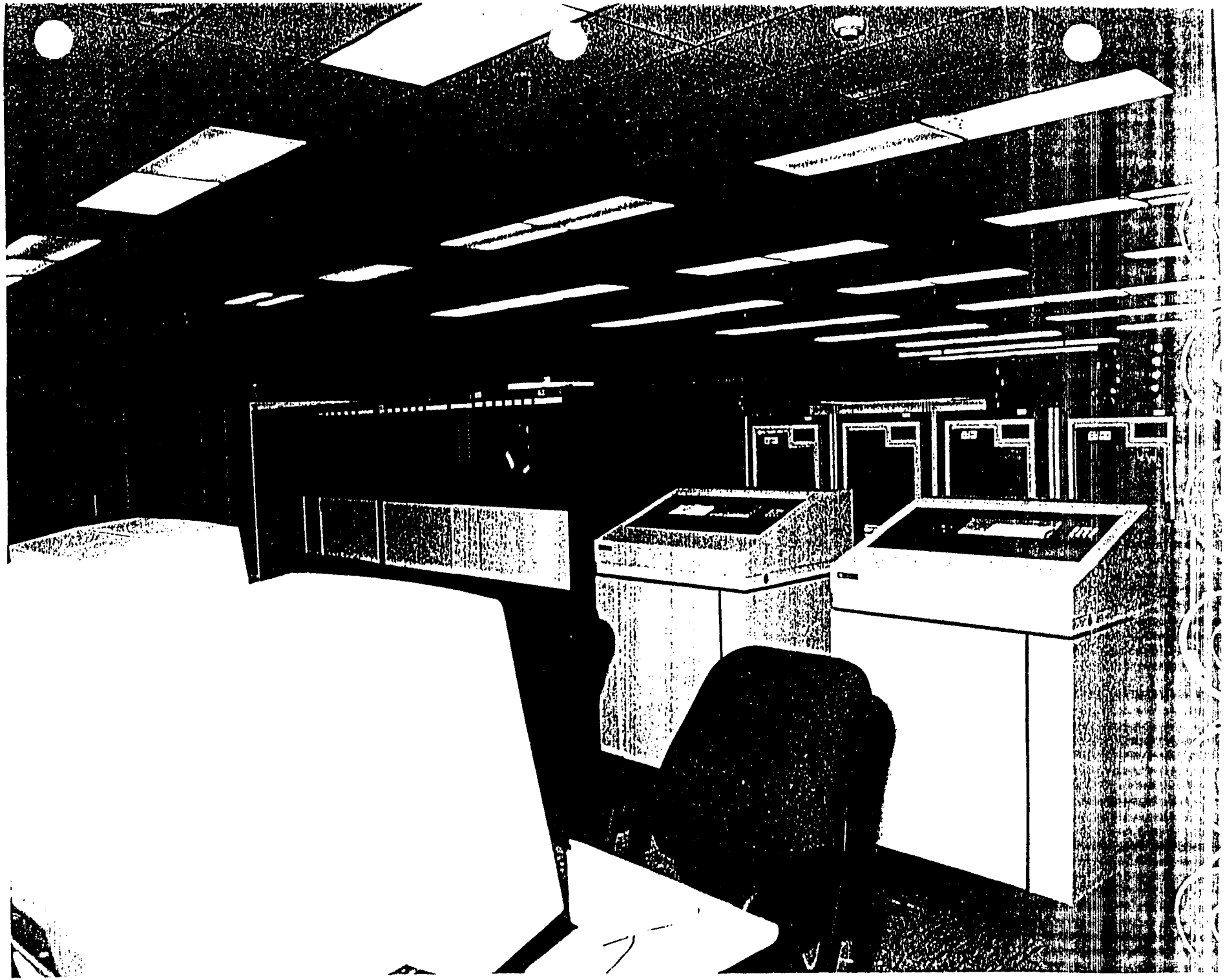
- Management of Specialized Electronic Media for WCS
- Control of Information to/from SSBN and Developers
- Archive Agent for SSBN

Central S&E Computer Complex

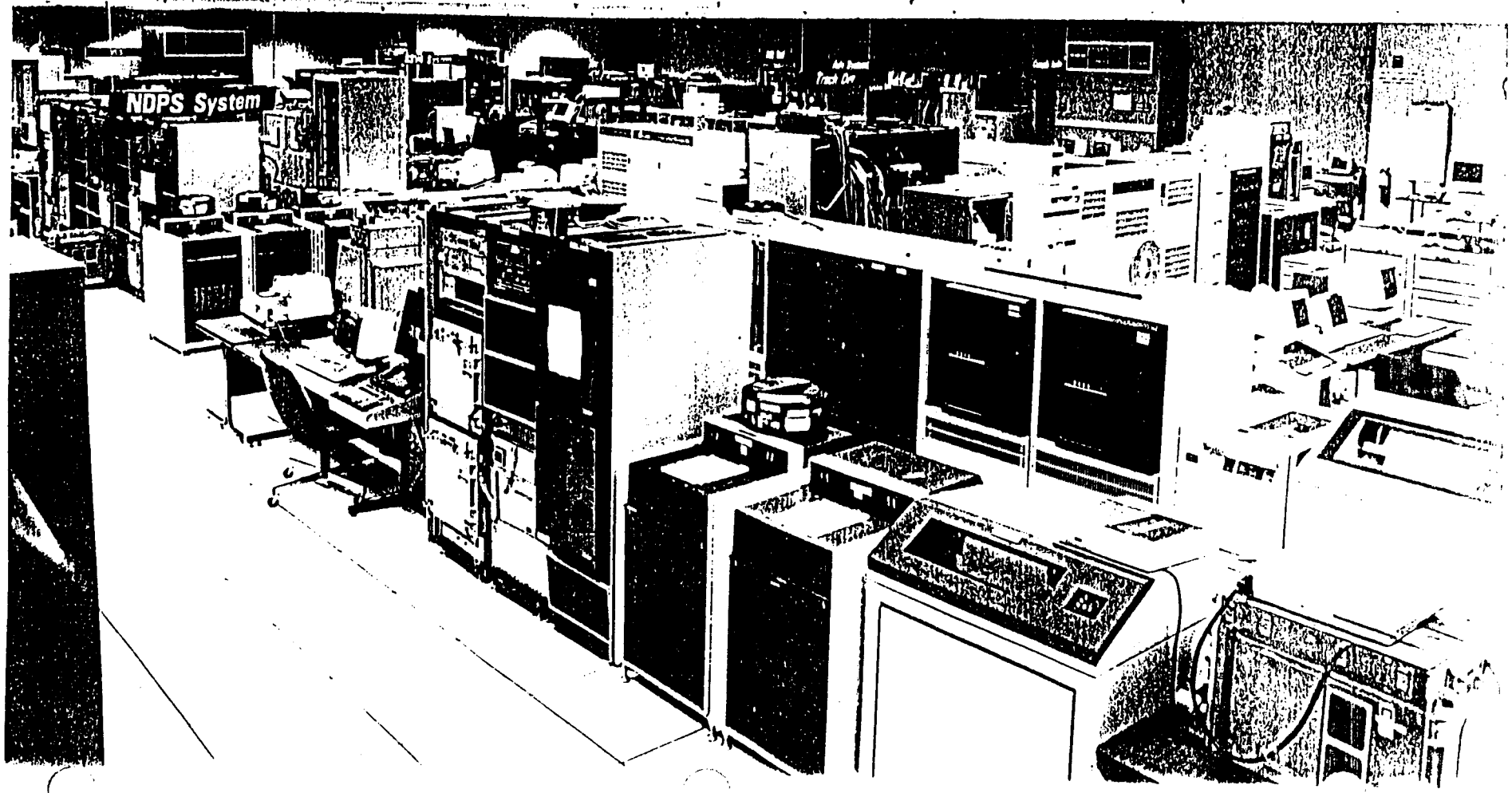
- Cray Based System
- Network, Secret High Ops
- Technology Studies
- Simulation and Modeling
- Algorithm Development
- WCS & USSTRATCOM Support
- Backup for Targeting Support

THE POTOMAC RIVER TEST RANGE (PRTR)



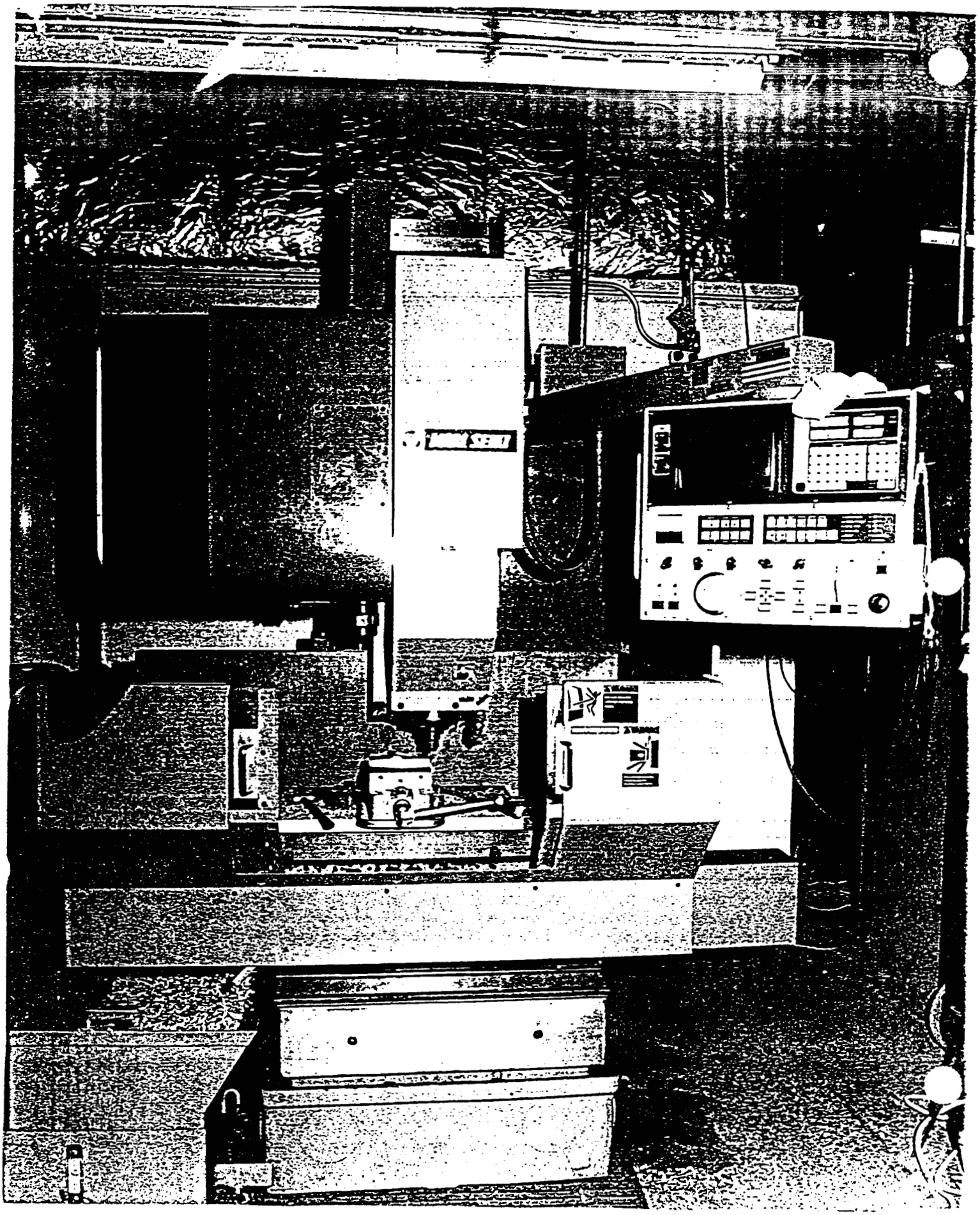


SCIENTIFIC & ENGINEERING COMPUTER COMPLEX

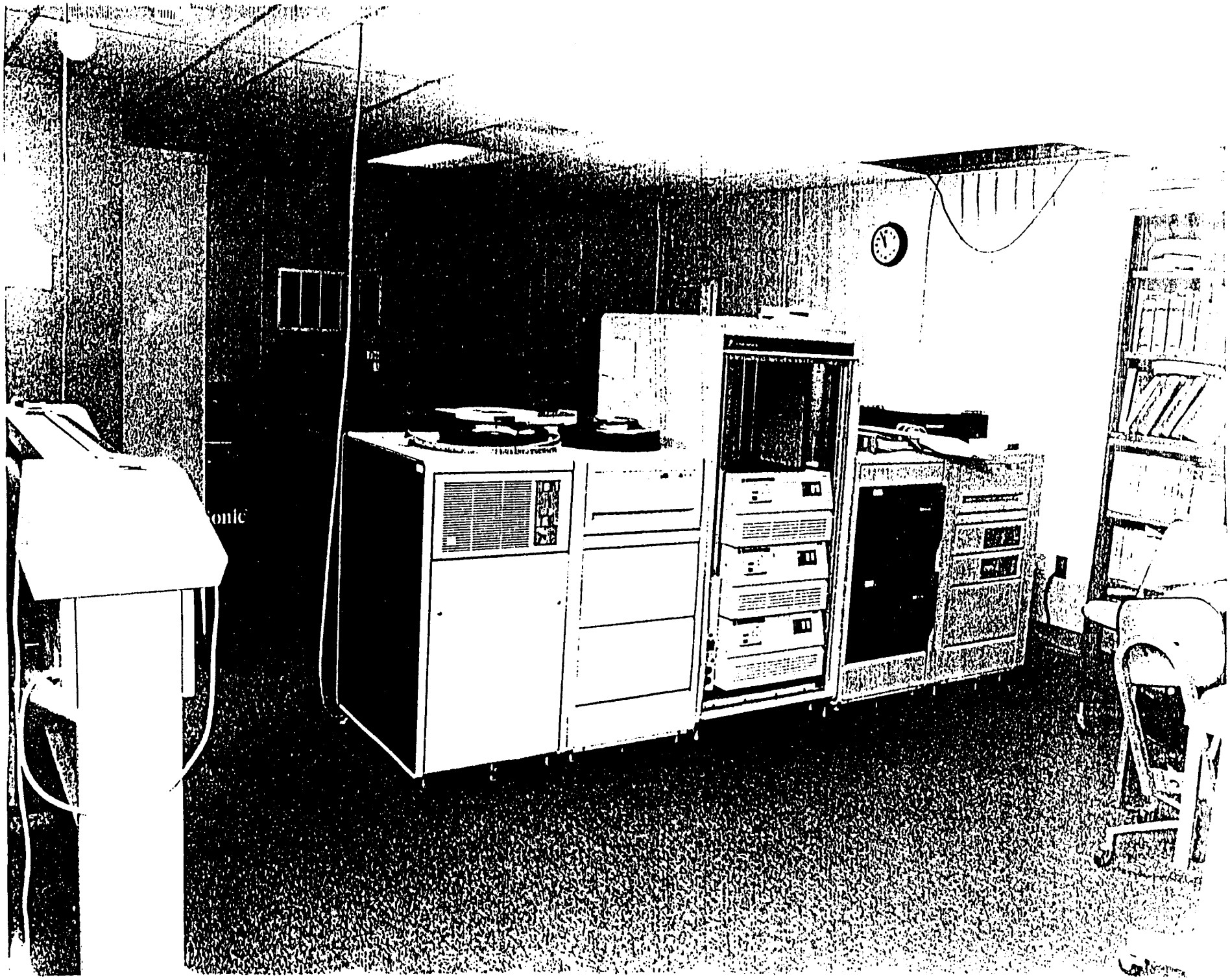


CRUISE MISSILE/UAV SYSTEM DEVELOPMENT & INTEGRATION FACILITY

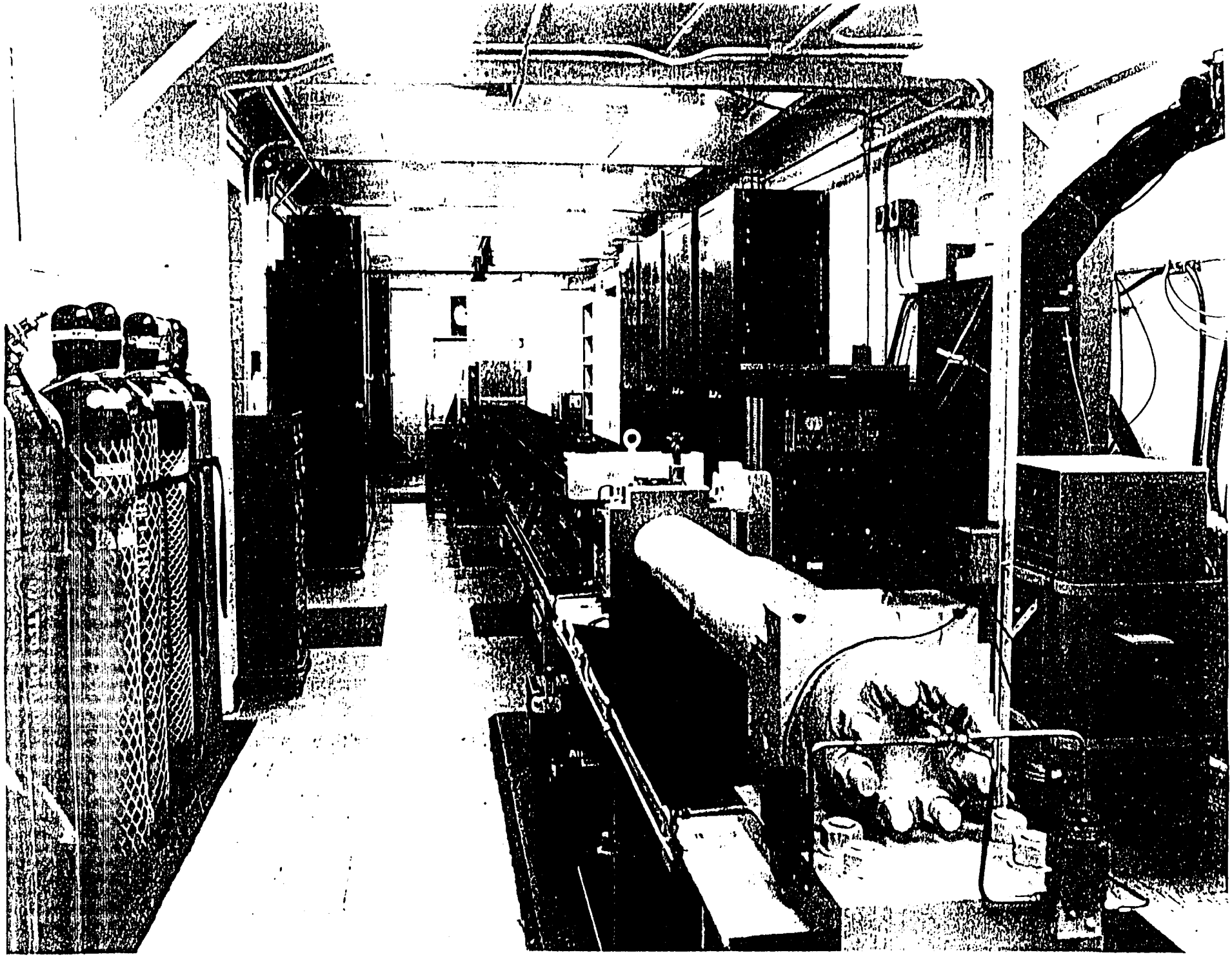
COMPUTER AIDED ENGINEERING & PERFORMANCE ASSESSMENT FACILITY



PROTOTYPE FABRICATION FACILITY

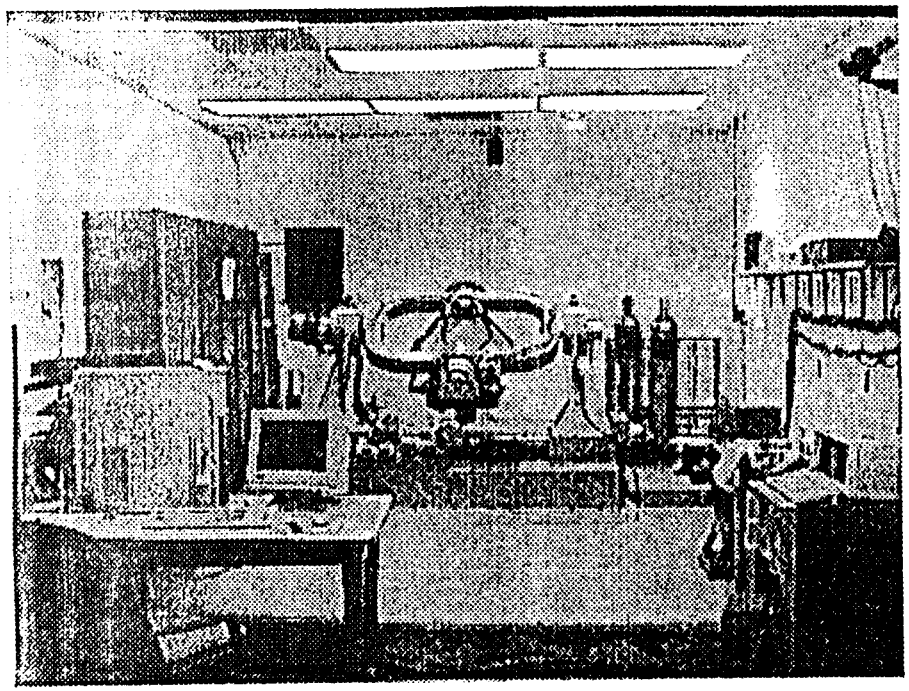


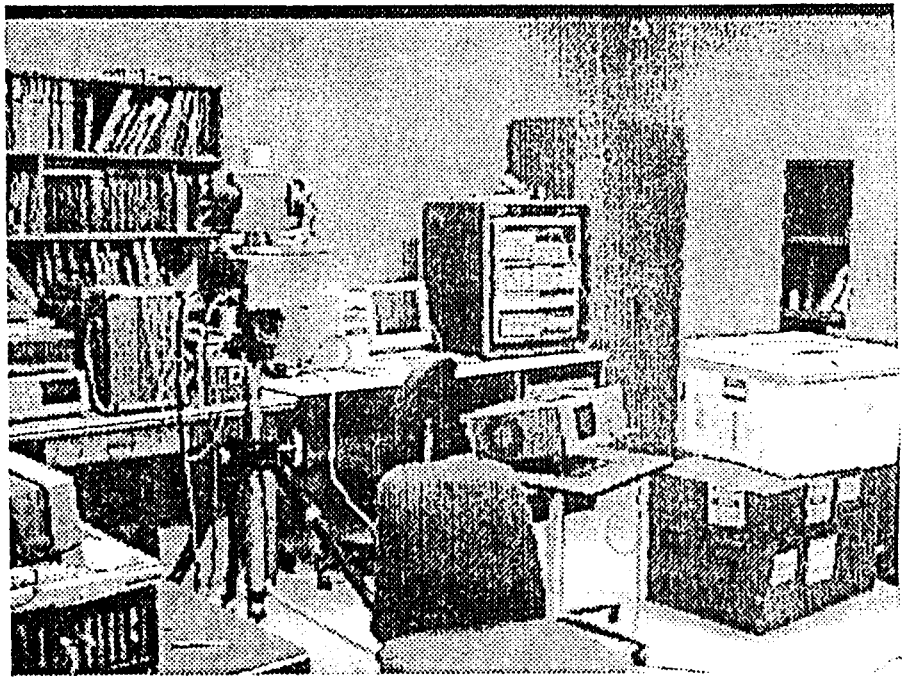
WEAPONS SYSTEMS SAFETY ANALYSIS AND EVALUATION FACILITY

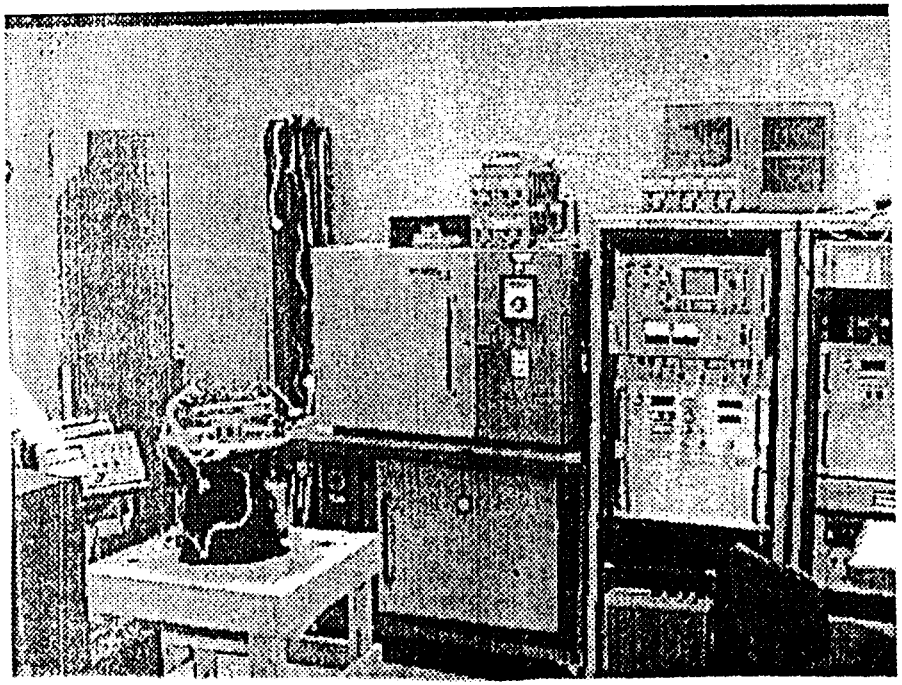


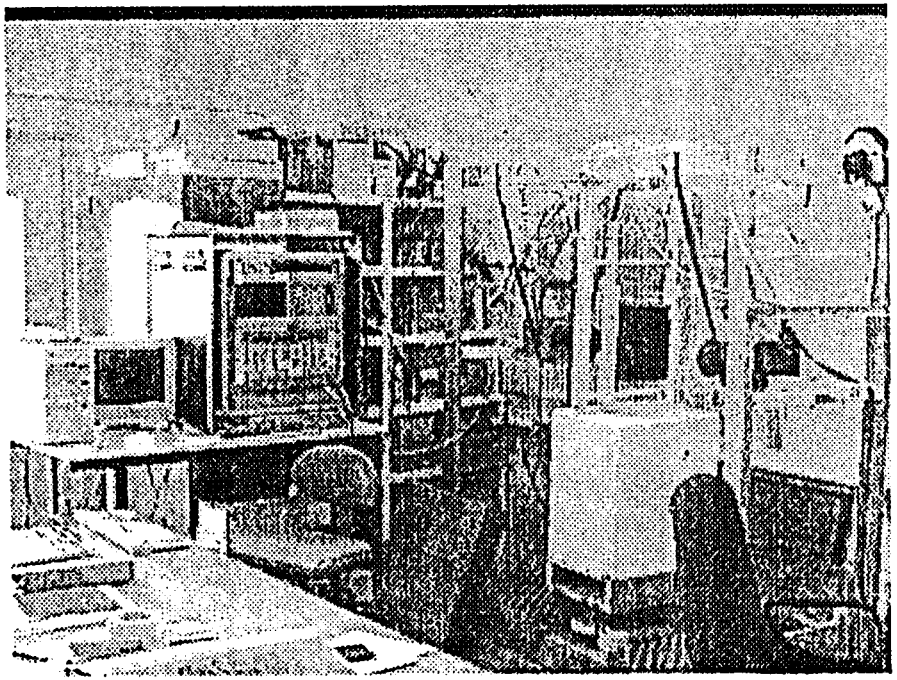
WARHEAD DEVEL NT FACILITY

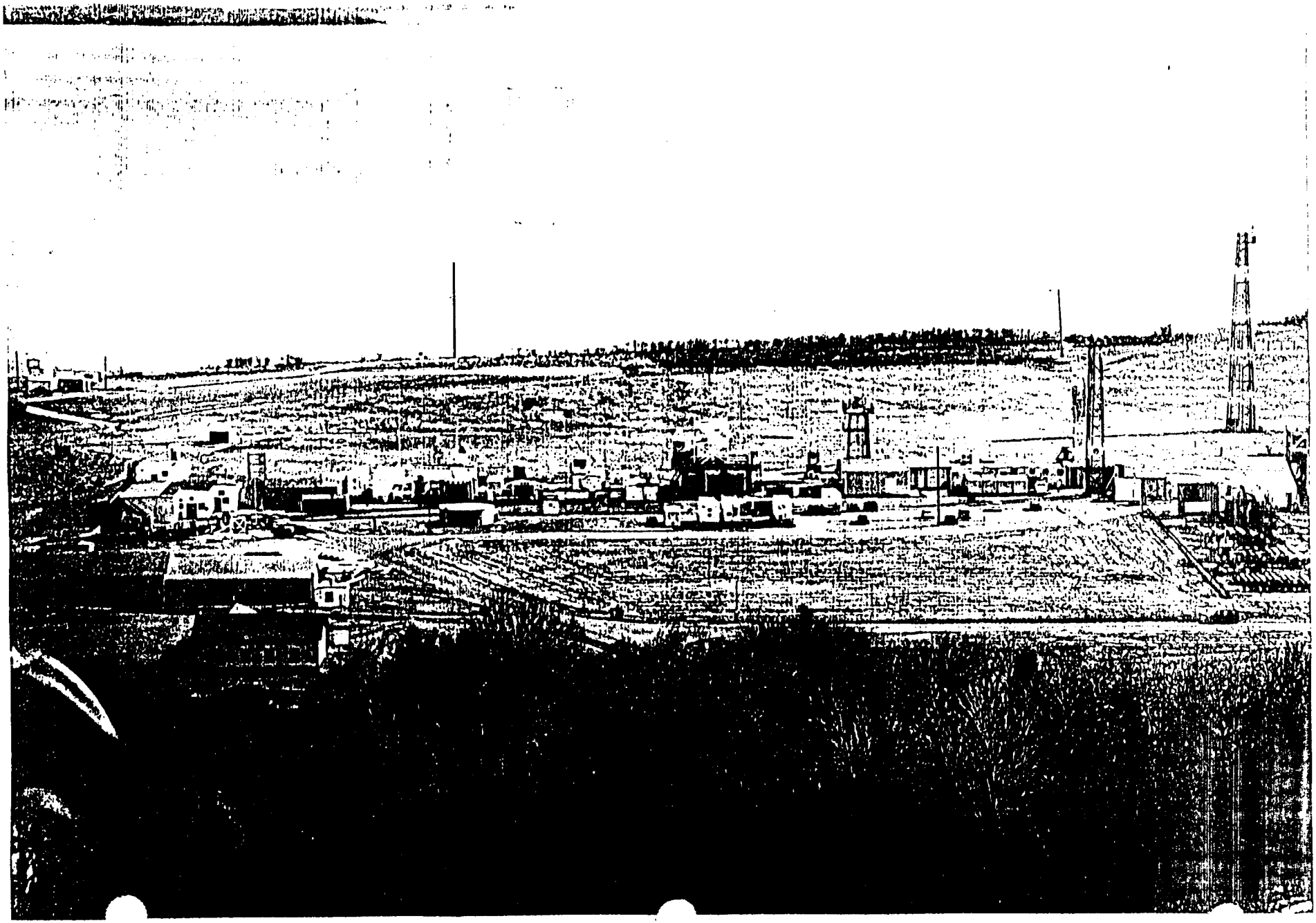
Smart Munitions Development Laboratory





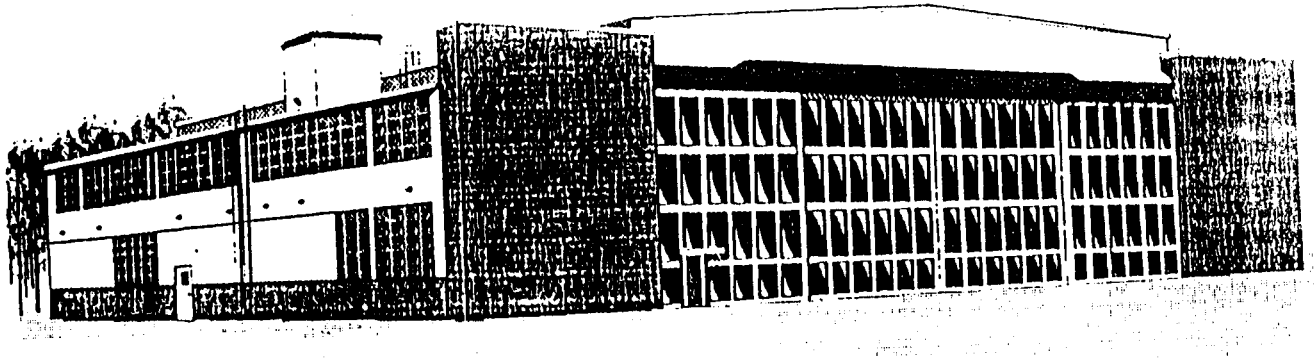


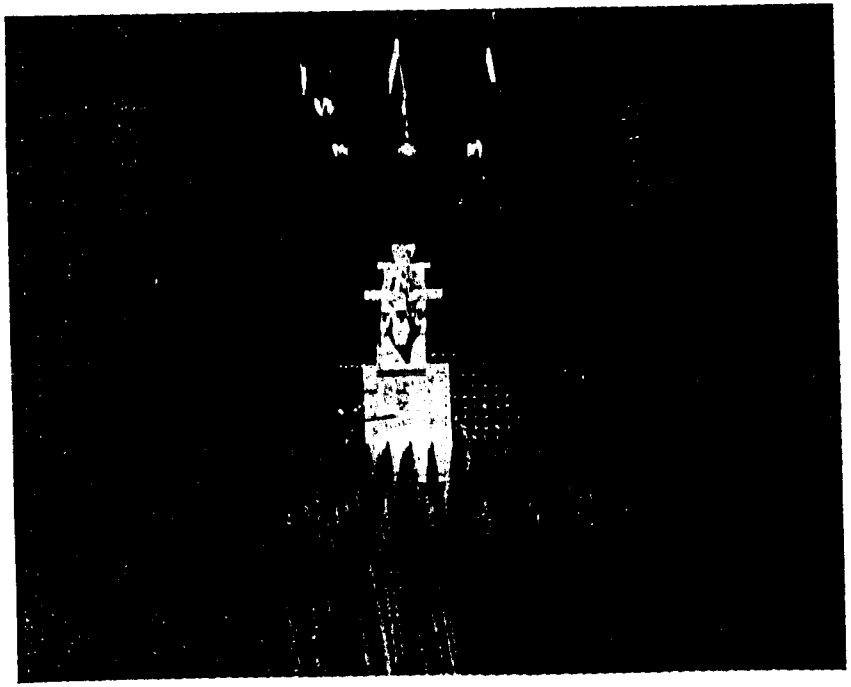


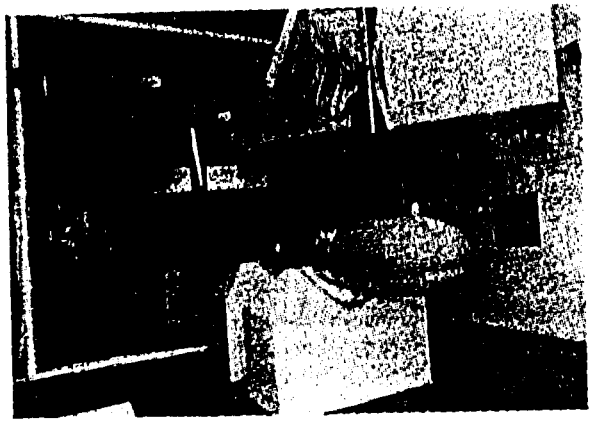


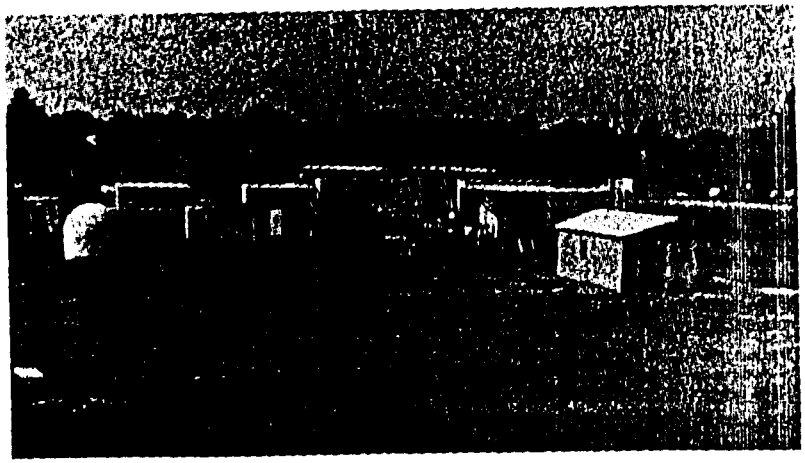
SEARCH & TRACK SENSOR TEST SITE

ELECTROMAGNETIC VULNERABILITY ASSESSMENT FACILITY (EMVAF)





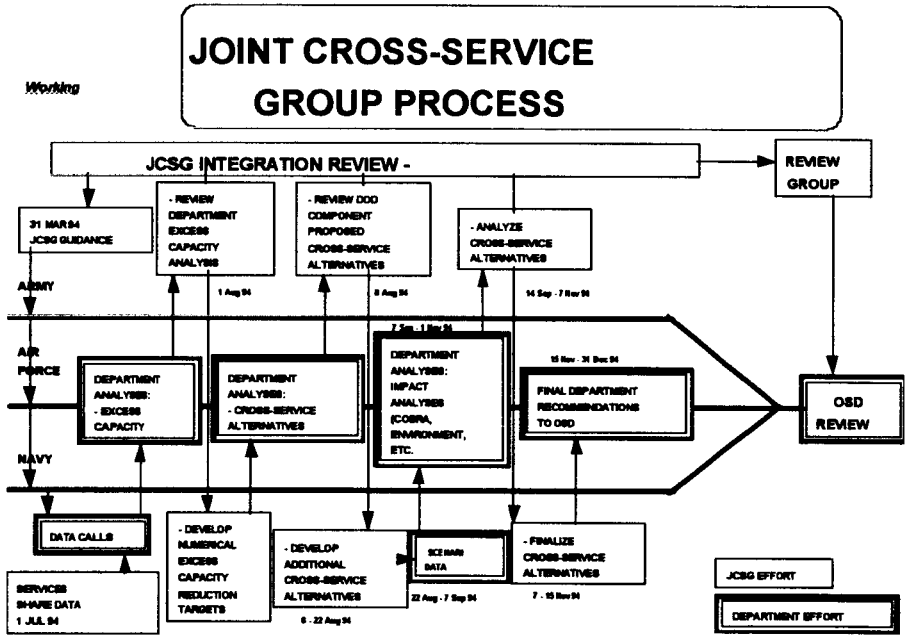




SECTION IV: APPENDICES

A. Macro Process/Schedule
B. List of Activities
C. Common Support Functions

APPENDIX A



Submission for
UIC **N00178**

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

Submission for
UIC **N00178**

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.

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.

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. STEINER
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

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

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.

REVISIONS 27 JULY 94

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.

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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

N. S. SCOTT, CAPT, USN
NAME (Please type or print)

Signature

COMMANDER
Title

28 July 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 July 1994.

Revised Pages 7, 7A, 14, 18, 18A, 26, 26A, 30, 30A, 39, 40
45, 45A, 55, 60, 60A, 77, 78, 79, 80, 81, 82, 82A
103, 104, 105, 106, 107, 107A, 125, 126, 127, 128, 129

REVISIONS 27 JULY 94

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)

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)

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)

Signature

Title

8/8/94
Date

CONTAINED W/ 21 AUG 94 REVISIONS

EXPLANATIONS TO QUESTIONS ASKED IN THE BSAT FACSIMILE OF 18 AUGUST 1994

PAGES 25 (31 MARCH 1994) and 26-R (27 JULY 1994)

A revised page 26-R has been submitted that provides the percentage of time the facility is used by the various functions that use the facility.

The reason a Section III for ADVANCED MATERIALS was not completed is two fold. First, all advanced materials work has been done at the White Oak Detachment and the White Oak Detachment did not receive Data Call #12. The reference to the advanced materials was only to identify that the White Oak effort was using the facility via a network connection to do computational analysis. The work amounted to 2.5 work years and was for the Re-entry body program of the SLBM program. The amount of computational time is a small part of the 65% of the total SLBM use of the S&E Computing Facility.

The materials effort along with other work at the White Oak Detachment is being transferred to the Carderock Division of the Naval Surface Warfare Center as of October 1994.

PAGE 30-R (27 July 1994)

Again, this reference to materials refers to the work being done at the White Oak Detachment which was not an addressee of Data Call #12. This materials work was similar to the Re-entry Body materials work and is being transferred to the Carderock Division as of October 1994.

PAGE 45-R(27 July 1994), 45A-R (27 July 1994) and 51 (31 March 1994)

All Unmanned Aerial Vehicles (UAV) work done by the Dahlgren Site is on the shipboard systems only; therefore, it does not fit the definition of the AIR VEHICLE/FIXED CSF.

PAGE 55-R (27 July 1994)

This facility is not shared. It is interconnected via classified and unclassified data links and fiber optics. This interconnection allows the Shipboard Cruise Missile/UAV System Development & Integration Facility to be connected to other combat system facilities. With today's combat systems the cruise missile (TOMAHAWK) must function as a part of the whole surface ship combat system providing information to the ship's combat system and receiving information from the combat system. When upgrades or modifications are made to any component of the combat system it is often necessary to determine the effect of the changes on other components of the combat system . It is this testing of multiple components of an integrated combat system that is referred to in this context, not the sharing of the facility. Only cruise missile /UAV actually use the facility.

CONTAINED W/ 21 AUG 94 REVISIONS

PAGE 82A-R (27 July 1994)

The Guided Projectile CSF work was included in the Gun and Ammunition (35%). It has now been broken out and is identified on a revised Page 82A-R included with the revised pages. This correction has been included in all other places where applicable and revised pages included.

The Electromagnetic Vulnerability Assessment Facility (EMVAF) was designed and developed to test ordnance for its susceptibility to hazards of electromagnetic radiation. This expertise was also applicable to testing fixed and rotary wing aircraft avionics to susceptibility of electromagnetic radiation. This function and its applicability to AIR VEHICLE/FIXED/AVIONICS and AIR VEHICLE/ROTARY/AVIONICS CSFs were overlooked. Section IIIs have been included in the revision pages to cover this oversight

PAGE 88 (31 March 1994 and 113 (31 March 1994)

The Dahlgren site does not do work in the AIR VEHICLE CSF except for the Fixed and Rotary Avionics CSFs. The indication of a relationship and interconnectivity refers to the necessary knowledge of Air Vehicle CSFs in order to systems engineer and integrate weapons into the combat systems.

PAGE 125-R (27 July 1994)

This work is all development and testing and not S&T; thus does not fit in the Pervasive Common Support Function ELECTRONIC DEVICES.

PAGE 128-R (27 July 1994)

The Guided Projectile CSF work was included in the Gun and Ammunition (15%). It has now been broken out and is identified on a revised Page 128-R included with the revised pages. This correction has been included in all other places where applicable and revised pages included.

PAGE 129-R (27 July 1994)

See PAGE 82A-R (27 July 1994) above for explanation.

PAGE 131 (31 March 1994)

This was an error in preparing and editing the original submission. The paragraphs 3.5.2 and 3.5.3 are included under the other Section III's. This omission has been corrected on a revised Page 131-R that has been included in the revised pages submitted herein.

REVISIONS 21 AUG 94

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

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

Revised Pages 1, 5A, 5B, 5C thru 5Y, 79, 26, 82, 82A
104, 107, 107A, 126, 128, 129, 131

REVISIONS 21 AUG 94

DATA CALL #12
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

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)

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)

Signature

G. R. STERNER
Title

8/27/94
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)

Signature

Title

9/1/94
Date

CONTAINED W/ 9-14-94 REVISIONS

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.

REVISIONS 9-14-94

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.

Revised Pages 23, 34, 48, 49, 50, 64, 65, 66, 67, 68, 69, 70, 71, 73
91, 92, 94, 95, 95A, 96, 98, 118, 119, 120

REVISIONS 9-14-94

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
Commander
Title Naval Sea Systems Command

Signature

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

9/19/94
Date

Title

203

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)

Dr. Ira M. Blatstein
NAME (Please type or print)

Ira M Blatstein
Signature

Technical Director
Title

10/27/94
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
Commander
Naval Sea Systems Command
Title

Signature

10-28-94
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

11/2/94
Date

DATA CALL #12, AMEND 1
LJCSG QUESTIONS
DAHLGREN

BRAC-95 CERTIFICATION

Submission of Data Call #12 Amendment #1, Clarification Question for 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

JAMES S. PERRY, CAPT, USN
NAME (Please type or print)

James S. Perry
Signature

ACTING COMMANDER
Title

26 Oct 94
Date

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

Answer to a question from the 20 October 1994 briefing to Energetics Cross Services Analysis Team

1. Can the warhead work at the Naval Surface Warfare Center, Dahlgren Division be moved?

YES. Given sufficient upfront money, the warhead work COULD be moved. The more important question is "SHOULD the warhead work be moved?" or do the benefits exceed the drawbacks. Our analysis of this question encompasses several points:

- The Dahlgren Division was assigned the air and surface warhead R&D by Assistant Secretary of the Navy in 1991,
- Warhead component work could be moved but the Dahlgren Division can identify no cost savings from the move,
- Moving the work will result in significant loss in unique expertise,
- Missile warhead R&D is more closely related to the engage function of the "sense-control-engage" paradigm of combat systems than to energetics, thus should be retained at NSWCDD
- Navy with NSWCDD lead has the most extensive missile warhead expertise when compared to the other services

NO COST REDUCTIONS HAVE BEEN IDENTIFIED BY THE DAHLGREN DIVISION

Our hypothesis is that there is an expectation that locating all warhead work (as a component) in one location will result in increased technical synergism. Moving the work might also result in some infrastructure savings; however, savings would only occur if the receiving site had excess capacity to support the new work and if the losing site support infrastructure decreases. While we cannot comment on the gaining site economics, we know the warhead work is a contributing portion of the overall Strategic and Surface Warfare Systems effort at the Dahlgren site and that the support infrastructure also supports other efforts; thus, infrastructure savings from moving the warhead work from Dahlgren would be negligible.

Offsetting the synergism and questionable cost saving benefits of collocating all warhead component work are major drawbacks to moving the warhead work.

UNIQUE EXPERTISE WILL BE LOST

Warhead technology and development require scientists and engineers with hands-on experience far beyond the formal college degree. Experience on warhead R&D must be grown over many years in an operational/laboratory environment. Dahlgren has 1767 work years of warhead experience in its S&E's. Previous consolidations have proven that if work moves many of the S&E's will not move with the work. The expertise will have to be rebuilt at considerable cost and mission impairment.

LOSS OF SYNERGISM WITH THE "ENGAGE" FUNCTION OF COMBAT SYSTEMS "SENSE-CONTROL-ENGAGE"

Today's combat systems are large complex systems which must be engineered as a system to function effectively. This was one of the fundamental reasons that Dahlgren was assigned sole leadership for air and surface warhead R&D by the Assistant Secretary of the Navy in 1991. The Dahlgren Division is a leader in engineering large complex combat systems, having system engineered or developed all generations of both fire control and targeting systems for Polaris, Poseidon, and Trident (I &II), the TOMAHAWK weapon control and mission planning systems, AEGIS baselines, and is currently involved in Ship Self Defense System and TBMD. Dahlgren is providing the technical leadership of a Navy wide and Joint team defining the next generation combatant. Dahlgren initiated and now is technically responsible for the Engineering of Complex Systems technology effort for ONR. This expertise and leadership has been acquired and sustained by hands-on knowledge of all phases of the combat engagement from sensing the threat, controlling the combat system, engaging the threat, to evaluating the destruction of the threat. We call this sequence the "sense-control-engage" paradigm. Warhead work is the crucial part of the hands-on knowledge base in the "engage" portion of the paradigm. Indeed, it is the warhead that projects lethal energy to the target completing the system mission. As a critical part of the "engage" function, weapons are not developed as components, but as elements of the larger system. We consider this system synergism as more critical to be collocated than collocation with other warhead work. We feel the benefits, if any, of cost savings from moving the warhead work from Dahlgren would be small and far outweighed by the loss to the Navy in capability to effectively engineer current and future combat systems modifications and improvements. In Dahlgren's opinion, the upfront costs associated with either moving scientists, engineers, and equipment or more likely, with hiring, training, and growing replacement personnel would be excessive.

LOSS OF THE MOST EXTENSIVE CORE OF MISSILE WARHEAD EXPERTISE OF THE SERVICES

The Navy's approach to R&D emphasizes the utilization of in-house expertise as well as contracted efforts. Through this approach, Dahlgren Division maintains a world class in-house capability for missile warhead R&D. Other services, contractors and foreign nations often turn to Dahlgren for support. Specifically, the Dahlgren Division does approximately 75% of the Navy's warhead R&D and in FY 1993 received 27% of its funding for warhead R&D from other services, agencies and foreign nations. For this reason as well as the systems synergism discussed in the preceding paragraph, the Assistant Secretary of Navy decided in 1991 that the Dahlgren Division should be the Navy's lead activity for warhead R&D. It is in the best interests of the Navy and country to effectively maintain this capability. If further consolidation is deemed desirable, then the Dahlgren site is the most logical choice of location.

Document Separator

203

Submission of Data Call #12 Amendment #1, 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

18 Oct 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)

DR. IRA M. BLATSTEIN
NAME (Please type or print)

Signature

Technical Director
Title

10/20/94
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

E.S. MCGINLEY, II
NAME (Please type or print)

Signature

(ACTING) COMMANDER
Title

10/20/94
Date

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)

Signature

Title

27 OCT 1994
Date

BRAC-95 CERTIFICATION

Submission of Data Call #12 Amendment #1, 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)

J C Overton
Signature

COMMANDER
Title

18 Oct. 94
Date

NAVAL SURFACE WARFARE CENTER
DAHLGREN DIVISION
Activity

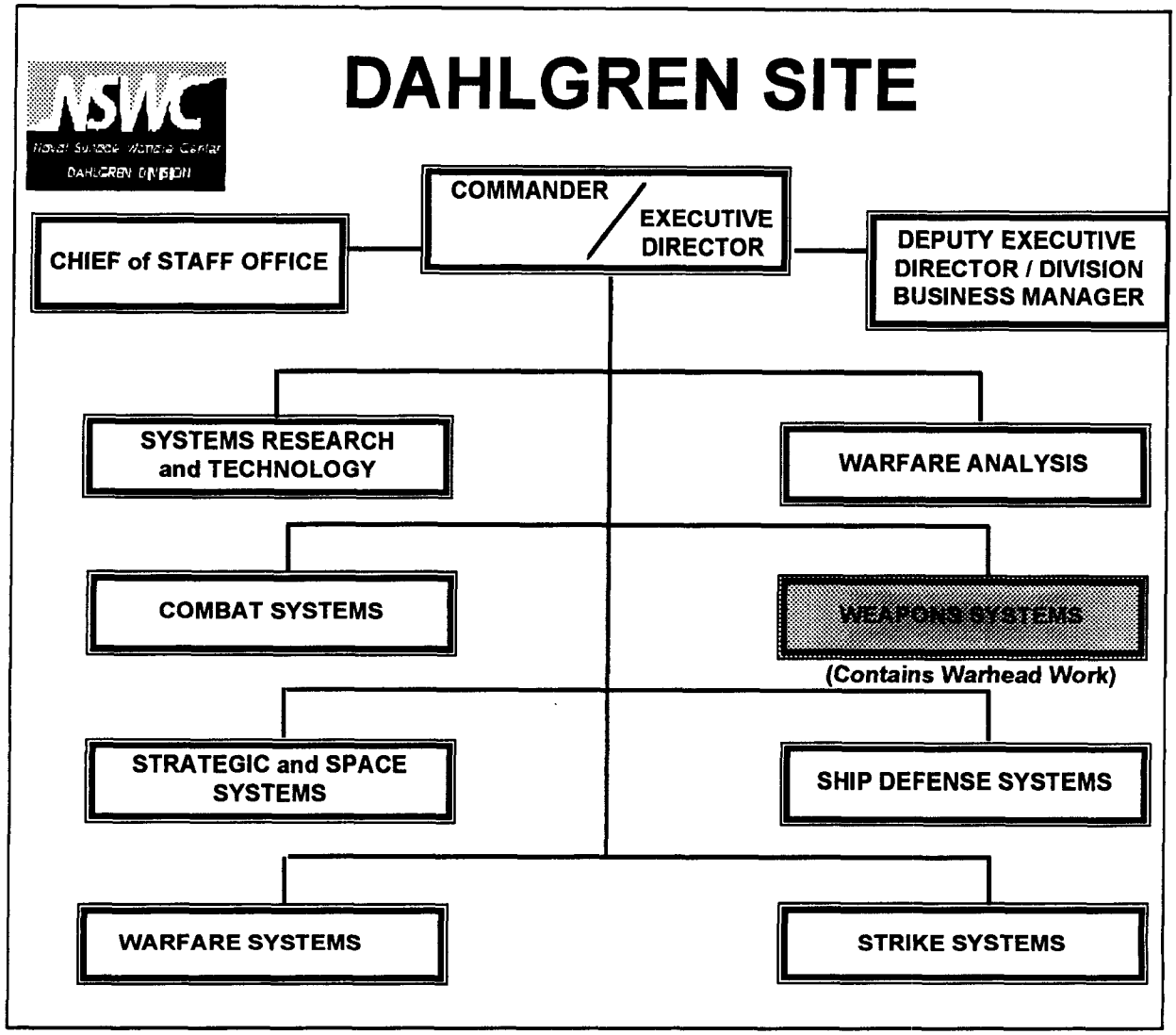
BRAC-95

DATA CALL #12
AMENDMENT #1

DAHLGREN SITE

18 OCTOBER 1994

1. (a) Organization Chart



1. (b) Describe organizational relationships.

The warhead work is a key element and integral part of the Dahlgren Division's primary mission of combat and weapon systems engineering. To effectively engineer complex combat and weapon systems, it is important to maintain expertise and first hand knowledge of all three parts of the sense-control-engage combat sequence. The warhead work constitutes Dahlgren's main "engage" work of the sense-control-engage sequence. While the Division's primary focus is in the

control portion, expertise and a strong working knowledge of the sense and engage portions are also critical. Thus, the warhead efforts provides the Division with the critical and necessary engagement expertise and working knowledge. The warhead work is an integral part and interfaces with all the other Dahlgren technical organizations except for our Strategic Systems organization.

The Dahlgren site hosts three major tenants - AEGIS Training Center , Naval Space Command, and Joint Warfare Analysis Center. The Dahlgren warhead efforts do not support or affect these tenants except for the Joint Warfare Analysis Center. The warheads group of the Weapons System Department works on various special tasks sponsored by the Joint Warfare Analysis Center.

The technical work, including the warhead efforts, are supported by a complement of support functions. These functions include personnel, supply operations, comptroller, public works, safety, and security. The support functions report to the Commander through the Division Business Manager and the Chief Staff Office. The services of the support functions are also available to the tenants located at the Dahlgren site.

2. (a) Breakout of FY 93 Work Years:

The Dahlgren Division at the Dahlgren site works a total of 2408 direct work years in FY 93. In addition, contractors under contract to Dahlgren contributed an additional 2187 work years toward technical program efforts. The direct work years (government) are broken down by technical organization are as follows:

TECHNICAL ORGANIZATION	WKYRS
Warfare Analysis & Modelling	37
Combat Systems	459
Ship Defense Systems	378
Weapon Systems[1]	483
Space & Strategic Systems	431
Strike Systems	197

Systems Research & Technology	133
Warfare Systems	208
Other[2]	82
Total	2408

[1] Weapon Systems includes the 211 work years of Dahlgren Division Energetics work.
[2] Other includes all direct work performed by support functions.

Dahlgren Division Energetics (Warheads) Work Years by Type and Category

TYPE / CATEGORY	GOVT	FFRDC ON-SITE	FFRDC OFF-SITE	CONTRACTOR ON-SITE	CONTRACTOR OFF-SITE
S&T	78	0	0	0.5	20
ENGINEERING DEVELOPMENT	92	0	0	2	7
PRODUCTION	25	0	0	0	7
IN-SERVICE ENGINEERING	16	0	0	1	0
OTHER	0	0	0	0	0
TOTAL	211	0	0	3.5	34

2. (b) Space Occupied by Energetics (Warhead) Work:

The Dahlgren site owns 1,127,600 sq. ft. of laboratory space; 509,400 sq. ft. of office space; and 857,000 sq. ft. of other space. In addition, the site leases 9,300 sq. ft. of space off-site. The space used to support the energetics (warhead) work is broken out below. All space supporting energetics work is owned by the government.

TYPE	SQUARE FEET
LABORATORY	
MISSILE WARHEADS	15,210
ANTI-ARMOR WARHEADS	7,706
TARGET VULNERABILITY	1,000
EXPLOSIVE TEST FACILITIES	34,480
LABORATORY TOTAL	40,186
GENERAL OFFICE	
MISSILE WARHEADS	2,759
ANTI-ARMOR WARHEADS	3,500
TARGET VULNERABILITY	3,237
EXPLOSIVE TEST FACILITIES	2,000
GENERAL OFFICE TOTAL	11,496
OTHER	
SUPPORT ENGINEERING (CM, QA, CAD, SAFETY)	1,775
CLASSIFIED THREAT MATERIAL STORAGE	4,500
TEST PREPARATION	1,800
EXPLOSIVE EXPERIMENTAL AREA (FULLY INSTRUMENTED, SECURE, AIR SPACE TO 8,000 FEET)	1640 Acres
POTOMAC RIVER TEST RANGE	26 MILES LONG, 5 MILES WIDE, AIR SPACE TO 60,000 FEET

2. (c) FY 93 Funds, Main Programs, and Customers:

Total FY 93 direct funding for the Dahlgren site including RCP's, but excluding tenant funding was $701M. The main programs for the site include AEGIS, Surface Launched Ballistic Missile (SLBM) Systems, Ship Self Defense, TOMAHAWK, STANDARD Missile, AN/SLQ-32, ASW Surface Ship Combat System, Marine Corps Weaponry, Cooperative Engagement, Theater Ballistic Missile Defense (TBMD), and many smaller programs. The major sponsors include: PMS-400, SSPO, PEO (TAD), PEO (CU), PEO (USW), NAVSEA, US Marine Corps, and NAVAIR.

The main programs within the warhead R&D and target vulnerability/systems effectiveness work With associated FY 93 funding include:

PROGRAM	FUNDING ($K)
WARHEADS	
INDEPENDENT RESEARCH	64
SURFACE WEAPONS TECHNOLOGY	1640
MATERIALS TECHNOLOGY	1200
INSENSITIVE MUNITIONS ADV. DEV.	5632
DIRECTIONAL ORDNANCE SYSTEM	1500
PHOENIX	25
SPARROW	10
PATRIOT	365
STANDARD MISSILE	4000
DEFENSE NUCLEAR AGENCY	75
NORWAY (FMS)	15
EVOLVED SEA SPARROW	25
AMRAAM	60
TOMAHAWK	15
OTHER TESTING	300
SPECIAL JOINT WARFARE PROGRAMS	Classified
SMAW	1600
SRAW	1200
SRAW-MP	3000
JAVELIN	175
DECOYS	3500
WARHEADS SUBTOTAL	20,901

TARGET VULNERABILITY AND SYSTEMS EFFECTIVENESS

SURFACE WEAPONS TECHNOLOGY	511
CLOSE IN WEAPON SYSTEM	483
JOINT TECHNICAL COORDINATING GROUP	761
JOINT LIVE FIRE	210
SOVIET SHIP VULNERABILITY	160
PROTEC	210
ETG	160
STANDARD MISSILE	1629
DIRECTIONAL ORDNANCE SYSTEM	100
TACTICAL BALLISTIC MISSILE DEFENSE	425
EVOLVED SEASPARROW MISSILE	216
STANDARD ENGINEERING TEST TARGET	410
OTHER	420
TARGET VULNERABILITY/SYSTEMS EFFECTIVENESS	5,275
GRAND TOTAL	26,176

Sponsors of the Dahlgren site energetics work include:

Office of Naval Research
US Marine Corps
PEO (TAD)
PEO (CU)
US Army (PATRIOT Project Office)
Joint Warfare Analysis Center
NAVAIR
NAVSEA-91WM
Defense Nuclear Agency
Norway (FMS)
US Air Force (AMRAAM/PROTEC)

3. Describe Major Functional and Product Lines in Energetics including manpower, intellectual/skill capability, and major facilities and equipment:

The Dahlgren Division maintains a world class capability in missile systems engagement (Warhead) research and development. The Division performs missile warhead system design and

development, warhead system testing and evaluation, target vulnerability evaluation and threat modeling, and surface ship missile systems effectiveness. The Division has 117 scientist and engineers (S&E's)working on warhead efforts with a combined 1767 work years of experience in warhead work. These 117 S&E's are physicists, mechanical engineers, and systems analyst. There are 6 PhD's and 15 Masters. They have unique and special expertise specific to warheads and warhead effectiveness which is not taught in any college. Supporting the 117 S&E are 85 technicians skilled in explosive testing, high speed instrumentation, terminal ballistics and ordnance handling. The technicians provide a combined 2206 work years of experience in warhead testing and explosives handling. Also supporting the direct warhead work are 10 specialty S&E's skilled in configuration management, quality assurance, computer aided design, safety and electromagnetic compatibility. These 10 S&E's had a combined experience of 200 work years in assisting and ensuring that warhead developments meet the requirements for operation systems.

The Division's warhead development facilities provide all the necessary design, prototype, and test capabilities to conduct missile warhead development. These development facilities include the warhead assembly and analysis facility, the warhead structural analysis facility, the material test facility, the gas gun facility, a storage facility for classified threat material, weapons systems assembly facilities, a computation laboratory, and a smart munition laboratory.

These development laboratories are supported by a complete suite of test facility, some of which are nationally unique. The unique facilities include the near miss shock simulator, barbettes for warhead tests within the blast radius, and a fully instrumented 26 mile over water Potomac River Test Range with air clearance to 60,000 feet. These unique facilities allow testing of warhead configurations for shock susceptibility, blast parameters and effectiveness, and when necessary over water testing of the warhead.

The development facilities and unique testing capabilities are supported by the space and instrumentation systems required for warhead development testing. There is a 1,600 acre test area with air clearance to 8,000 feet that supports development testing from small scale to 1,000 lbs of explosive. Instrumentation systems include high speed photography, flash X-ray, arena sites, shaker tables, velocity and pressure sensors, environmental conditions, shock machines, and target vulnerability test facilities.

All of the above facilities and equipment are supported by an infrastructure of 53 certified storage magazines, explosive system fabrication and assembly facilities, and more that 100 personnel trained and certified to handle ordnance.

4. Maps of Installation showing Facilities and Equipment:

(a) See attached maps for location of buildings.

(b) Some of the equipment is large and requires large stable foundations and some instrumentation would require special setup and calibration if moved. However with difficultly, all of the facilities used for warhead work are capable of being moved. It should be noted that to perform the warhead R&D effectively requires that all the facilities and equipment mentioned below be collocated. The warhead facilities and associated major equipment along with replacement cost are listed below.

FACILITY	MAJOR EQUIPMENT	REPLACEMENT COST (Does not include buildings)
WARHEADS	**RESEARCH FACILITIES**	
WARHEAD ASSEMBLY	GENERAL LAB EQUIP CLASSIFIED STORAGE	$200K
WARHEAD STRUCTURAL	BEND TEST FIXTURE	$130K
WARHEAD ANALYSIS	SILICON GRAPHICS WORKSTATIONS IMAGE ANALYZER	$125K
GAS GUN	SINGLE STAGE GAS GUN HIGH SPEED INSTRUMENTATION	$2,000K
MATERIAL TEST	SCANNING ELECTRON MICROSCOPE OPTICAL MICROCOPY INSTRON TEST MACHINE TINIUS OLSON TEST MACHINE	$995K
SMART MUNITION LAB	RATE TABLE	$3,750K
WEAPON SYSTEM ASSEMBLY AREA (3)		$260K
MECHANICAL ASSEMBLY LAB		$500K

FACILITY	MAJOR EQUIPMENT	REPLACEMENT COST (Does not include buildings)
EXPLOSIVE OPERATION FACILITY	CLASSIFIED ENERGETIC ASSEMBLY	$2,000K
	SUBTOTAL	$9,960K
TARGET	**VULNERABILITY FACILITY**	
LABORATORY	GENERAL LAB EQUIP VAX COMPUTER SYSTEM SILICON GRAPHICS WORKSTATION	$400K
	SUBTOTAL	$400K
EXPLOSIVE	**TEST FACILITIES**	
DESIGN FACILITIES	COMPUTER SYSTEMS AND EQUIP	$436K
SAFETY BUNKERS	FIRING CONSOLES AND SEQUENCERS	$1,012K
FRAG ANALYSIS FACILITY	CLEANING EQUIP AND PRECISION SCALES	$150K
SHAKER LABS	CONTROL EQUIP, UD-4000 SHAKER	$492K
SHOCK LABS	CONTROL AND RECORDERS	$358K
TEMP & HUMIDITY	4-WALK-IN COMPUTER CONTROLLED	$1,953K
FAST COOK-OFF	30' TEST PAN AND RECORDERS	$320K
12 METER DROP CAGE	100' DROP TOWER AND CAPTURE CAGES	$1,200K
NEAR MISS SHOCK TEST	SHOCK TESTER AND RECORDERS	$600K

FACILITY	MAJOR EQUIPMENT	REPLACEMENT COST (Does not include buildings)
STATIC FIRE ARENA	FULLY INSTRUMENTED ARENA SITE	$750K
OVERPRESSURE TEST ARENA	FULLY INSTRUMENTED GRID SYSTEM	$100K
STATIC FIRE TEST	100K LBS THRUST STAND	$200K
100 FOOT DROP TOWER	100' DROP TOWER AND IMPACT AREA	$180K
SLOW COOK OFF	COMPUTER CONTROLLED FULLY AUTO	$150K
MULTI BULLET IMPACT	3-50 CAL GUN SPECIAL DESIGN	$160K
MEDIUM WEIGHT SHOCK MACHINE	NEW SYSTEM (TO BE INSTALLED)	$1,100K
SUPPORT EQUIPMENT	FIBER OPTIC LINK AND INSTRUMENTATION	$6,925K
ORDNANCE RADIOGRAPHY	INDUSTRIAL X-RAY	$1,000K
SMALL SCALE EXPLOSIVE TEST	FLASH X-RAY ULTRA HIGH SPEED PHOTO	$1,000K
LARGE SCALE EXPLOSIVE TEST	FLASH X-RAY ULTRA HIGH SPEED PHOTO	$600K
OTHER		$2,237K
	SUBTOTAL	$20,923K
	GRAND TOTAL	$31,283K

5. Estimate Capacity of the Activity to absorb similar work years:

The Dahlgren Division is recognized as a national asset for the threat cruise missile vulnerability data. This vulnerability data is used by the Navy, Army, Air Force and Ballistic

Missile Defense Office. Dahlgren is also recognized as the prime US group for air target vulnerability. The warhead expertise at Dahlgren currently supports all services - AMRAAM for the Air Force/Navy, Patriot and Javelin for the Army and SRAW/SMAW for the Marine Corps.

In its recognized role of leader in warheads, the Dahlgren Division can absorb a reasonable amount of additional warhead R&D and vulnerability work of all types. Current and planned end-strength reductions provide office space for the expansion. The infrastructure to support warhead research and development currently exists. There exist the ordnance material handling and storage capability, the ordnance testing and evaluation facilities, target vulnerability and performance assessment, security, and contracts. In addition, Dahlgren is just 30 miles from the energetic materials expertise of Indian Head which provides close technical synergism between the developers of new explosives and the warhead designers.

If a large amount (hundreds of work years) of warhead R&D work were to be relocated to Dahlgren, additional office space would be required to house the additional personnel.

Even with major modifications, the Dahlgren site cannot expand significantly beyond the previously mentioned increase in the warhead research and development and target vulnerability/systems effectiveness work. The site does not have enough large open spaces to provide for expansion of energetic type work. Encroachment becomes a major problem if energetic work was to increase significantly beyond the warhead R&D.

6. Describe the impact of BRAC 91 and BRAC 93 decisions on the activity:

Prior to BRAC 91, the Naval Surface Warfare Center, Dahlgren, VA, was a laboratory, reporting directly to the Director of Navy Laboratories, with a major subordinate detachment located at Silver Spring, MD known as the White Oak Detachment. The BRAC 91 established the Naval Surface Warfare Center, located in Arlington, VA, with supporting divisions. The Dahlgren Division was established at that time with the following subordinate commands: The NSWCDD Coastal Systems Station, Panama City, FL and NSWCDD White Oak Det, Silver Spring MD.

BRAC 91 required the reassignment of Warfare Analysis, and ASW Combat Systems, from the Naval Surface Warfare Center, White Oak Detachment to the Naval Surface Warfare Center, Dahlgren Division, Dahlgren, VA. BRAC 91 also provided for relocating the ASW functions from NCCOSC to the Naval Surface Warfare Center, Dahlgren Division, Dahlgren, VA.

BRAC 93 directed the disestablishment of the White Oak Detachment of the Naval Surface Warfare Center, Dahlgren Division and stated that the functions would be transferred to the Dahlgren Division, Dahlgren and Coastal Systems Station sites as well as the Naval Surface

Warfare Center, Indian Head Division. This will result in an increase of personnel (both contractor and government) at the Dahlgren Site.

Neither BRAC 91 nor 93 decisions impacted the Division's warhead work directly. However, the BRAC 93 decision to move all energetics and underwater warheads work from the White Oak Detachment to the Indian Head Division places the energetics closer to Dahlgren. At Indian Head, the development of explosives is 30 miles from Dahlgren. Both sites are located on the Potomac River which allows for river transportation of sensitive ordnance.

7. Describe military department approved and programmed plans which impact the activity:

In March of 1991 NAVSEA, NAVAIR, and ASN(RD&A) entered into an agreement which dealt with the assignment of missile systems (subsystems) work. The result of that agreement was that missile systems engineering and integration was divided among three warfare centers as follows: Aircraft - Air Warfare Center, Surface Ship - Surface Warfare Center, and Submarine - Undersea Warfare Center. For certain missile subsystems (seekers, airframe/aerodynamics, fuzes, propulsion) the Air Warfare Center was assigned the responsibility. Missile warheads were assigned to the Surface Warfare Center and the Dahlgren Division.

8. Remaining Tenants and Other Activities on the installation:

The Dahlgren site has three major tenants - AEGIS Training Center, Naval Space Command, and Joint Warfare Analysis Center.

AEGIS Training Center — 279 Work Years (Does not include students)

Mission: To provide officers and enlisted personnel the knowledge, ability, and skill to operate, employ, and maintain the AEGIS Combat System aboard surface warships.

Naval Space Command — 342 Work Years

Mission: Naval Space Command uses the medium of space and its potential to provide essential information and capabilities to ashore and afloat naval forces by: operating surveillance, navigation, communication, environmental, and information systems; advocating naval warfighting requirements in the joint arena; and advising, supporting, and assisting naval sciences through training and developing space plans, programs, budgets, policies, concepts, and doctrine.

Joint Warfare Analysis Center 265 Work Years

Mission: Assist the Chairman of the Joint Chief of Staff and Commander of the Unified Commands in their preparation and analysis of joint operational plans.

In addition to the three major tenants, the Dahlgren site has numerous small tenants which support the site. All the tenants are listed below.

Tenant Command Name	UIC	Officer	Enlisted	Civilian
NAVAL SPACE COMMAND	00046	61	110	171
EXPLOSIVE ORDNANCE DISPOSAL	30703	1	5	0
NAVAL BRANCH MEDICAL CLINIC	32639	3	13	9
NAVAL DENTAL CLINIC	35755	1	3	0
DEFENSE PRINTING SERVICE	43630	0	0	6
PERSONNEL SUPPORT DETACHMENT	44175	1	8	4
NAVAL WARFARE ANALYSIS CENTER	49869	42	23	200
CHESDIV NAVFACENGCOM	62477	2	0	18
NAVY RESALE AND SERVICES SUPPORT OFFICE	63576	0	2	19
AEGIS TRAINING CENTER	68724	37	196	46
AEGIS TRAINING CENTER (Average students on board)	45541	11	135	0
NAVAL INVESTIGATIVE SERVICE	68896	0	0	2

Tenant Command Name	UIC	Officer	Enlisted	Civilian
DEFENSE COMMISSARY AGENCY	N/A	0	3	12
DEFENSE REUTILIZATION AND MARKETING OFFICE	N/A	0	0	2
NSWSES DET	N/A	0	0	20
DOD SECTION 6 SCHOOL	EVADL	0	0	22
COMSUBLANTREP	N/A	1	0	0
DEFENSE INVESTIGATIVE SERVICE	HS1500	0	0	1
DEFENSE FINANCE AND ACCOUNTING SERVICE	N/A	0	0	36

9. Summarize your overall mission:

DAHLGREN DIVISION MISSION STATEMENT

Provide research, development, test and evaluation, engineering, and fleet support for surface warfare systems, surface ship combat systems, ordnance, mines, amphibious warfare systems, mine countermeasures, special warfare systems, and strategic systems. Execute other responsibilities as assigned by the Commander, Naval Surface Warfare Center.

The primary focus of the Dahlgren Division is the systems engineering of large complex systems. These complex systems must work effectively with many other systems in a joint, multi-platform, multi-theater warfare arena of tomorrow. In order to properly engineer these complex systems, one must have the expertise and first hand knowledge of all parts of the combat sequence from sensing the threat, to controlling all combat assets, to engaging the threat.

The warhead R&D and vulnerability/systems effectiveness work is key part in maintaining expertise and working knowledge in the engage portion of the sequence.

Specifically, the technical capabilities that support our mission and the focus of systems engineering of large complex systems are:

- **SURFACE AND STRATEGIC WARFARE ANALYSIS, COST ANALYSIS, SIMULATION, AND MODELING** - This capability provides for the conduct of threat analysis, mission analysis, surface warfare analysis, multi-warfare analysis, requirements and cost analysis, and effectiveness analysis, as well as modeling and simulation in all areas related to surface ship combat systems, weapons systems and strategic systems.

- **SURFACE SHIP COMBAT SYSTEMS ENGINEERING R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The methods and ideas in this capability encompass the whole warfighting system, and point out affordable technical paths toward improved warfighting capability in likely future regional conflicts. This over-arching role serves major combat systems roles such as that for AEGIS.

- **JOINT MISSION PLANNING SYSTEMS, R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - This capability encompasses Strategic and Strike Targeting and Mission Planning, particularly as it applies to Navy and Joint Strike systems such as TOMAHAWK, TACAIR, and Unmanned Aerial Vehicles (UAV), and to Strategic Systems such as the Submarine Launched Ballistic Missile (SLBM).

- **RF & EO SENSORS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The unique aspect of this capability in the Dahlgren Division is the requirement to consider the sensors from the full combat system perspective. Sensors and sensor systems are conceived, designed and developed based upon combat system requirements and the aggregate contribution of the sensor system to the combat system performance.

- **SURFACE SHIP COMBAT AND WEAPON CONTROL SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division is actively involved in the combat systems architecture computing, and advanced capabilities that will enhance the joint service operations that are envisioned in future DoD requirements.

- **SURFACE SHIP WEAPON SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division has evolved as the technical leader in total systems engineering and integration of detect, control, and engage

subsystem elements. The Dahlgren Division has the technical depth, operational understanding, experience and vision to develop and field new systems quickly and cost effectively.

- **THEATER AIR DEFENSE SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - This is a highly integrated joint service network of sensors, communications, command and control and weapon subsystems that form a theater wide multifaceted and multilayered system. The Dahlgren Division responsibilities include systems engineering (from a joint and force perspective) and R&D of key system elements including sensors, weapons and control systems.

- **SURFACE SHIP DEFENSE SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - Conduct total systems engineering and integration of detection, control, and engagement subsystems to provide an effective zero-loss capability for surface ships against all threats and particularly against antiship cruise missiles in the Littoral Warfare environment.

- **COOPERATIVE ENGAGEMENT CAPABILITY SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT (CEC)** - The Dahlgren Divisions' experience in systems analysis, systems engineering and integration, Independent Validation and Verification (IV&V), software development and support, system safety, and electromagnetic effects establishes and assures continued overall CEC technical integrity. This breadth of experience and capabilities together with our unique knowledge and experience with special intelligence allows us to meet Fleet operational needs.

- **THEATER BALLISTIC MISSILE DEFENSE SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT (TBMD)** - The Dahlgren Division defined the Navy's contribution to the TBMD and assumed the lead role in defining this Naval Mission.

- **GUN WEAPONS SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division conducts the full spectrum RDT&E in Gun Weapons Systems for the Surface Navy and Marine Corps. This area of responsibility includes the R&D of gun, fire control, sensors, and ammunition designs and the establishment/evaluation of performance thresholds necessary to meet operational requirements.

- **MARINE CORPS WEAPONRY R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division directs and conducts programs for

the Marine Corps in the following areas: Weaponry Technology, Tactical Targeting Sensors, Mine Detection Technology, Land Mine Countermeasures Technology, and Chemical/Biological Defense Technology.

- **STRATEGIC AND SPACE SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division is the only Navy activity with a strategic role in this high national priority capability. The Dahlgren Division provides systems engineering, technology advancement, software development, and operational support for the Navy strategic systems and for space systems.

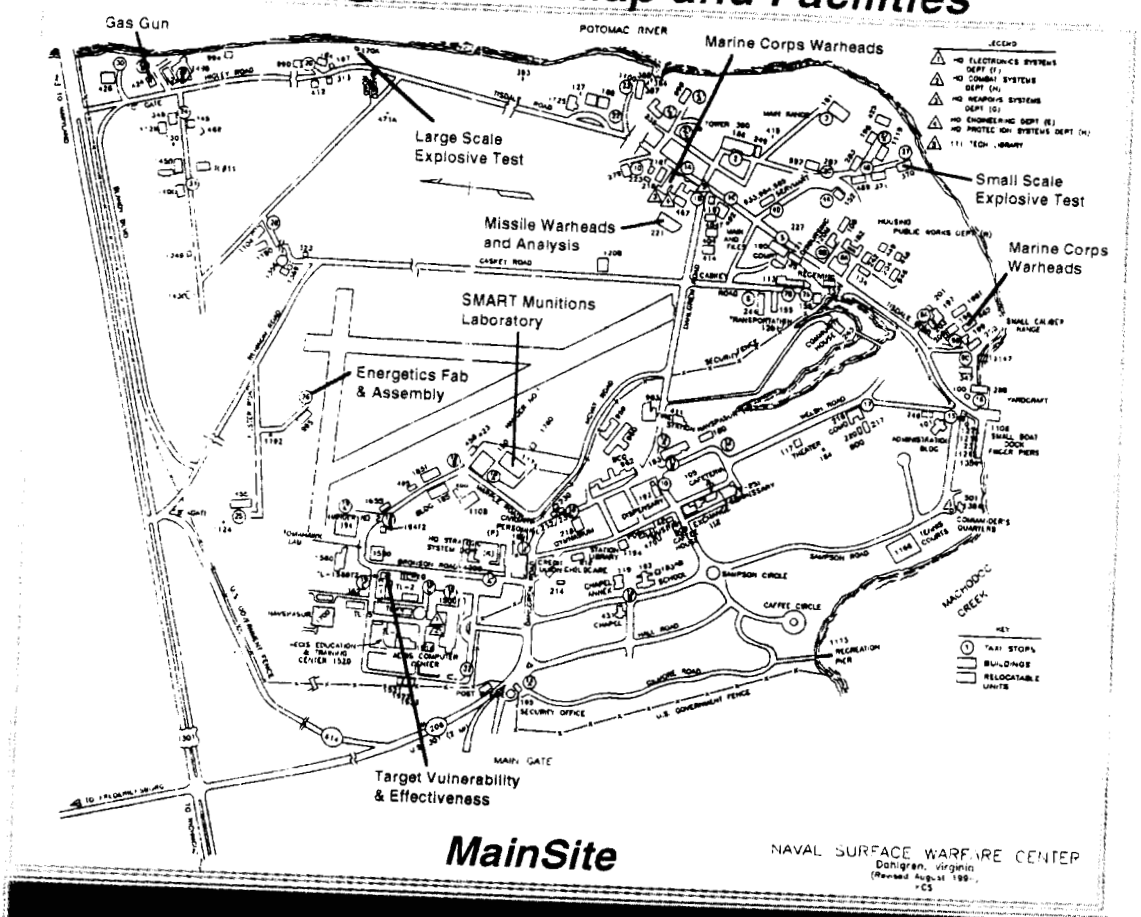
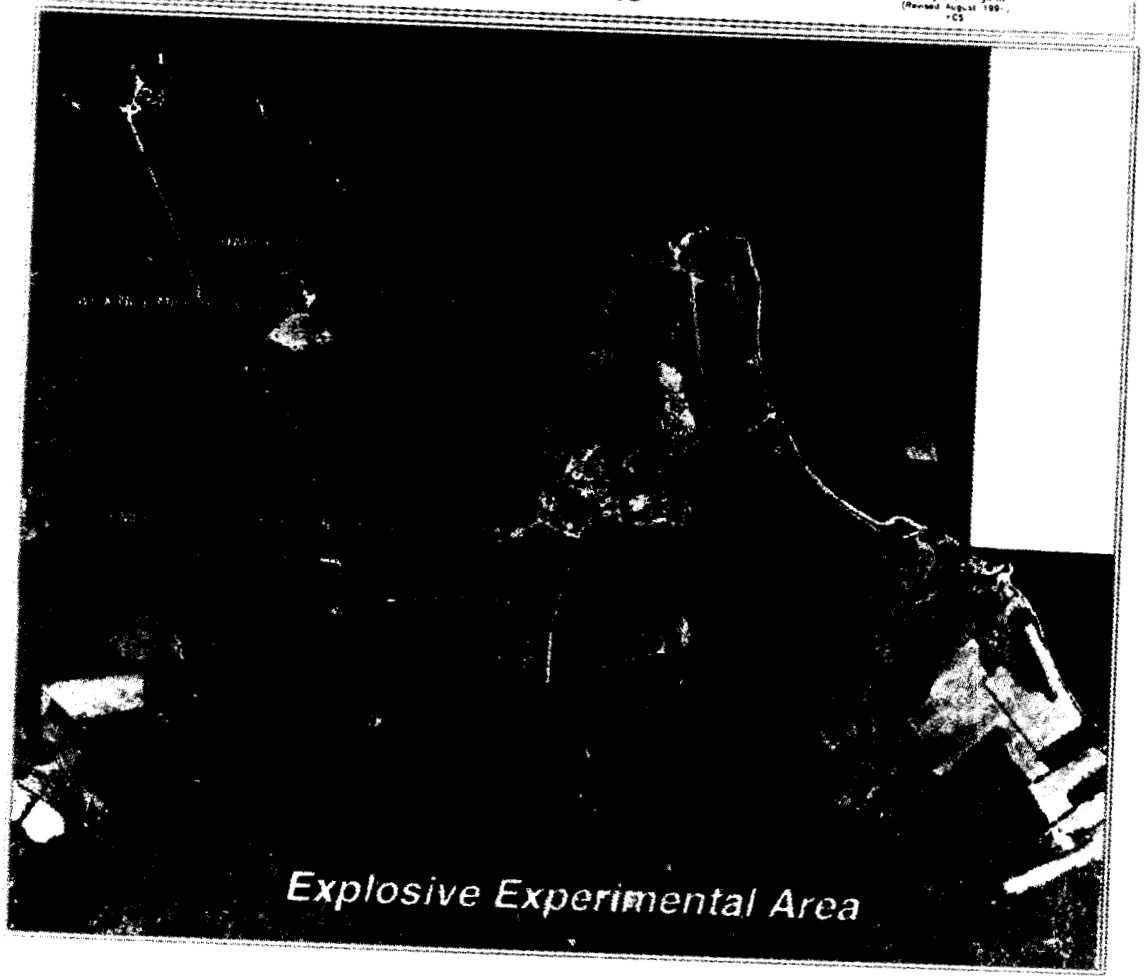
- **ELECTRONIC WARFARE SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division role is one of developing new technologies for the application in surface ship sensor and countermeasures systems, the transition of new technologies to existing and planned electronic warfare suites, acquisition support, technical evaluation, and development of technologies and fields systems for special purpose intelligence collection purposes.

- **ELECTROMAGNETIC ENVIRONMENTAL EFFECTS (E^3) R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - As the Navy's lead laboratory, the Dahlgren Division assures operational effectiveness of Naval systems exposed to stressing electromagnetic (EM) environments. The Dahlgren Division assesses the susceptibility of electronic components, circuits, and systems to the EM effects; investigates specific and generic susceptibility problems, develops, evaluates, and recommends procedural and hardware changes, as appropriate to harden Naval equipment to these effects.

- **WEAPON SYSTEMS SAFETY R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division provides the technology base, product development, and Fleet support for systems safety and survivability of Fleet assets, especially surface warfare assets. The Dahlgren Division assesses system and item vulnerabilities including software. The Division specifies, designs and develops means to remove failure modes, control environments, limit damage, or otherwise reduce possible loss of combat capability.

- **CHEMICAL/BIOLOGICAL WARFARE DEFENSE SYSTEMS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division is the principal Navy activity for Chemical/Biological Warfare for threat analysis and model development. The Division develops equipment and systems for the Marine Corps and is the principal Navy Development Activity for Chemical/Biological Detection and Protection Systems for Naval Forces.

- **WARHEADS R&D, T&E, ACQUISITION SUPPORT, AND SOFTWARE SUPPORT** - The Dahlgren Division is the Technical Direction Agent and Design Agent for warhead development, and is Chair of the Project Reliance and other joint DoD/DoE coordinating groups. Under 1991 directed mission purification SECNAV directed the Dahlgren Division to be the sole in-house technology development activity for missile warheads.

- **SPECIAL PROGRAMS** - This mission area complements naval warfare master planning efforts, analyzes future naval warfare requirements, establishes conceptual warfare initiatives with respect to potential warfare scenarios, and defines the platform and weapon requirements that must be satisfied to function within those scenarios.

Dahlgren Site Map and Facilities