DCN 787

Entirely Revised

MILITARY VALUE DATA CALL #5

TECHNICAL CENTERS

| Category | Technical Center |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Location/Address | 53560 Hull Street<br>San Diego CA 92152-5001 |


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**TAB A** Technical Operations: Functional Support Area - Life Cycle Work Area Form

**TAB B** Facilities and Equipment: Facilities/Equipment Capability Form

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**Appendix A** Functional Support Areas - Life Cycle Work Areas List

**Appendix B** Definitions for Functional Support Areas - Life Cycle Work Areas

## MILITARY VALUE MEASURES
## MISSION

GENERAL NOTE:

**After implementing a significant reorganization driven by previous BRAC decisions and right sizing, NCCOSC Detachment sites and field offices are no longer functionally independent activities. To achieve the greatest efficiency possible, while operating with a smaller work force at multiple field sites, business operations, technical and support functions, and workload have been integrated, and are managed and operated at the Division level. As a result, technical functions and workload data requested by this data call is not routinely available at the individual detachment level and is therefore not included in detachment submissions. For these reasons, this data call response for NCCOSC RDTE DIV SAN DIEGO CA includes integrated mission, technical and support functions and workload data for itself and its detachments.**

1. **Mission Statement.*** State the officially assigned mission of this activity and cite the reference document(s) that assigns the mission.

Mission as stated in OPNAV Notice 5450

To be the Navy's research, development, test and evaluation center for command, control and communications systems and ocean surveillance and the integration of those systems which overarch multiplatforms.

REFERENCE: NCCOSC RDTE DIV SAN DIEGO CA Mission Statement OPNAV NOTICE 5450, Subj: Establishment of Two Shore Activities and Modification of Certain Shore Activities and Detachments, of 23 Dec 1991.

2. **Joint Service Missions.** * State any officially assigned joint/lead service assignments missions and cite the document(s) that assigned them.

*** As indicated in the "GENERAL NOTE" above, mission, technical and support functions, and workload are integrated at the NCCOSC Division level. Therefore, this section of the data call response reflects mission functions for NCCOSC RDTE DIV and its detachments.**

NAVY ARMY TACTICAL MISSILE SYSTEM (NATACMS) - Mission is to provide operational and photographic planning support. REFERENCE: NAWCSPNS Code P6120 Document Number N6312694WR34026.

ATMOSPHERIC EFFECTS ASSESSMENT - NCCOSC RDTE DIV has the lead in the following area of project alliance:

Lead:

(1) Radio Propagation Assessment

(2) EO Propagation Assessment and Target/Background Contrast (Marine and Coastal Environments)

(3) Sensing of Refractivity and Aerosol Extinction (Refractivity)

(4) Sensitivity Analyses and Simulations (Engineer's Refractive Effects Prediction System, Navy Performance Assessment Systems)

(5) Environmental Effects in C2 Systems (Shipboard/Shore C2 Systems)

Joint:

(1) Sensing of Refractivity and Aerosol Extinction (Lidar Technics, Satellite Sensors)

(2) Sensitivity Analyses and Simulations (Tactical Decision Aids, Military Systems Climatologies)

(3) Environmental Effects in C2 Systems (Strike Warfare Applications)

REFERENCE: Project alliance, Joint Directors of Laboratories, Joint Service Program Plan for Environmental Sciences, 31 Jan 94.

ARCTIC OCEAN PROJECTS - Jointly tasked with the Department of National Defence of Canada for certain classified Arctic Ocean projects. REFERENCE: Memorandum of Understanding: Supplemental Arrangement Between the United States Department of Defense and the Department of the National Defence of Canada Concerning Project Spinnaker (U), N00039000969080, dated 29 SEP 92. The most recent NCCOSC RDTE DIV tasking documents (1993) for this task are NCCOSC Task Assignment Serial Numbers PMW 182/TA003, PMW 182/TA004, and PMW 182/TA005, dated 27 SEP 93.

GENERALIZED EMULATION MICROCIRCUIT (GEM) - NCCOSC RDTE DIV mission is to provide technical program planning, oversight, and master in-house DOD archive design library functions. The GEM program produces form, fit, and function exact replacements for non-procurable microcircuit requirements in fielded DOD systems utilizing an advanced modern fabrication process with the commercial sector. REFERENCE: Defense Logistics Agency MIPR and SOW, HQ DLA, AQPOT-94-03. Defense Electronics Supply Center (DLA Field Activity) contract DLA900-92-D-0049.

MULTIFUNCTION INFORMATION DISTRIBUTION SYSTEM (MIDS) - NCCOSC RDTE DIV mission is to evaluate digital application specific integrated circuit (ASIC) designs, digital sub-system architectures and power systems. This encompasses analysis and simulation of very high speed integrated circuit (VHSIC) hardware description language (VHDL) descriptions, power supply sub-systems and related analog circuits. REFERENCE: MIDS Program Memorandum of Understanding (PMUO) 1991. MIDS PMOU 1991 supplement of Feb 94.

VERY HIGH SPEED INTEGRATED CIRCUITS (VHSIC) - NCCOSC RDTE DIV mission is to establish an industrial base to provide advanced (0.5 micron) semiconductor technology, which was a necessary prerequisite in the development of next generation weapons systems. REFERENCE: Funding document DOD-VHSIC Deputy Director for Research and Engineering (DDDR&E) - 6.3A.

PILOTLINE EXPERIMENT TECHNOLOGY (PET)/ADVANCED COMPONENTS EVALUATION (ACE)/SILICON HYBRIDS WITH INFRARED LONG-WAVELENGTH DETECTORS (SHIELD)/LONG-WAVELENGTH INFRARED LOW BACKGROUND UNIFORM MERCURY CADMIUM TELLURIDE (LLUM)/STRATEGIC HYBRIDS WITH ADVANCED OPTIMIZED MEDIUM WAVELENGTH INFRARED (SHADOW) - NCCOSC RDTE DIV mission is to provide a unique source of highly credible optical characterization and radiation environment testing of the state-of-the-art focal plane arrays produced by these programs. PET and ACE are U.S. Army programs. REFERENCE: ACE Program SOW and MIPR W31RPD-2-S1021; PET Program SOW and MIPR W31RPD-2-P4104; SHIELD, LLUM, and SAHDOW MIPR FMBD 94 557 NRDC.

OPTOELECTRONIC SWITCHING PROGRAM - NCCOSC RDTE DIV mission is to provide switch development for Navy, Air Force, other agencies, and commercial use in ultra-high speed Time Division Multiplexing and in Reconfiguration Antennas. REFERENCE: Advanced Research Projects Agency Order 8547.

OPTOELECTRONIC SWITCHES FOR HIGH TEMPERATURE SENSOR (HTS) COMPONENTS PROGRAM - NCCOSC RDTE DIV mission is to provide switch development in support of Navy and Air Force Small Business Innovative Research (SBIR) programs in HTS from end filter arrays. REFERENCE: Advance Research Projects Agency Order B019.

## TECHNICAL FUNCTIONS

3. **Technical Functions Resource Allocations.** Appendix A provides a list of numbered functional support areas that cover the spectrum of naval warfare and support operations. Additionally, Appendix A provides a list of numbered life-cycle work areas that cover the "cradle to grave" spectrum of Navy systems acquisition. Utilizing the two lists at Appendix A, each activity will break out its entire FY1993 technical program within any applicable intersections of these two defining schemes (for example, functional support area #5.2 - life cycle work area #3 will identify the activity's level of resources allocated to sensors and surveillance systems, radar systems in advanced development). Definitions for each functional support and life cycle work area are provided in Appendix B for reference.

a. Use the form at Tab A of this data call to provide data on work years and expenditures for FY1993 to support each applicable intersection of functional support areas and life cycle work areas. When necessary, estimate data to the best of your ability

b. Similarly, use the Tab A forms to report separately on your detachments or sites that have not received this data call directly. This data may be consolidated when the detachments or sites perform work in the same area. When necessary, estimate data to the best of your ability.

**Note: All technical programs for NCCOSC RDTE DIV and its two detachments have been combined in Tab A. Pertinent information is:**

| | |
|---|---|
| NCCOSC RDTE DIV SAN DIEGO CA | N66001 |
| NCCOSC RDTE DIV DET WARMINSTER PA | N49281 |
| NCCOSC RDTE DIV DET PHILADELPHIA PA | N68592 |

UIC: N66001

## MANPOWER

4. **Work Breakdown Structure.**

**Note: As indicated in the "GENERAL NOTE" found at the front of this data call response, mission, technical and support functions, and workload are integrated at the NCCOSC Division level. Therefore, this section of the data call response reflects support functions for NCCOSC RDTE DIV and its detachments.**

a. Use Table 4.1 (below) to provide data on the general support functions at your activity. Report data as of 31 March 1994. If you are collocated with one of your subordinate base keeper commands (i.e., a NAWS or NAS collocated with a NAWC Division), describe the differences in the functions of each and provide a separate Table 4.1 for the subordinate command. Include this command in the Table 4.1 submission for your Activity.

b. Similarly, use Table 4.2 (below) to provide general support function data for all your detachments or sites that did not receive this data call directly. Consolidate data from all of these detachments into one table (4.2). Provide a list of the detachments whose data is included in Table 4.2. For each identified detachment in this list, include its name, location, UIC, and number of civilian and military personnel onboard.

In addition, if any of your detachments or separate sites not receiving an individual data call have over 50 civilian personnel or own technical facilities, provide separately a description of the site, the functions performed there, photographs showing the facilities and state the reason for that site's existence and the necessity for it to be at that location.

c. Use Table 4.3 (below) to provide estimated data, for your activity only, to reflect the anticipated impact of previous BRAC decisions that have not yet been implemented. This data should provide the deltas from Table 4.1.

NOTES:

[1] Use the following definitions when providing data for the tables below:

Workyears: Consistent with those used in the preparation of inputs to the President's budget.

Contract Workyears: Actual or estimated workyears performed by support contractors with workyears defined consistent with the definition used in the President's budget.

Civilian Personnel Onboard: Full Time Permanent (FTP) employees.

[2] Any categories of personnel that are employed to support other Activities should be noted with the name of the additional Activity supported.

UIC: N66001

**Table 4.1, General Support Resources for (Activity: NCCOSC RDTE DIV SAN DIEGO CA) (UIC:N66001)**

| Function | Space allocated (Gross SQFT) | Work Years | Civilian Persnel onboard | Contract Work Years | Military Personnel Onboard | |
|---|---|---|---|---|---|---|
| | | | | | Off | Enl |
| ADMINISTRATION | | | | | | |
| Command (CO/XO/TD/etc.) | 20,300 | 24.3 | 28.0 | 2.0 | 2.0 | 0 |
| Comptroller | 36,800 | 86.97 | 87.0 | 6.0 | 0 | 0 |
| Admin | 93,000 | 111.8 | 109.0 | 23.0 | 3.0 | 4.0 |
| Human Resources | 13,000 | 32.29 | 35.0 | 1.0 | 0 | 0 |
| OPERATIONS SUPPORT | | | | | | |
| Supply Management | 61,000 | 150.64 | 155.0 | 211 | 1.0 | 0 |
| Consolidated Computational Computer Support | 15,000 | 12.97 | 14.0 | 23.5 | 0 | 0 |
| Information Systems and Communications | 12,000 | 10.19 | 11.0 | 44.5 | 0 | 0 |
| Safety/OSH/Environmental | 3,300 | 13.39 | 14.0 | 0.5 | 0 | 0 |
| INFRASTRUCTURE | | | | | | |
| Physical Security | 11,000 | 11.54 | 12.0 | 88.0 | 1.0 | 2.0 |
| Public Works/Staff Civil | 11,100 | 0 | 42 | 217.0 | 0 | 0 |
| Fire Protection | 0 | 0 | 0 | 0 | 0 | 0 |
| Medical/Dental | 0 | 0 | 0 | 0 | 0 | 0 |
| Military Support | 1,600 | 4.17 | 4.0 | 0 | 0 | 0 |
| Air/Waterfront Operations | 0,000 | 0 | 0 | 0 | 0 | 0 |
| Other | 0,000 | 0 | 0 | 0 | 4.0 | 1.0 |
| TECHNICAL STAFF | | | | | | |
| Technical Operations | | | 2445.0 | 3587.8 | 53.0 | 57.0 |
| Totals | 278,100 | 512.39 | 2958.0 | 4000.0 | 64.0 | 64.0 |

**Note:** Main site and detachment are included in the data

UIC: N66001

**Table 4.2, General Support Resources for all Detachments (Activity: NCCOSC RDTE DIV SAN DIEGO CA) (UIC: N66001)**

| Function | Space allocated (Gross SQFT) | Work Years | Civilian Persnel onboard | Contract Work Years | Military Personnel Onboard | |
|---|---|---|---|---|---|---|
| | | | | | Off | Enl |
| ADMINISTRATION | | | | | | |
| Command (CO/ XO/ TD/etc.) | | | | | | |
| Comptroller | | | | | | |
| Admin | | | | | | |
| Human Resources | | | | | | |
| OPERATIONS SUPPORT | | | | | | |
| Supply Management | | | | | | |
| Consolidated Computational Computer Support | | | | | | |
| Information Systems and Communications | | | | | | |
| Safety/OSH/Environmental | | | | | | |
| INFRASTRUCTURE | | | | | | |
| Physical Security | | | | | | |
| Public Works/Staff Civil Engr | | | | | | |
| Fire Protection | | | | | | |
| Medical/Dental | | | | | | |
| Military Support | | | | | | |
| Air/Waterfront Operations | | | | | | |
| Other | | | | | | |
| TECHNICAL STAFF | | | | | | |
| Technical Operations | | | | | | |
| Totals | 0 | 0 | 0 | 0 | 0 | 0 |

Note: Detachments are included in Table 4.1

UIC: N66001

**Table 4.3, Previous BRAC Impact to General Support Resources for (Activity: NCCOSC RDTE DIV SAN DIEGO CA) (UIC: N66001)**

| Function | Space allocated (Gross SQFT) | Work Years | Civilian Persnel onboard | Contract Work Years | Military Personnel Onboard | |
|---|---|---|---|---|---|---|
| | | | | | Off | Enl |
| ADMINISTRATION | | | | | | |
| Command (CO/XO/TD/etc.) | (250) | (1) | (1) | | | |
| Comptroller | | | | | | |
| Admin | (400) | (2) | | (2) | | |
| Human Resources | | | | | | |
| OPERATIONS SUPPORT | | | | | | |
| Supply Management | (3600) | (4) | (1) | (5) | | |
| Consolidated Computational Computer Support | | | | | | |
| Information Systems and Communications | | | | | | |
| Safety/OSH/Environmental | | | | | | |
| INFRASTRUCTURE | | | | | | |
| Physical Security | (200) | (1) | (1) | (7) | | |
| Public Works/Staff Civil Engr | (150) | (1) | (1) | | | |
| Fire Protection | | | | | | |
| Medical/Dental | | | | | | |
| Military Support | | | | | | |
| Air/Waterfront Operations | | | | | | |
| Other | | | | | | |
| TECHNICAL STAFF | | | | | | |
| Technical Operations | | | (53) | (112) | | |
| Totals | (4600) | (9) | (57) | (126) | | |

UIC: N66001

5. Technical Staff Qualifications.

a. Use Table 5.1 (below) to provide data on the civilian personnel allocated to Technical Operations having the educational and experience levels indicated in the table for your activity. Report data as of 31 March 1994. Similarly, use Table 5.2 (below) to provide data for all your separate detachments or sites that did not receive this data call directly. Consolidate data from all of these detachments into one table (5.2). Provide a list of the detachments whose data is included in Table 5.2.

**Table 5.1, Technical Staff Education Level for**
**(Activity: NCCOSC RDTE DIV SAN DIEGO CA) (UIC: N66001)**

| Highest Degree Attained | Years of Government and/or Military Service | | | | | |
|---|---|---|---|---|---|---|
| | Less than 3 Years | 3-10 Years | 11-15 Years | 16-20 Years | More than 20 Years | Total |
| Grade School | 0 | 2 | 1 | 0 | 2 | 5 |
| High School | 8 | 90 | 105 | 86 | 226 | 515 |
| B.A./B.S | 11 | 256 | 168 | 93 | 353 | 881 |
| M.A./M.S | 10 | 101 | 91 | 75 | 283 | 560 |
| Ph.D./ M.D. | 5 | 41 | 33 | 20 | 96 | 195 |
| Total | 34 | 490 | 398 | 274 | 960 | 2156 |

**Table 5.2, Technical Staff Education Level for all Detachments (Parent Activity: NCCOSC RDTE DIV SAN DIEGO CA) (UIC: N66001)**

| Highest Degree Attained | Years of Government and/or Military Service | | | | | |
|---|---|---|---|---|---|---|
| | Less than 3 Years | 3-10 Years | 11-15 Years | 16-20 Years | More than 20 Years | Total |
| Grade School | 0 | 0 | 0 | 0 | 0 | 0 |
| High School | 0 | 0 | 0 | 0 | 0 | 0 |
| B.A./B.S | 0 | 0 | 0 | 0 | 0 | 0 |
| M.A./M.S | 0 | 0 | 0 | 0 | 0 | 0 |
| Ph.D./ M.D. | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 |

b. Use Table 5.3 (below) to provide data on the number of civilian personnel allocated to Technical Operations with graduate degrees and at least three years of applicable experience that have their highest degree in the fields indicated. Report data as of 31 March 1994. Similarly, use Table 5.4 (below) to provide data for all your separate detachments or sites that did not receive this data call directly. Consolidate data from all of these detachments into one table (5.4). Provide a list of the detachments whose data is included in Table 5.4

**Table 5.3, Technical Staff Academic Fields for (Activity: NCCOSC RDTE DIV SAN DIEGO CA) (UIC: N66001)**

| Academic field | Number |
|---|---|
| Physics | 114 |
| Chemistry | 8 |
| Biology | 3 |
| Mathematics/Statistics/ Operations Research | 86 |
| Engineering | 369 |
| Medical | 1 |
| Dental | 0 |
| Computer Science | 51 |
| Social Science | 29 |
| Other Science | 62 |
| Non-Science | 0 |
| Total | 723 |

**Table 5.4, Technical Staff Academic Fields for all Detachments (Parent Activity: NCCOSC RDTE DIV SAN DIEGO CA) (UIC: N66001)**

| Academic field | Number |
|---|---|
| Physics | 0 |
| Chemistry | 0 |
| Biology | 0 |
| Mathematics/Statistics/ Operations Research | 0 |
| Engineering | 0 |
| Medical | 0 |
| Dental | 0 |
| Computer Science | 0 |
| Social Science | 0 |
| Other Science | 0 |
| Non-Science | 0 |
| Total | 0 |

c. Are there unique aspects of the activity's location that help or hinder in the hiring of qualified personnel?

The RDT&E Division's location in San Diego, CA has been a definite asset in attracting and

retaining high quality personnel at all levels and in all occupations. When recruiting, typically, there are multiple quality applicants available in the area or willing to relocate to San Diego, occasionally at their own expense. There are several major universities in the immediate area that are excellent sources of candidates for our entry level science and engineering positions. We attract candidates from across the country who prefer the climate and lifestyle that San Diego has to offer. We have never experienced a lack of quality candidates in the past and we expect that will continue in the future.

**Note for 5.d. through 5.o.: As indicated in the " GENERAL NOTE" found at the front of this data call response, data contained in these subsections provide integrated technical/functional data for NCCOSC RDTE DIV SAN DIEGO CA and its detachments.**

d. List all articles written by the in-house technical staff that were published or accepted for publication in refereed journals since 1 January 1990.

Abusalem, H., T. Albert, and M. Juniper, Experimental Results: Detection and Tracking of Low SNR Sinusoids Using Real-Time LMS and RLS Lattice Adaptive Line Enhancers, ICASSP-91 (Volume D) July 1991.

Ahmad, R., C.B. Bell, and J. Peugh, Statistical Inference for Survival Analysis and Related Topics Under Censoring and Truncation, Statistic (Volume 91, Number 3) 1993.

Aklufi, M.E., Semiconductor Films for High Temperature Environments, Proceedings, Navy R&D Information Exchange Conference (Pages 9-27) July 1991.

Aklufi, M.E., and D. Brock, Synthesis of Diamond Films by Microwave-Generated Pulsed Plasmas, Proceedings, Second International Symposium on Diamond Materials (Volume 91-1) Electrochemical Society, May 1991.

Albares, D.J., Fiber Optics: Advantages and Military Applications, Proceedings, Optique et Defense 90, April 1990.

Albares, D.J., C.T. Chang, G.P. Imthurn, G.A. Garcia, R.W. Major, M.J. Taylor and C.K. Sun, Optoelectronic Switches and Applications, Proceedings, Government Microcircuit Applications Conference (Pages 301-304) November 1992.

Albert, T.R., M.D. Juniper, R.C. North, and W.H. Ku, The Design of Real-Time Adaptive Filter Development System, Proceedings, Twenty-Fourth Asilomar Conference on Circuits, Systems, and Computers, November 1990.

Allen, J., and N. Gerr, Time-Delay Estimation for Harmonizable Processes, Digital Signal Processing (Volume 4, Number 1, Pages 49-62) 1994.

Allen, J.C., Advanced Beamforming Concepts: Source Localization Using the Bispectrum, Gabor Transform, Wigner-Ville Distribution, and Nonstationary Signal Representation, Proceedings, Twenty-Fifth Annual Asilomar Conference on Signals, Systems, and Computers, November 1991.

Allen, J.C., and S.L. Hobbs, Detecting Target Motion by Frequency-Plane Smoothing, Proceedings, Twenty-Sixth Asilomar Conference on Signals, Systems, and Computers (Volume 2, Pages 1042-1047) October 1992.

Allen, J.C., and S.L. Hobbs, Instantaneous Variance Estimation by Spectral Collapse, Proceedings, Twenty-Seventh Annual Asilomar Conference on Signals, Systems, and Computers (Pages 1128-1132) November 1993.

Ambrose, J., J. Satriano, and C. Cari, Advances in Signal Processing for Wide Swatch Bathymetric Sonars, Proceedings, Hydrographic Conference 94 (Volume 1 sixth, Page 15) March 1994.

Andersen, B., J. McDonnell, and W. Page, Configuration Optimization of Mobile Manipulators with Equality Constraints Using Evolutionary Programming, Proceedings, First Annual Conference on Evolutionary Programming (Pages 71-79) February 1992.

Andersen, B., W.C. Page, J.R. and McDonnell, Multi-Output System Identification Using Evolutionary Programming, Proceedings, Twenty-Fifth Annual Asilomar Conference on Signals, Systems, and Computers (Pages 546-550) November 1991.

Andersen, K.D., Radar Detection of Low-Altitude Targets Over the Ocean, Published in Program and Abstracts for the 1991 North American Radio Science Meeting (Page 442) July 1991.

Andersen, K.D., 94 GHz Propagation in the Evaporation Duct, IEEE Trans. Ant. & Prop. (Volume 38, Pages 746-753) May 1990.

Anderson, G.W., J.J. Rohr, and S.D. Stanley, The Combined Drag Effects of Riblets and Polymers in Pipe Flow, Journal of Fluids Engineering (Volume 115, Pages 231-221) June 1993.

Andrews, J.M., and S.H. Lieberman, Use of a Neural Network for the Analysis of Fluorescence Spectra From Mixtures of Polycyclic Aromatic Hydrocarbons, Proceedings, Chemical, Biological, and Environmental Fiber Sensors III, SPIE V. 1587 (Pages 21-29) 1991.

Apitz, S., L.M. Borbridgem, K. Bracchi, and S.H. Lieberman, The Fluorescent Response of Fuels in Soils: Insights into Fuel-Soil Interactions, Proceedings, International Symposium on Environmental Sensing, June 1992.

Au, W.L.L., and L. Jones, Acoustic Reflectivity of Nets: Implications Concerning Incidental Take of Dolphins, Marine Mammal Science, 1991.

Au, W.W.L., Application of the Reverberation-Limited Form of the Sonar Equation to Dolphin Echolocation, Journal of the Acoustical Society of America (Volume 92(4), Pages 1822-1826) October 1992.

Au, W.W.L., Application of the Sonar Equation to Dolphin Echolocation, Proceedings, Fourteenth International Congress on Acoustics, September 1992.

Au, W.W.L., Comparison of Sonar Discrimination by an Echolocating Dolphin and a Counter-Propagation Neural Network, Proceedings, Fourteenth International Congress on Acoustics, September 1992.

Au, W.W.L., Comparison of Sonar Discrimination by an Echolocating Dolphin and a Counterpropagation Neural Network, Journal of the Acoustical Society of America, (Volume 90, Issue 4, Page 2334) November 1991.

Au, W.W.L., Critical Ratio and Critical Bandwidth for the Atlantic Bottlenose Dolphin, Journal of the Acoustical Society of America (Volume 8, Issue 3, Pages 1635-1638) October 1990.

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Au, W.W.L., Dolphin Sonar Discrimination Cues, Proceedings, International Symposium on Sensory Systems and Behavior of Aquatic Animals (Pages 17-18) October 1991.

Au, W.L.L., Echolocation Signals of the Smallest Odontocetes, Journal of the Acoustical Society of America (Volume 89, No. 4, Page 1967) 1991.

Au, W.W.L., and C.W. Turl, Material Composition Discrimination Of Cylinders At Different Aspect Angles By An Echolocating Dolphin, Journal of the Acoustical Society of America (Volume 89(5) Pages 2448-2452) May 1991.

Au, W.L.L., Narrow-Band Sonar Signals of Small Cetaceans, Proceedings, Ninth Biennial Conference on the Biology of Marine Mammals, December 1991.

Au, W.W.L., Sonar Detection of Nets by Dolphins, IWC Special Issue on Mortality of Cetaceans in Passive Fishing Nets and Traps, September 1991.

Au, W.W.L., Target Strength Measurements of Nets and Implications Concerning Incidental Take of Dall's Porpoises, Marine Mammal Science (Volume 7, Issue 3, Pages 1-32) December 1990.

Aviles, W.A., T.W. Hughes, H.R. Everett, A.Y. Umeda, S.W. Martin, A.H. Koyamatsu, M.R. Solorzano, R.T. Laird, and S.P. McArthur, Issues in Mobile Robotics: The Unmanned Ground Vehicle Program Teleoperated Vehicle, Proceedings, SPIE Symposium on Advances in Intelligent Systems (Volume 1388, Pages 587-597) April 1991.

Axford, R.A., Blind Equalization with the Lattice Constant Modulus Algorithm, Proceedings, IEEE MILCOM 1993 (Pages 268-272) October 1993.

Azu, C.C., An Application Protocol for CAD to CAD Transfer of Electronic Information, Proceedings, Technology 2000 Conference, December 1992.

Azu, C.C., Statistical Process Control in the Hybrid Microelectronics Manufacturing Industry: A Navy Viewpoint, Proceedings, ADPA Statistical Process Control (Pages 103-130) March 1993.

Backman, K., Strapdown Astro-Inertial Navigation Utilizing the Optical Wide-Angle Lens Startracker, Journal of the Institute of Navigation, Winter 1990/1991.

Balias, J.A., C.L. Heitmeyer, M.A. Perez, Interface Styles for the Intelligent Cockpit: Factors Influencing Automation Deficit, Proceedings, AIAA Computing in Aerospace 8, 1991.

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Bamber, D.E., Learning-Forgetting Independence, Unidimensional Memory Models, and Feature Models; Commentary on Bogartz, Journal of Experimental Psychology, Learning, Memory, and Cognition, January 1990.

Barlin, B., Rapid Prototyping of Message Processor Systems, MILCOM 90 Conference Record (Volume 3, Pages 1044-1048) October 1990.

Barlin, B., Effective Software Reuse in An Embedded Realtime System, Proceedings, TRI-Ada 92, November 1992.

Barr, D., Surface Ship Ring Laser Gyro Navigator, Proceedings, Joint Service Data Exchange, October 1992.

Barrios, A.E., Terrain Modeling Using the Split-Step Parabolic Equation Method, Proceedings, IEEE Radar 1992 (Issue 365, Pages 66-69) October 1992.

Barrios, A.E., Parabolic Equation Modeling in Horizontally Inhomogeneous Environments, IEEE Transactions on Antennas and Propagation (Volume 40, Number 7, Pages 791-797) April 1993.

Barrios, A.E., Parabolic Equation Modeling In Range-Dependent Environments, Proceedings, National Radio Science Meeting (URSI) January 1992.

Barrios, A.E., Terrain Parabolic Equation Model (TPEM), Proceedings, VRSI National Radio Science Meeting (Page 107) January 1993.

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f. Identify any Nobel laureates employed at this activity.

None.

g. List all non-governmental awards for research or technical excellence given to members of your technical staff since 1 January 1990.

**CY 90**

Acoustical Society of America Fellow

Dr. Whitlow Au

American Society of Mechanical Engineers Dedicated Service Award Medal

Dr. Jerry D. Stachiw

Society for Technical Communication Publication Awards

"STI Handbook: Guidelines for Producing Using, and Managing Scientific and Technical Information at NOSC," Award of Excellence

"Fifty Years of Research and Development on Point Loma," Award of Excellence

"A Short History of NOSC on Point Loma," Award of Excellence

Awards for Research or Technical Excellence

Dr. James Zeidler appointed adjunct professor in the Department of Electrical and Computer Engineering at the University of California, San Diego

Dr. Thomas Mautner selected as Senior Fellow at San Diego Supercomputer Center

Dr. George M. Dillard selected as General Chairman, Twenty-Fourth Annual Asilomar Conference on Signals, Systems, and Computers

International Marine Animal Trainer's Association (IMATA) Awards

D. Schinder, "Behavior of the Decade" award for "Relieving stress in husbandry through behavioral conditioning"

R. L. Brill, for service as Vice President

Honorary Life Membership Award - International Association for Aquatic Animal Medicine

Sam H. Ridgway

Society for Technical Communication

Margaret E. Cathcart for her successful development and management of the technical program for the 37th International Technical Communication Conference

**CY 91**

International Marine Animal Trainers Association (IMATA) "Behavior of the Decade" Award for dolphin-trained husbandry behaviors to improve medical treatment for the animals

Distinguished Alumnus Award, Texas A&M University, College of Veterinary Medicine

Sam H. Ridgway

Awards for Research or Technical Excellence

Dr. George M. Dillard selected as a member of the Steering Committee of the Asilomar Conference on Signals, Systems, and Computers

Society for Technical Communication

Margaret E. Cathcart elected as Associate Fellow in recognition of superior commitment and outstanding contributions to management of scientific and technical information and for dedicated service to the Society for Technical Communication

**CY 92**

American Defense Preparedness Association Bronze Medal

John Ehlers for scientific and engineering achievement in the field of antisubmarine warfare

Federal Laboratory Consortium Award for Technology Transfer

Dr. Graham A. Garcia and Dr. Isaac Lagnado for their technical and marketing efforts in developing and transitioning thin film silicon on sapphire technology to industry

Institute of Electrical and Electronic Engineers Achievement Award

Harry Gold for his work in the development and publication of an IEEE token ring standard

for communications networks

Marine Technology Society Remotely Operated Vehicle Committee Decade of Achievement Award

Bob Wernli for organizing the first ROV conference and serving as conference chairman for 10 years

Marine Technology Society Remotely Operated Vehicle Committee Distinguished Service Award

Howard R. Talkington for his role in developing the first ROVs and subsequent contributions to this technology area

Pacific Congress on Marine Science and Technology International Service Award

Howard R. Talkington

San Diego Oceans Foundation Roger Revelle Perpetual Award

Peter Seligman for leadership of and contributions to Navy environmental programs

International Marine Animal Trainer's Association (IMATA) Awards

R. L. Brill for service of President
R. L. Brill for Outstanding Service
R. L. Brill for Outstanding Achievement as Chair of the Constitution/Bylaws Committee

Clinical Medicine Award - International Association for Aquatic Animal Medicine

Sam H. Ridgway

Awards for Research or Technical Excellence

Dr. Richard Freund appointed Guest Editor of special issue of Journal of Parallel and Distributed Computing

Dr. Irwin Goodman appointed Guest Editor of the special issue of the IEEE Transactions on Systems, Man, and Cybernetics

CY 93

Royal Institute of Navigation Gold Medal

Eric R. Swanson for contributions to the theory and practice of navigation, particularly as related to the Omega Navigation System

Acoustical Society of America Pioneers of Underwater Acoustics Medal

Dr. Homer Bucker for outstanding contribution to the science of underwater acoustics, specifically for his work in modeling sound propagation through matched-field processing and for his efforts in signal processing, computational acoustics, and experimental methods

AFCEA Hawaii Executive of the Month

Dr. Bernie Schneiderman

Distinguished Young AFCEAn

John Robusto for professional efforts in direct support of the fleet in application of space systems in the tactical environment and for leading advanced intelligence systems research

International Marine Animal Trainer's Association (IMATA) Award

R. L. Brill for the best presentation in education/conservation for "Reintroducing captive dolphins: responsible management or emotional placebo?"

Society for Technical Communication Publication Awards

STI Handbook -- A Handbook for Navy Scientists and Engineers, Award of Merit

Naval Command, Control and Ocean Surveillance Center, Certificate of Achievement

Optical Fibers for Long-Haul Transmission in Severe-Bending Applications, Award of Merit

Using the Burst Derivative Measure to Improve the Computational Efficiency of ISAR Compensation Algorithms, Certificate of Achievement

Battle Management Architecture Design Concepts, Certificate of Achievement

Visualization of Scattering Strength of Elastic Bodies in a Fluid, Certificate of Achievement

Awards for Research or Technical Excellence

Dr. Homer Bucker received the Pioneer of Underwater Acoustics Medal

Dr. James Rohr chosen to serve on the Technical Review Panel for the White House Technical Reinvestment Project

Dr. Po Tang selected to serve on the Composites Committee of the Material Division of the American Society of Mechanical Engineers.

Dr. Sabine Apitz selected as Navy liaison for the Marine Board of the National Research Council's Committee on Contaminated Marine Sediments
Dr. Alan Gordon selected to submit the Advanced Unmanned Search System (AUSS) as an entry in the 1994 DISCOVER Awards for Technical Innovation

Society for Technical Communication

Margaret E. Cathcart elected Fellow for exceptional performance as writer, editor, and manager of naval publications; for introducing the Navy's first state-of-the-art electronic publishing system; and for leadership in advancing the quality of STC's international conferences.

h. List all governmental awards for research or technical excellence given to members of your technical staff since 1 January 1990.

**CY 90**

Trident II (D-5) flag presented by Director, Navy Strategic Systems Programs, for "significant contributions" to Trident Submarine Program

Strategic Defense Initiative Office, Passive Sensors Division, Technical Excellence Award

J. D. Merriam

Navy Superior Civilian Service Award

George R. Dobson for service as NSAP Science Advisor to Commander, Naval Special Warfare Command, specifically in communications

Carl H. Grieve for service in intelligence projects

Navy Meritorious Civilian Service Award

James W. Aitkenhead for contributions and leadership in ASW and undersea surveillance programs

Arthur J. Antczak for overseeing the transition to the new CATS telephone system

Dr. M. Allan Beal for outstanding achievement in arctic research

Steve Brenneman for leadership as program manager for Tactical Flag Command Center/Flag Data Display System program

Robert D. Boyle for engineering design of the Center's scientific facilities

Margaret E. Cathcart for development and management of the Center's formal publications program

Roger K. Cernius for development of improved strategic and tactical submarine communications systems

Refugio Delgado III for contributions as senior systems engineer for the USS *Belknap* upgrade program

Louis E. Griffith for development of techniques for automatic signal detection and classification in the area of ASW

Dr. Thomas E. Jones for high temperature superconductivity research

Dr. Michael F. Morrison for his achievements in underwater acoutic propagation applications for surveillance technology

Dr. Glenn A. Osga for contributions in human factors research related to combat systems and for service as U.S. representative on a NATO armament information exchange group

Dr. Lynn A. Parnell for research in closed liquid metal combustion technology

Merle R. Paulson for communications research ranging from VLF radio waves to atmospheric optics

Rik Pierson for his leadership in the shift of the CINCPACFLT battle watch to an alternate command center

James V. Thorn for efforts in the areas of optics, mathematics, electronics, acoustics, and mechanics

Ron Thuleen for contributions to Navy surface ship ASW capabilities

Franklin E. White, Jr. for design of command and control intelligence systems and

correlation architectures

Robert L. Williams for design and development of the High Data Rate Mode and other communications systems

Navy Award of Merit for Group Achievement

Battle Group Assessment Team

Navy Science Assistance Program - Technical Advisor of the Year

John Smaldino

IR/IED

Carol Dooley, Mark Berry, and Debra Gookin for outstanding achievement at the Third Annual Navy IR/IED Symposium

Navy Commendation Medal

CDR Ed McDaniel, USN, for coordinating and supervising intelligence and cryptologic support to Third Fleet during PACEX-89

CDR Charles Wolfe, USN, for service as Planning and Coordinating Officer for PACEX 89

LCDR Carleton Ayers, USN, for duty as Principal Liaison Officer for PACEX 89

LCDR Leigh M. Thaeler, USN

LT Mark E. Chisam, USN

LT Daniel Welke, USN, for duty as Communications Support Section Head for PACEX 89

RMCM Leroy L. Ballard, USN

HT1 Kirk D. Pyle, USN, and BM2 Richard L. Giffin, USN, for their night, open-ocean rescue in heavy seas of an F-14 crew after their plane crashed off San Clemente Island

Navy Achievement Medal

CDR Edmond Hagee, USN

HMCM (MDV) Dennis R. Elsasser, USN, for service as senior diving medical technician

and administrative assistant for NOSC San Diego Diving Division

ETC Donna L. Means, USN
ET1 Jeffrey A. Hopkins, USN, for service as leading electronics technician in support of PACEX-89

IC1 Edward Mitchell, USN

OTA1 Peter Szlachetka, USN,for service as program manager of the Target Data Processor and the Universal Communications Processor for the Oceanographic System Support Detachment

RM2 Janice E. Gillespie, USN

RM2 Angela Lamour Walters, USN, or service as watch supervisor and satellite communications terminal operator for CNO Project 784

EN2 Jami A. Schoenfelder USN

ET2 George Garcia for service as satellite communications terminal and baseband equipment maintenance technician for CNO Project 784

EN3 Maritza Rodriguez, USN

**CY 91**

Federal Laboratory Consortium (FLC) Technology Transfer Award

Dr. Steve Cowen for efforts in transferring expendable fiber-optic microcable technology to industry

Federal Laboratory Consortium (FLC) Technology Transfer Awards of Merit

R. Paulus
H. Hitney
K. Anderson
C. Haltan
A. Barrios
W. Patterson
G. Lindem

Office of Naval Research Outstanding IR/IED Achievement Awards

Dr. Homer Bucker
Neil Kamikawa

Office of Naval Technology Certificates of Commendation

Slack-Line Array

Dr. Homer Bucker
Dean Hanna
Mike Morrison
Art Nakagawa
Jack Olson
Dick Shockley
Bruce Williams

United Networking Technology

Roger Casey
Caesar Castro
Reeve Peterson
Dr. Cliff Warner

Strategic Defense Initiative Office, Passive Sensors Division, Lifetime Achievement Award

D. L. Stierwalt

Navy Superior Civilian Service Award

Carl Grieve for intelligence and security services in support of special compartmented activities

Alan K. Hayashida for service as Arctic advisor, test director, senior scientist, and tactical development exercise coordinator in USS *Seahorse* (SSN-669) during ICEX 1-90

Dan Hightower for pioneering efforts in developing emerging technologies, including Small Water-Plane Area Twin-Hulled (SWATH) ship technology, undersea vehicles and their cables, telerobotics, fiber optics, acoustic and electromagnetic surveillance, and marine mammal research and systems applications

Jeanne Holzmann for service as Navy Science Assistance Program science advisor to Commander, Naval Surface Force, Pacific

Navy Meritorious Civilian Service Award

Jerome R. Beauchane for leadership as head of the Afloat Command Systems Information Branch and Deputy Project Manager for the Navy Tactical Command Systems-Afloat program

Donald J. DeFrain for planning and development of numerous military construction projects and other facilities requirements

Dr. Richard J. Jaffee for leadership of and technical contributions to the Navy Tactical Command Systems-Afloat program

Aram K. Kevorkian for technical leadership in development of supercomputing applications and extensive technical publication

James L. Lievens for 40 years of contributions to location, testing, and designation of shipboard antennas

Dr. Tom Mautner for leadership and technical contributions in the area of propeller design

Matthew N. McLandrich for significant contributions to the advancement of lightwave communications technology

Patrick W.B. Moore for contributions in the areas of animal psychophysics and neural network models of dolphin echolocation

Richard M. Poehling for his leadership in effective handling of a variety of administrative functions

Paul A. Singer for development and deployment of several systems increasing the Navy's capabilities in the area of submarine communications

Judith R. Theisen for technical contributions and leadership in development of computer programs for the Antisubmarine Warfare Control System Mark 116 Mods 5, 6, 8, and 9

Christopher M. Young for leadership and contributions to fiber-optic cable programs that provide more effective underwater communications

Dr. James R. Zeidler for efforts distinguishing him as an international expert in semiconducting diamond technology

Navy Awards of Merit for Group Achievement

Battle Force Inport Training

Project Manager Thomas R. Tiernan
Kevin E. Boner
Contradita Gonzalez
Douglas R. Hardy
John G. Kammerer
Rubin P. Kaufman

Electronic Combat Module

Project Leader Rey Yturralde
Robert Fish
Chris Haupt
Sia McGown
Rick Odermatt
Bill Ray
Tim Wadsworth

Navy Tactical Command Systems-Afloat

Program Manager Dr. Richard Jaffee
Todd A. Almond
Jerome R. Beauchane
Refugio Delgado III
CDR Wayne Duke
Don Eddington
Janet L. Fader
Mary L. Fox
Laura R. Hickman
DS2 David M. Nutting, USN
Charles J. Schwartz
Randal R. South
Herbert M. Stillings
LCDR Kenneth Wheeler, USN

Regional ASW Command Center

Team Leader Corky Stradling
Frank Adams
James Aitkenhead
Morris R. Akers, Jr.
Barry Ault
Domenick Calabro
Palmer Chase

Thomas Clark
Kenneth Faucher
Sid Green
Carl Grieve
Russell F. Holland
Edward Jahn
Patrick H. Johnson
Christine Lisman
David Lowenstein
Greg Mani
Dennis Mattison
CDR Ed McDaniel, USN
Tyrone McMurrey
James A. Michael
John Novotny
John Salzmann, Jr.
Harold Smith
Randy South
Gerald S. Sprouse
Charles Sturtevant
George Walt
Edward C. Wysocki

"50 Year" History Publication Team

Project Manager Margaret E. Cathcart
Joyce Andrews
Eleanor Boxberger
Lee Hood
Shari Stafford
Juni Thompson
Al Woerner

IR/IED

Dr. Homer Bucker and Neil Kamikawa for outstanding achievement at the Fourth Annual Navy IR/IED Symposium

Secretary of Defense Award for Excellence

Ray E. Glass

American Defense Preparedness Association Award

Robert L. Matthews
Robert L. Smith

Meritorious Service Medal

CDR William T. Sleichter

Navy Commendation Medal

CW03 Steven K. Dowd, USN

CDR Ed McDaniel, USN, for organizing, coordinating, and supervising a select group of intelligence and cryptologic specialists supporting Third Fleet forces in PACEX-89, the largest Pacific naval exercise since World War II

LCDR Judy A. Overhauser, USN

LT William R. Ray, USN

Army Commendation Medal

ET1 Kirk A. Guarian, USN

RM2 Linda L. Handley, USN

ET1 Lance V. Hayden, UCN

Navy Achievement Medal

HTCS (DV) Kenneth O. Cline, USN

ET2 George Garcia, USN, for service as satellite communications terminal and baseband equipment maintenance technician for CNO Project 784, EHF Satellite Communications Program

ET1 Jeffrey A. Hopkins, USN, for service as leading electronics technician supporting Commander-in-Chief, U.S. Pacific Fleet Alternate Command Center during relocation of CINCPACFLT Battle Watch to a remote location

DS2 David M. Nutting, USN

HM1 Edward P. Presnillo, USN

QMC Peter Riordan, USN

LT Norah H. Taylor-Brown, USN

RM2 Angela Lamour Waters, USN, for service as watch supervisor and satellite communication terminal operator for CNO Project 784

CY 92

Army Corps of Engineers, Special Act Award

Briar Visser for service in the Kuwait Emergency Recovery Office following the Persian Gulf War

Department of Defense, Civilian, Desert Shield/Desert Storm Medals

Todd Almond
Jerry Beauchane
Dr. Will Cronym
Regufio Delgado III
Tim Fitzgerald
Edwin C. Lewis
David Matsubara
Bill Ray
John Smaldino
Randy South
Robert A. Stephenson
Michael Wills
Ed Zeranski

Meritorious Service Medal

CDR Tom Utschig, USNR, for service aboard USS *Tarawa* (LHA-1) as flag watch officer for Commander, Amphibious Group Three, deployed to the Persian Gulf during Operation Desert Storm

Navy Achievement Medal

IC1 (SS) Daniel R. Christensen, USN, for service as Assistant Arctic Submarine Laboratory Logistics Coordinator at Ice Camp APLIS during ICEX 1-91

OM1 Daniel I. Grundfossen, USN, for service as Assistant Arctic Submarine Laboratory Logistics Coordinator at Ice Camp APLIS during ICEX 1-91

DS2 David M. Nutting, USN, for service as the Flag Data Display System Navy Tactical Command System-Afloat military technician

ET1 (SW) Donald Thornberry II, USN, for service as Assistant Arctic Submarine Laboratory Logistics Coordinator at Ice Camp APLIS during ICEX 1-91

Navy Award of Merit for Group Achievement

Fleet Mobile Operational Command Center

Jim Kadane, Project Manager
Jerry Beauchane
Refugio Delgado III
Bob Stephenson
Todd Almond
Steve Musson
Brad Carter
DS3 Rich Jack, USN
Jesus Lopez
Raymond Barrera
Frank Stitt
Lee Hansen
Russ Keefer
Rick Hollandsworth
Janet Fader
Laura Hickman

Air Defense Initiative

Jim Price, Program Manager
Jim Kadane, Systems Engineering and Integration Manager
Cliff Meland, Acceptance Test Director
Joe Culver, Team Leader
Angela D'Amico, Team Leader
John Ehlers, Team Leader
Stan Follis, Team Leader
Lt. Ken Garber, USN, Team Leader
Lou Griffith, Team Leader
Jay Martin, Team Leader
Scott Adams
Rodney Anderson
Ray Barrera
Mel Calderon

Teresa Church
David Clark
Khanh Dam
Don Davison
Gary Dorrance
John Douma
Jayson Durham
Dave Edelblute
Brian Gilbreath
Doug Grimmett
Charles Hansen
Lee Hansen
Mike Hoernemann
Mark Hogue
Mike Howard
Glen Hunsaker
Martin Jordan
Paul Kennedy
Fred Kramer
Charles March
Joe McCarthy
John McDonnell
Larry McKinley
Maggie Minor
Richard Myers
Toni Nelson
Todd Pickering
Nick Ramos
John Skadberg
Ted Sledzinski
Willie Stevenson
Lynne Tablewski
Bill Taylor
Son Tran
Glenn Urie
Jesus Zuniga

Navy Commendation Medal

Lt. Kenneth, R. Garber, USN, for service as project manager for the aircraft integration of the Sonobuoy Thinned Random Array Program

UIC: N66001

Navy Meritorious Civilian Service Award

Dr. James W. Broyles for service as Navy Science Assistance Program human factors advisor to virtually every major Navy and Marine Corps operational command

Jack L. Davis for leadership as Program Manager of the Antisubmarine Rocket missile program

Refugio Delgado III for creative engineering in developing open architecture command and control systems for the Fleet

Timothy P. Fitzgerald for design, development, and installation of fiber optics capability for the Defense Dissemination System

Jeff Gossett for service as technical advisor to the Commanding of USS *Pargo* (SSN-650) during ICEX 1-91

Edward M. Holler for establishing and managing the Integrated Undersea Surveillance System Software Support Activity

Thomas W. Hughes for leadership of and technical contributions to the Department of Defense Unmanned Ground Vehicle Development Program

Douglas R. Jensen for his work in quantifying the effect of the atmosphere on optical and infrared propagation

Elizabeth A. Lachtman for her work as lead designer for antisubmarine warfare control systems, including exceptional front-end software engineering

Richard J. Morin for technical and leadership achievements in managing the Command and Control Processor Program

Patrick Moore for contributions and leadership in areas of animal psychophysics and neural network models of dolphin echolocation

James B. Rhode for building the competence and reputation of his branch and developing positive relationships with branch sponsors

Robert A. Stephenson for managing efforts to provide over-the-horizon targeting support to Navy long-range weapons

Earl R. Towson for contributions to the mission purification team during the consolidation period that led to the establishment of NCCOSC RDTE DIV SAN DIEGO CA

UIC: N66001

Edward J. Zeranski for design, development and installation of fiber optics capability for the Defense Dissemination System

Navy Science Assistance Program, Technical Advisor of the Year

Dr. James Broyles

Federal Laboratory Consortium (FLC) Award for Excellence for Technology Transfer

I. Lognado
G. Garcia

Act Award

Celia D. Metz for Unmanned Ground Vehicle Program

Navy Superior Civilian Service Award

Mike Reilley for superior leadership and outstanding technical expertise resulting in high quality and quantity software support to the Fleet

Office of Naval Technology, Best FY 91 Independent Exploratory Development Project

Dr. Roger Boss
Bill Jacobs

Navy Commendation Medal

CDR Carl A. Wales, USN, for service as Officer-in-Charge of Ice Camp APLIS (Applied Physics Laboratory Ice Station) during Ice Exercise (ICEX) 1-91

LT William R. Ray, USN, for service as Submarine Range Safety Officer at Ice Camp APLIS during ICEX 1-91

**CY 93**

Department of the Army

Group Special Act Award, U.S. Army Belvoir R&D Center for contributions to the Mobile Detection Assessment Response System (MDARS)

Gary Gilbreath
Tracy Heath-Pastore
Richard Laird

Richard Smurlo
Steve Timmer
Teresa Tran

Department of the Navy

Legion of Merit

Captain James D. Fontana, USN

Meritorious Service Medal

LCDR Ronald C. Bethmann, USN

Special Act Awards

Navy Information Technology Acquisition Center

Steve Brenneman for service as lead engineer and team leader on the Source Selection Evaluation Board for the Navy Tactical Advanced Computer acquisition project

Navy Public Works Center, San Diego

Gordon Chase for substantial fund savings in repair of a portal crane providing direct support to aircraft carriers at NAS North Island

NDARS Team

Robin T. Laird
Richard P. Smurlo
Tracy A. Heath-Pastore
Theresa T. Tran
Gary Gilbreath

Mobile Inshore Undersea Warfare System

Brain M. Oshima
Lloyd B. Yano

Navy Superior Civilian Service Award

Don Eddington for service as Navy Science Assistance Program (NSAP) Science and Technical Advisor to Commander in Chief, U.S. Pacific Command

Howard R. Talkington for leadership and significant personal contribution to ocean technology and exploration of the ocean environment

Earl Towson for strategic business and reorganization planning, and new business outlook analysis and forecasting

Dr. Sachio Yamamoto for service as Director of the Office of Naval Research Asian Office, during which he initiated new contacts with high-level Japanese R&D leaders

Navy Meritorious Civilian Service Award

Dr. Donald J. Albares for internationally recognized efforts in development of optical fiber and guided wave optical technogies

Jerome R. Beauchane for service as lead on-site systems engineer for the Navy Tactical Command System-Afloat, providing afloat and ashore command centers with state-of-the-art command and control capabilities

Dr. Roger D. Boss and Everett W. Jacobs for in-depth investigation into fractal image compression techniques

Ronald L. Broersma for key efforts on the NCCOSC Corporate Internet and Administrative System and his service as principal Navy representative on the Defense Research and Engineering Network Technical Advisory Panel

John Y. Chang for program management on the Marine Air Ground Task Force Tactical Warfare Simulation

Patrick J. Donahoe for test direction and systems engineering for the Surveillance Towed Array Sensor System and the Low Frequency Active Program

Donald L. Endicott for efforts as the Navy representative on the Department of Defense High Performance Computing in the DoD HPC implementation plan

Dean A. Hanna for technical leadership of the Undersea Surveillance Block Program, establishing new standards of quality for program management and for the block's technical products

Dr. Peder M. Hansen for technical leadership in submarine communications including testing of VLF antennas transitioning from the U.S. Navy to the Royal Australian Navy

Ronald M. Hidinger for technical development and leadership that enhanced Navy capabilities in antisubmarine warfare, computer technology and undersea acoustic surveillance

James Kadane for leadership in fielding the Fleet Mobile Operational Command Center, enhancing Navy $C^4I$ capability and providing the Naval Component Commander $C^4I$ ashore and connectivity to the Joint Commander

Dr. William H. Marsh for achievements as chief scientist for Surveillance Towed Array Sensor System and Low Frequency Active project for coordinating at-sea testing and data analysis

John A. Mayr for design, development, operation and management of the hybrid simulator, providing hardware-in-the-loop simulation essential to test and evaluation of torpedo guidance systems

Jack R. Olson for underwater sensor design, fabrication and deployment, particularly of experimental ocean environmental sensing and measurement devices for undersea surveillance

John A. Salzmann for leading development of ashore and afloat command and control capabilities and moving toward a single integrated software development environment for C2 systems

Richard T. Shearer for leadership as Technical/Executive Director during a difficult transition period including major reorganization, transfer of product lines into and out of the command, facilities closure, and personnel reductions

Cornell S. Stradling for management of the Navy Space Task, leading development of $C^3I$ prototypes serving the Navy intelligence community in signal, electronic and acoustic data collection and analysis

Thomas R. Tiernan for initiation of projects covering core technologies for an Advanced Technology Demonstration, based on the transition of simulator networks to an open system of distributed interactive simulation

Gary Toth for service as Navy Science Assistance Program Automatic Data Processing Technical Advisor to Commander, Sixth Fleet

Dr. Clifford J. Warner for communications networking expertise, including service as block manager for Communications Support System program and efforts on Communication Systems Network Interoperability program

UIC: N66001

Reynaldo F. Yturralde for leading development of environmental and electronic warfare data bases to support Fleet $C^4I$ systems, including contributions to a system employed by USS *Ranger* (CV-61) in Operation Desert Storm

Navy Award of Merit for Group Achievement

Automated Information System Accreditation Process Action Team
- Lee Churchyard, Chairperson
- Rick Avila
- Tom Clark
- Larry Core
- Michelle Ferro-Czech
- Marion Griffin
- Lynn Roenicke
- Nancy Vorce
- Shirley Walbert

Fleet Mobile Operational Command Center Team
- James Kadane, Project Manager
- Todd Almond
- Jerome Beauchane
- Brian Britt
- Refugio Delgado
- Janet Fader
- CDR Michael Ferguson, USN
- Robert Fish
- Patrick Garcia
- Laura Hickman
- DS3 Richard Jack, USN
- Jesus Lopez
- Ward Page
- Charles Schwartz
- Robert Stephenson
- Kristine Ward

Surveillance Towed Array Sensor System/Low Frequency Active (SURTASS/LFA) Team
- Dr. Robert S. Smith, Program Manager
- Alfred Aburto
- Scott Adams
- Don Barach
- Dr. Homer Bucker
- Cecilia Burrus
- Melquiades Calderon

UIC: N66001

LCDR Richard Chase, USN
Margaret Cobleigh
Margaret Cooper
Dana Cottrell
Joseph Culver
Jerome DeJaco
Andrew de Torres
Patrick Donahoe
Vickie Flood
Mary Ann Garbarini
David Gillette
Marilyn Green
James Gregg
David Keir
James Lockwood
Charles March
William Marsh
Steven McCarthy
Larry McKinley
Clifford Meland
Daniel Michon
Ulysses Miller
William Miller
Michael Morey
Donald Murdock
Charles Nichols
Barbara Peugh
Gunnar Ramstrum
Willard Rask
James Reese
Daniel Rountry
Frank Ryan
Phillip Schey
STS1 Robert Schlayer, USN
Rhett Shaw
CDR William Sleichter, USN
STG1 James Taylor, USN
Ray Tejidor
James Thomson
Gary Turton

i. List all patents awarded to the in-house technical staff members of this activity since 1 January 1990.

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4. Navy Case No. 70055 by Larry D. Flesner for "Scanning Electron Microscopy by Photovoltage Contrast Imaging", U.S. Patent No. 4,902,967 issued Feb. 20, 1990.

5. Navy Case No. 70282 by David Rubin and Kurt Reinke for "Millimeter-Wave Multiplexers", U.S. Patent No. 4,902,992 issued Feb. 20, 1990.

6. Navy Case No. 71286 by Jimmy L. Held and Charles E. Tallerino for "Pressure Armed Release Device", U.S. Patent No. 4,903,382 issued Feb. 27, 1990.

7. Navy Case No. 68706 by David Rubin for "Suspended Substrate Elliptic Rat-Race Coupler", U.S. Patent No. 4,904,966 issued Feb. 27, 1990.

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9. Navy Case No. 71288 by Gerald R. Mackelburg, Stanley J. Watson, Jayson T. Durham and Alan Gordon for "Precision Doppler Effect Compensator", U.S. Patent No. 4,905,211 issued Feb. 27, 1990.

10. Navy Case No. 70748 by Patrick A. Shoemaker, Gene L. Haviland and Isaac Lagnado for "CMOS Analog Four-Quadrant Multiplier", U.S. Patent No. 4,906,873 issued Mar. 6, 1990.

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16. Navy Case No. 70447 by Larry D. Flesner, Wesley L. Eisenman, James D. Merriam, Richard L. Bates, Rolf N. Dahle and Douglas C. Arrington for "Electron Beam Apparatus for Testing Infrared Detectors in a Cryogenically Shielded Environment", U.S. Patent No. 4,929,831 issued May 29, 1990.

17. Navy Case No. 70023 by Sam DiVita and Howard E. Rast, Jr. for "Method for Detecting Pinholes and Incomplete Coverage of Hermetic Coatings on Optical Fiber Waveguides", U.S. Patent No. 4,929,837 issued May 29, 1990.

18. Navy Case No. 72289 by Alan M. Schneider and Donald W. Doherty for "Search-Radar Azimuth Correction", U.S. Patent No. 4,929,952 issued May 29, 1990.

19. Navy Case No. 69894 by Donald J. Albares, David B. Cavanaugh and Thomas W. Trask for "Optical Fiber-to-Channel Waveguide Coupler", U.S. Patent No. 4,930,854 issued Jun. 5, 1990.

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25. Navy Case No. 70390 by David M. Bullat and Willie L. Thomas for "Preset Restraining Device", U.S. Patent No. 4,944,074 issued Jul. 31, 1990.

26. Navy Case No. 64387 by Edward F. Rynne, Jr. and Jay C. Brown for "Piezoelectric Sandwich Polymer Transducer", U.S. Patent No. 4,950,936 issued Aug. 21, 1990.

27. Navy Case No. 69449 by Robert A. Bybee for "Low Storage-Volume Closure Device for Curved Surface", U.S. Patent No. 4,951,727 issued Aug. 28, 1990 (contractor).

28. Navy Case No. 71401 by Timothy C. Stamnitz for "Electro-Opto-Mechanical Cable for Fiber Optic Transmission Systems", U.S. Patent No. 4,952,012 issued Aug. 28, 1990.

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35. Navy Case No. 70022 by James H. Dombrowski, Herbert L. Mummery, Roger W. Buecher and Isao R. Yumoori for "System for Limiting Snap Load Intensity", U. S. Patent No. 4,964,491 issued Oct. 23, 1990.

36. Navy Case No. 69729 by Paul A. Singer and James L. Conrath for "Receiver Test Apparatus with Test Message Injector", U. S. Patent No. 4,972,511 issued Nov. 20, 1990.

37. Navy Case No. 71402 by David Lapota, Gary F. Mastny and Hugh D. Copeland for "Bioluminescent Detector", U. S. Patent No. 4,978,854 issued Dec. 18, 1990.

38. Navy Case No. 72220 by Patrick A. Shoemaker for "CMOS Analog Four-Quadrant Multiplier", U. S. Patent No. 4,978,873 issued Dec. 18, 1990.

39. Navy Case No. 71373 by Martin E. Moore and Robert R. Bennett for "Self-Sealing Separation Fastener for Small Confines", U. S. Patent No. 4,986,708 issued Jan. 22, 1991.

40. Navy Case No. 70532 by John Reindel for "Waveguide Bandpass Filter Having a Non-Contacting Printing Circuit Filter Assembly", U. S. Patent No. 4,990,870 issued Feb. 5, 1991.

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43. Navy Case No. 52344 by John W. McKune, Arnold O. Musolf, Timothy W. Hales and Eric D. Swanson for "Slurry Dispenser", U. S. Patent No. 4,991,529 issued Feb. 12, 1991.

44. Navy Case No. 61054 by Alan D. Rathsam for "Fin Apparatus for Controlling Heat Flux Distributions", U. S. Patent No. 4,991,530 issued Feb. 12, 1991.

45. Navy Case No. 47447 by James F. Dibrell and Donald L. Hendrix for "Device for Rejecting Pulse Repeater Deception Jamming", U. S. Patent No. 4,992,793 issued Feb. 12, 1991.

46. Navy Case No. 71940 by John A. Trias for "High Definition Video-Rate Laser-Addressed Liquid-Crystal Light-Valve Projection Display", U. S. Patent No. 4,992,880 issued Feb. 12, 1991.

47. Navy Case No. 41355 by Henry T. Yerby, Thomas G. Lang and Horace E. Karig for "Submarine Drone for Carrying a Barrel Stave-Type Transducer Array", U. S. Patent No. 4,992,999 issued Feb. 12, 1991.

48. Navy Case No. 71643 by Mark H. Berry and Debra M. Gookin for "Variable Weight Fiber Optic Transversal Filter", U. S. Patent No. 4,997,249 issued Mar. 5, 1991.

49. Navy Case No. 54886 by Fred G. Geil for "Transducer Array", U. S. Patent No. 5,003,285 issued Mar. 26, 1991.

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51. Navy Case No. 65493 by Glenn A. Walters for "Modulator to Provide a Continuous Stepped Frequency Signal Format", U. S. Patent No. 5,005,018 issued Apr. 2, 1991. (Contractor case)

52. Navy Case No. 71163 by Carol A. Dooley and Elek Lindner for "Organotin Compounds", U. S. Patent No. 5,006,554 issued Apr. 9, 1991.

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54. Navy Case No. 47650 by Shelby F. Sullivan, Harper J. Whitehouse and Richard P. Hamilton for "Transducer Assembly for Deep Submergence", U. S. Patent No. 5,007,030 issued Apr. 9, 1991.

55. Navy Case No. 72737 by Donald J. Albares for "Edge-Emitting Diode-to-Optical Fiber Coupling Technique", U. S. Patent No. 5,007,700 issued Apr. 16, 1991.

56. Navy Case No. 55212 by James R. Jones for "Radar Simulator", U. S. Patent No. 5,010,342 issued Apr. 23, 1991.

57. Navy Case No. 71726 by Patrick A. Shoemaker for "Resistive Element Using Depletion-Mode MOSFET'S", U. S. Patent No. 5,010,385 issued Apr. 23, 1991.

58. Navy Case No. 72075 by Richard Nguyen for "Insulator Assisted Self-Aligned Gate Junction", U. S. Patent No. 5,011,785 issued Apr. 30, 1991.

59. Navy Case No. 72450 by Russell E. Hammond, Robert L. Northup, Alan G. Shimp and Francis B. Fassnacht for "Electrical Power Supply for Short Term Power Interruptions", U. S. Patent No. 5,012,121 issued Apr. 30, 1991.

60. Navy Case No. 53930 by Clarence S. Johnson and Clarence G. Blanc for "Pulse Transformation Sonar", U. S. Patent No. 5,012,452 issued Apr. 30, 1991.

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65. Navy Case No. 70747 by Monti E. Aklufi and David W. Brock for "Plasma Generator Utilizing Dielectric Member for Carrying Microwave Energy", U. S. Patent No. 5,023,056 issued Jun 11, 1991.

66. Navy Case No. 61945 by Clarence F. Ramstedt for "Pulsed Field System for Detecting the Presence of a Target in a Subsurface Environment", U. S. Patent No. 5,025,218 issued Jun 18, 1991.

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68. Navy Case No. 55839 by Michael A. Halling for "Acoustic Locator for Elements of a Flexible Sonar Array", U. S. Patent No. 5,027,333 issued Jun 25, 1991.

69. Navy Case No. 58977 by Howard B. McCracken, Robert S. Acks and Stanley J. Watson for "Shaft Rub Simulator", U. S. Patent No. 5,029,143 issued Jul 2, 1991.

70. Navy Case No. 47187 by Guy J. Andrews, John M. McCool and Shelby F. Sullivan for "Acoustic, Underwater, Telemetry System", U. S. Patent No. 5,029,147 issued Jul 2, 1991.

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74. Navy Case No. 56170 by Howard R. Talkington for "Deep Operating Monitor and Destruct Device", U. S. Patent No. 5,033,354 issued Jul 23, 1991.

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79. Navy Case No. 70371 by John P. Bott for "Packaging for Explosive (ALCLO) Pellets", SIR Reg. Number H947 published Aug 6, 1991.

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88. Navy Case No. 56560 by Richard A. Hills for "High-Speed Beam Switching Processor", U. S. Patent No. 5,045,857 issued Sep 3, 1991.

89. Navy Case No. 40076 by Robert Halley for "Detection and Classification for Multi-Beam Sonar Systems", U. S. Patent No. 5,047,993 issued Sep 10, 1991.

90. Navy Case No. 71913 by Larry D. Flesner for "Optically Powered Charged Particle Accelerator", U. S. Patent No. 5,049,753 issued Sep 17, 1991.

91. Navy Case No. 60537 by Elmer D. Woodward for "Combined Microwave and Infrared Chaff", U. S. Patent No. 5,049,883 issued Sep 17, 1991.

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98. Navy Case No. 40075 by Keith E. Geren and Claude C. Routh for "Ping Elongator-Modulator for Realistic Echo Synthesis", U.S. Patent No. 5,062,083 issued Oct. 29, 1991.

99. Navy Case No. 60390 by Daniel E. Andrews, Jr. for "Vibration Isolation Module for Towed Seismic Arrays", U.S. Patent No. 5,062,085 issued Oct. 29, 1991.

100. Navy Case No. 70295 by Myer Geller and George A. Evanoff, Jr. for "Mid Range UV Communications", U.S. Patent No. 5,062,154 issued Oct. 29, 1991.

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102. Navy Case No. 70743 by Ronald E. Reedy, Graham A. Garcia and Isaac Lagnado for "Process for Making Semiconductor-on-Insulator Device Interconnects", U.S. Patent No. 5,066,613 issued Nov. 19, 1991.

103. Navy Case No. 70285 by Thomas I. Kirkpatrick for "Binaural Ultrasound Detector and Imager", U.S. Patent No. 5,068,832 issued Nov. 26, 1991.

104. Navy Case No. 72315 by Edward E. Betts for "High Lift Aircraft", U.S. Patent No. 5,071,088 issued Dec. 10, 1991.

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108. Navy Case No. 54913 by Rodney R. Buntzen and Robert R. Hammond for "Resonance Damage Process", U.S. Patent No. 5,081,900 issued Jan. 21, 1992.

109. Navy Case No. 71943 by Jimmy L. Held, Charles E. Tallerino and Ronald S. Reich for "Girth Hitching Mechanism", U.S. Patent No. 5,082,318 issued Jan. 21, 1992.

110. Navy Case No. 71997 by Robert F. Howarth for "Flux Containment Device", U.S. Patent No. 5,089,941 issued Feb. 18, 1992.

111. Navy Case No. 72099 by Richard Scheps for "Laser Diode-Pumped Tunable Solid State Laser", U.S. Patent No. 5,090,019 issued Feb. 18, 1992.

112. Navy Case No. 71162 by Gene L. Haviland, Patrick A. Shoemaker, James R. Feeley and Alfons Tuszynski for "Non-Volatile Analog Memory Circuit with Closed-Loop Control", U.S. SIR H1035 issued Mar. 3, 1992.

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118. Navy Case No. 71902 by Michael B. Young for "Cable-Line Shortening Device", U.S. Patent No. 5,109,577 issued May 5, 1992.

119. Navy Case No. 72770 by Hobart R. Everett, Jr., Gary A. Gilbreath and Robin T. Laird for "Navigational Control System for An Autonomous Vehicle", U.S. Patent No. 5,111,401 issued May 5, 1992.

120. Navy Case No. 73901 by Debra M. Gookin, Mark H. Berry and Markham E. Lasher for "High Speed Serial Optical Crossbar Switch", U.S. Patent No. 5,115,331 issued May 19, 1992.

121. Navy Case No. 68102 by Brett D. Castile and Shelby F. Sullivan for "Large, Air Deployable, Volumetric Hydrophone Array", U.S. Patent No. 5,117,396 issued May 26, 1992.

122. Navy Case No. 71711 by Frank Hanson for "Optics for Diode Array Transverse Pumped Laser Rod", U.S. Patent No. 5,117,436 issued May 26, 1992.

123. Navy Case No. 73695 by William D. Queen and Eugene P. Kelley for "Method of Making Integrated Circuit to Package Connections", U.S. Patent No. 5,119,173 issued Jun 2, 1992.

124. Navy Case No. 72530 by Richard Scheps for "Technique for Longitudinal Optical Pumping of a Laser", U.S. Patent No. 5,119,394 issued Jun. 2, 1992.

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130. Navy Case No. 73381 by Robert S. Henderson for "Flow Control and Diluter System for Bioassay Testing", U.S. Patent No. 5,123,438 issued Jun. 23, 1992.

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133. Navy Case No. 71369 by Harvey Tash and Robert Reed for "Retiming Decoder/Encoder", U.S. Patent No. 5,127,023 issued Jun. 30, 1992.

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1. Navy Case No: 71573 by Mark Lasher for "INTENSITY DEPENDENT BEAM DEFLECTOR" on 01/03/90.

2. Navy Case No: 71710 by L. McCleary for "COMPUTER GRAPHICS SOFTWARE TO PRODUCE ARBITRARY WORLD MAPS WITH POLYGON" on 01/31/90.

3. Navy Case No: 69926 by Robert Hoffman for "VEHICLE HANDLING SYSTEM FOR TETHERED SUBMERSIBLES" on 02/07/90.

4. Navy Case No: 70285 by Patrick Kirpatrick for "BINAURAL ULTRASOUND DETECTOR AND IMAGER" on 02/15/90.

5. Navy Case No: 71709 by Debra Gookin for "HIGH SPEED SERIAL OPTICAL CROSS BAR SWITCH" on 02/26/90.

6. Navy Case No: 72498 by Hobart Everett for "REAL-TIME OPTICAL MOTION DETECTOR" on 02/28/90.

7. Navy Case No: 72450 by Russell Hammond for "ENERGY STORAGE CIRCUIT FOR SHORT TERM POWER INTERRUPTION" on 03/22/90.

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9. Navy Case No: 72000 by Leopold Johnson for "MAIN AND AUXILIARY RECTIFIER SYSTEM FOR MINIMIZING LINE HARMONICS" on 03/22/90.

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11. Navy Case No: 71978 by Stephen Russell for "METHOD FOR LASER-ASSISTED SILICON ETCHING USING HALOCARBON AMBIENTS" on 03/29/90.

12. Navy Case No: 71726 by Patrick Shoemaker for "RESISTIVE ELEMENT USING DEPLETION-MODE MOSFETS" on 03/30/90.

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14. Navy Case No: 72737 by Donald Albares for "EDGE-EMITTING DIODE-TO-OPTICAL-FIBER COUPLING TECHNIQUE" on 04/13/90.

15. Navy Case No: 70448 by Mark Burgener for "ELECTRICAL CHARACTERIZATION OF AN INSULATING SUBSTRATE BY LOW INTERFACE BETWEEN THIN FILM FREQUENCY CAPACITANCE SILICON AND MEASUREMENTS" on 04/23/90.

16. Navy Case No: 70179 by David Cavanaugh for "A VERSATILE DIGITAL RECORDING SYSTEM FOR HIGH RESOLUTION VIDEO IMAGERY" on 04/25/90.

17. Navy Case No: 72056 by Patrick Shoemaker for "THREE-LEVEL WEIGHT UPDATE CIRCUITRY" on 05/08/90

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27. Navy Case No: 73021 by Monti Aklufi for "SEMICONDUCTOR- SEMICONDUCTOR COMPOUND INSULATOR-INSULATOR STRUCTURES" on 08/17/90.

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34. Navy Case No: 71912 by Larry Flesner QUANTUM WELL INFRARED DETECTOR -WITH DISCRIMINATION AGAINST INTRINSICION" on 09/26/90.

35. Navy Case No: 71826 by Richard Scheps for "A LASER DIODE PUMPED MULTIPLE ROD SOLID STATE RING LASER" on 09/28/90.

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57. Navy Case No: 72789 by Eric Whitesell Eric for " METHOD FOR BUFFERING AND RESIZING DATA" on 02/12/91.

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59. Navy Case No: 72464 by Stephen Russell for "LASER CONTROLLED DECOMPOSITION OF CHLOROFLUOROCARBONS" on 02/21/91.

60. Navy Case No: 72670 by Mark Berry for "WIDE BANDWIDTH DIFFERENTIAL AMPLIFIER" on 02/21/91.

61. Navy Case No: 70344 by Monti Aklufi Monti for "74LF ALIGNED BURIED INSULATED GATE FIELD EFFECT TRANSISTOR" on 03/01/91.

62. Navy Case No: 69930 by Bond James for "SPATIAL COMBINER" on 03/05/91.

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70. Navy Case No: 72992 by Daniel Katz for "FRAUNHOFER LINE LASER SOURCE @ 486.1 NM" on 05/16/91.

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81. Navy Case No: 73291 by Larry Flesner for "OPTICALLY POWERED PHOTOMULTIPLIER TUBE" on 06/18/91.

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98. Navy Case No: 72602 by Willard Cronyn for "UNINTERRUPTED, ENHANCED-RATE, EVENT-TIME RECORDER WITH MIXED-SPEED ----" on 10/09/91.

99. Navy Case No: 73106 by Victor Moberg for "CHROMIUM DOPED LASER TRANSMITTER OF EXTENDED WAVELENGTH CAPABILITY" on 10/16/91.

100. Navy Case No: 73577 by Steven Whiteside for "FLOW TRIPPED CERAMIC INJECTOR" on 10/16/91.

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107. Navy Case No: 74142 by Stephen Russell for "METHOD FOR LASER-ASSISTED SILICON ETCHING USING HALOCARBON AMBIENTS" on 12/12/91.

108. Navy Case No: 72604 by Willard Cronyn for "UNINTERRUPTED, ENHANCED MODULES RATE, EVENT SEQUENCER WITH MIXED-SPEED COUNTER" on 12/18/91.

109. Navy Case No: 73315 by Emilio De Pis Martinez for "REAL TIME CHANNEL SIMULATOR" on 12/23/91

110. Navy Case No: 73536 by Frank Hanson "BLUE GENERATION AT THE H-BETA FRAUNHOFER WAVELENGTH (486.13NM) USING--" on 12/26/91

111. Navy Case No: 73486 by Victor Moberg for "METHOD OF EMITTING ON A NEODYMIUM DOPED LASER SPECIFIC WAVELENGTH FRAUNHOFER TRANSMITTER LINE USING A" on 12/31/91.

112. Navy Case No: 74183 by Stephen Russell for "LASER TEXTURING" on 01/13/92.

113. Navy Case No: 74182 by Stephen Russell for "APPARATUS FOR LASER-ASSISTED COMPOUNDS USING ETCHING OF III-V AND II-VI CHLOROFLUOROCARBON AMBIENTS SEMICONDUCTOR" on 01/21/92.

114. Navy Case No: 73290 by Laurence Nishiguchi for "MULTIPLE USE SPANNER TOOL M.U.S.T. WRENCH" on 01/27/92.

115. Navy Case No: 73720 by Herbert Hitney for "HYBRID RAY OPTICS AND PARABOLIC EQUATION METHOD FOR RADIOWAVE PROPAGATION" on 02/12/92.

116. Navy Case No: 73845 by John Phelps for "EASILY TUNABLE DETECTOR FOR ANTENNA GROUND WIRES COVERING DISCONTINUITIES IN BURIED ENERGIZED" on 02/25/92.

117. Navy Case No: 73419 by Hobart Everett for "DOORWAY TRANSIT NAVIGATIONAL REFERENCING SYSTEM" on 02/26/92.

118. Navy Case No: 73514 by Neil Kamikawa for "PURE SILICA CORE DUAL-MODE OPTICAL FIBER" on 02/28/92.

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120. Navy Case No: 73611 by Willard Cronyn for "LOW COST RADAR TARGET SIMULATOR FOR REMOTE RADAR TESTING" on 03/13/92.

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122. Navy Case No: 72600 by Thomas Kirkpatrick for "TURN-ON TRANSIENT OVERCURRENT RESPONSE SUPPRESSOR" on 03/18/92.

123. Navy Case No: 72599 by Thomas Kirkpatrick for "HIGH-ISOLATION ELECTRONIC SWITCH" on 03/19/92.

124. Navy Case No: 73320 by Everett Jacobs for "ITERATED TRANSFORM ALGORITHM FOR COMPRESSION OF IMAGES" on 03/30/92.

125. Navy Case No: 74198 by Everett Jacobs for "ADAPTIVE PARTITIONING IN AN ITERATED TRANSFORM IMAGE COMPRESSION ALGORITHM" on 03/30/92.

126. Navy Case No: 74266 by Stephen Russell for "PHOTON CONTROLLED DECOMPOSITION OF NONHYDROLYZABLE AMBIENTS" on 03/31/92.

127. Navy Case No: 73689 by Trung Tran for "5VOLT LOW LEVEL SERIAL TRANSCEIVER" on 03/31/92.

128. Navy Case No: 73327 by Eugene Kelley for "METHOD OF RAPID SAMPLE HANDLING FOR LASER PROCESSING" on 03/31/92.

129. Navy Case No: 73084 by Glenn Osga for "METHOD AND APPARATUS FOR DISPLAYED OBJECTS THROUGH ENHANCING COMPUTER USER DYNAMICS SELECTION AREA AND SELECTION OF COMPUTER-CONSTANT VISUAL--" on 03/31/92.

130. Navy Case No: 73418 by Jack Holzschuh for "HYBRID DATA LINK" on 04/20/92.

131. Navy Case No: 73650 by Stephen Russell for "CONFORMAL WAVEGUIDE FOR OPTICAL AND ELECTRONIC INTEGRATION" on 04/30/92.

132. Navy Case No: 73421 by Richard Scheps for "INTERNALLY FOLDED SCALABLE LASER " on 05/21/92.

133. Navy Case No: 74585 by Richard Scheps for "TUNABLE LASERS PUMPED BY VISIBLE LASER DIODES" on 05/28/92.

134. Navy Case No: 73718 by Anthony Koyamatsu for "TORSIONAL DEVICE FOR REMOTE CONTROL STEERING SYSTEM" on 05/28/92.

135. Navy Case No: 73846 by Anthony Koyamatsu for "FIBER OPTIC CABLE PAYOUT SYSTEM" on 06/03/92.

136. Navy Case No: 72776 by Monti Aklufi for "LOW TEMPERATURE PLASMA FILM SOURCE MATERIAL DEPOSITION USING DIELECTRIC CHAMBER AS" on 06/11/92.

137. Navy Case No: 74157 by Car Zeisse for "AN ION-IMPLANTED DIAMOND METAL-INSULATOR-SEMICONDUCTOR TRANSISTOR" on 06/16/92.

138. Navy Case No: 73975 by Robert Slack for "INSTANTANEOUS BIT-ERROR-RATE METER"on 06/25/92.

139. Navy Case No: 73317 by Thomas Schlosser for "COMBINER FOR TWO DIMENSIONAL ADAPTIVE INTERFERENCE SUPPRESSION SYSTEM" on 06/25/92.

140. Navy Case No: 73324 by Randy Shimbukuro for "MICROELECTRONIC PHOTOMULTIPLIER DEVICE" on 07/01/92.

141. Navy Case No: 74081 by Gregory Adams for "FRAUNHOFER LINE LASER TRANSMITTING SYSTEM" on 07/01/92.

142. Navy Case No: 74742 by Alan Umeda for "MULTIPLE MONITOR PANORAMIC VIDEO DISPLAY SYSTEM" on 07/07/92.

143. Navy Case No: 74741 by Alan Umeda for "VIDEO PROPORTIONING AND DIRECTING CIRCUITRY FOR MULTIPLE MONITOR DISPLAY" on 07/07/92.

144. Navy Case No: 73973 by Laurence Gadbois for "STORM WATER RUNOFF FIRST FLUSH SAMPLER" on 07/23/92.

145. Navy Case No: 74728 by Stephen Russell for "LASER TEXTURING" on 07/27/92.

146. Navy Case No: 73927 by Douglas Sexton for "MICRODYNAMIC DEVICES FABRICATED ON SILICON-ON-INSULATOR SUBSTRATES" on 08/19/92.

147. Navy Case No: 73763 by Albert Zirino for "LIGHT-POWERED SYNTHETIC MUSCLE" 08/27/92.

148. Navy Case No: 73627 by Richard Nguyen for "SELF-ALIGNED GATE DIFFUSED JUNCTION FIELD EFFECT TRANSISTOR" on 08/28/92.

149. Navy Case No: 73776 by Wadad Dubbelday for "AETHOD OF FORMING A HIGH VOLTAGE SILICON-ON-SAPPHIRE PHOTOCELL ARRAY" on 08/31/92.

150. Navy Case No: 74272 by Matthew Tran for "NAVY TACTICAL DATA SYSTEM INTERFACE ADAPTER" on 09/11/92.

151. Navy Case No: 73701 by Herbert Hitney for "METHOD AND SYSTEM FOR OF THE ATMOSPHERIC FROM RADIO INFERRING THE RATIO REFRACTIVE MEASUREMENTS INDEX STRUCTURE" on 09/24/92.

152. Navy Case No: 73931 by James Lockwood for "PREPROCESSOR AND ADAPTIVE ACTIVE SIGNALS BEAMFORMER FOR LINEAR-FREQUENCY MODULATION" on 10/06/92.

153. Navy Case No: 73746 by Thomas Stixrud for "THERMISTOR CONTROLLED CURRENT SOURCE VERSATILE TEMPERATURE SENSOR" on 10/07/92.

154. Navy Case No: 73489 by Richard Scheps for "DIFFERENTIAL IMAGING FOR SENSITIVE PATTERN RECOGNITION" on 10/07/92.

155. Navy Case No: 74063 by Aram Kevorkian for "A PARALLELIZATION TOOL FOR PARALLEL ARCHITECTURE COMPUTER" on 10/21/92.

156. Navy Case No: 74124 by Douglas Sexton for "LASER TEXTURED SURFACE ABSORBER AND EMITTER" on 10/23/92.

157. Navy Case No: 75001 by Adi Bulsara for "NONLINEAR DYNAMIC SIGNAL FREQUENCY SIGNALS EMBEDDED IN PROCESSOR SUITABLE FOR NOISE DETECTING VERY LOW" on 10/23/92.

158. Navy Case No: 73883 by Richard Scheps for "A MULTIFREQUENCY, RAPIDLY SEQUENCED OR SIMULTANEOUS TUNABLE LASER" on 10/26/92.

159. Navy Case No: 74300 by David Bullat for "ACOUSTIC WINDOW (LOW COST)" on 11/19/92.

160. Navy Case No: 72765 by David Buck for "SOFTWARE SELECTABLE MIL-STD-188-114 COMMUNICATIONS CARD" on 11/19/92.

161. Navy Case No: 75114 by David Cavanuagh for "VERSATILE DIGITAL RECORDING IMAGERY SYSTEM FOR RECORDING HIGH RESOLUTION VIDEO" on 12/07/92.

162. Navy Case No: 74815 by David Arney for "HELICAL SPRING FASTENER" on 12/08/92.

163. Navy Case No: 73466 by Larry Flesner for "MONOLITHIC LOW VOLTAGE TO HIGH VOLTAGE CONVERTER" on 12/10/92.

164. Navy Case No: 74763 by John Maltby for "CONFORMING TUNING COUPLER FOR FLEXTENSIONAL TRANSDUCERS" on 01/07/93.

165. Navy Case No: 74617 by Sabine Apitz for "METHOD FOR QUANTITATIVE EMENTS IN SOILS USING SOIL CALIBRATION OF IN SITU OPTICAL CLASS AND CHARACTERISTICS CHEMICAL MEASURE" on 01/20/93.

166. Navy Case No: 74274 by Thomas Jones for "METHOD OF DETERMINING THE PULSED CURRENT GRANULAR NATURE OF SUPERCONDUCTORS USING" on 01/28/93.

167. Navy Case No: 74784 by Randy Shimbukuro for "MULTILAYER MICROELECTRONIC PHOTOMULTIPLIER DEVICE" on 02/16/93.

168. Navy Case No: 75154 by Richard Scheps for "COMPACT, EFFICIENT, SCALABLE PUMPED BY VISIBLE LASER DIODES Nd LASER CO-DOPED WITH ACTIVATOR IONS AND" on 02/22/93.

169. Navy Case No: 73747 by Jack Olson for "SENSOR TO CABLE MOLDING PROCESS" on 02/26/93.

170. Navy Case No: 74817 by Gregory Lewis for "METHOD AND/OR SYSTEM FOR MENT FROM BRAIN ACTIVITY PERSONAL IDENTIFICATION AND PATTERNS IMPAIRMENT ASSESS-" on 03/26/93.

171. Navy Case No: 75251 by Paul De La Houssaye for " INTEGRATION OF SEMICONDUCTOR CIRCUITS AND DEVICES CIRCUITS AND DEVICES WITH SUPERCONDUCTING" on 04/01/93.

172. Navy Case No: 73323 by William Webster for "HIGH SENSITIVITY HYDROPHONE" on 04/14/93.

173. Navy Case No: 74813 by Jayson Durham for "DEVICE MEANS AND METHOD" on 04/16/93.

174. Navy Case No: 74125 by Clark Hendrickson for "DEMAND ASSIGNED MULTIPLE ACCESS (DAMA) DEVICE CONTROLLER INTERFACE" 04/23/93.

175. Navy Case No: 74618 by Thinh Ho for "A HYBRID ORTHOGONAL TAPER FEED REFLECTOR ANTENNA" on 05/06/93.

176. Navy Case No: 75143 by Thomas Jones for "SUPERCONDUCTING CERAMIC MAGNET" on 05/07/93.

177. Navy Case No: 75320 by James Dombrowski for "FIBER OPTIC MICROCABLE CURED RESIN PRODUCED WITH FIBER REINFORCED ULTRAVIOLET LIGHT" on 05/10/93.

178. Navy Case No: 74148 by Thomas Jones for "COMPACT SUBSTRATE HEATER FOR USE IN AN OXIDIZING ATMOSPHERE" on 05/19/93.

179. Navy Case No: 73765 by Richard Scheps for "A WAVELENGTH DISPERSIVE GAIN ELEMENT FOR A TUNABLE LASER" on 05/20/93.

180. Navy Case No: 75295 by Eric Catagena for "METHOD FOR FABRICATING AN TRANSISTORS IN OPERATIONAL AMPLIFIER USING SILICON-ON-SAPPHIRE BIPOLAR JUNCTION" on 05/20/93.

181. Navy Case No: 75445 by Stephen Russell for "METHOD FOR LASER-ASSISTED SILICON ETCHING USING HALOCARBON AMBIENTS" on 05/25/93.

182. Navy Case No: 75019 by Thomas Ogden for "STABILIZER FOR SUBMERGED GASEOUS JETS IN LIQUIDS" on 06/02/93.

183. Navy Case No: 74299 by George Imthurn for "SILICON TO SAPPHIRE BOND" on 06/07/93.

184. Navy Case No: 74400 by Mark North for "CHLORINATED HYDROCARBON SENSOR FOR CONE PENETROMETER" on 06/08/93.

185. Navy Case No: 74801 by Thinh Ho for "A BROADBAND COPLANAR WAVEGUIDE TO SLOTLINE TRANSITION" on 06/17/93.

186. Navy Case No: 74999 by Robert Slack for "SIGNAL AMPLITUDE DISTRIBUTION ANALYZER" on 06/23/93.

187. Navy Case No: 74065 by Russell Hammond for "HYBRID HIGH POWER AMPLIFIER" on 06/28/93.

188. Navy Case No: 73899 by Randy Shimabukuro for "METHOD FOR FABRICATING EFFECT TRANSISTORS ON A SINGLE COMPLEMENTARY ENHANCEMENT & SUBSTRATE DEPLETION MODE FIELD" on 06/30/93.

189. Navy Case No: 73925 by Randy Shimabukuro for "ULTRA-HIGH RESOLUTION LIQUID CRYSTAL DISPLAY ON SILICON-ON-SAPPHIRE" on 08/04/93.

190. Navy Case No: 74211 by Richard Scheps for "A TECHNIQUE FOR INTRACAVITY SUM FREQUENCY GENERATION" on 08/12/93.

191. Navy Case No: 74706 by Howard Miller for "WATER EXPANDED COMPRESSED FOAM CABLE FAIRING" on 08/25/93.

192. Navy Case No: 74032 by Homer Bucker for "SUBMERGED SENSING SYSTEM USING LINE ARRAY SEGMENTS" on 08/25/93.

193. Navy Case No: 75663 by Paul De La Houssaye for "A STRUCTURE FOR PROVIDING HIGH POTENTIAL IN THE VICINITY OF A RESOLUTION MODULATION OF SURFACE VOLTAGE" on 08/30/93.

194. Navy Case No: 75292 by Stephen Russell for "PHOTONIC SILICON ON A TRANSPARENT SUBSTRATE" on 09/09/93.

195. Navy Case No: 75726 by Stephen Russell for "METHOD OF CONTROLLING TATION PHOTOEMISSION FROM POROUS SILICON USING ION IMPLAN" on 09/09/93.

196. Navy Case No: 75786 by Laurence Gadbois for "STORM WATER RUNOFF FIRST FLUSH SAMPLER" on 09/21/93.

197. Navy Case No: 75144 by Richard Smurlo for "TEMPORAL SENSOR DATA FUSION SCHEME FOR INTELLIGENT SECURITY ASSESSMENT" on 09/28/93.

198. Navy Case No: 74705 by Herbert Mummery for "CABLE RECOVERY WINDER" on 11/19/93.

199. Navy Case No: 75129 by Richard Scheps for "LASER WITH MULTIPLE GAIN ELEMENTS" on 11/19/93.

200. Navy Case No: 75931 by Randy Shimabukuro for "METHOD OF FABRICATING A GRATED CIRCUITRY MICROELECTRONIC PHOTOMULTIPLIER DEVICE WITH INTE" on 11/22/93.

201. Navy Case No: 75000 by David Chadwick for "FEEDBACK-CONTROLLED, OXYGEN REGULATION SYSTEM" on 12/03/93.

202. Navy Case No: 74190 by James Bond for "SELF-ADAPTING FILTER" on 12/15/93.

203. Navy Case No: 75973 by Douglas Sexton for "EXCIMER LASER DOPANT ACTIVATION OF BACKSIDE ILLUMINATED CCD'S" on 12/21/93.

204. Navy Case No: 74762 by Carol Dooley for "ORGANTION BIOCIDES CONTAINING MIXED SATURATED/UNSATURATED CARBON CHAINS" on 12/30/93.

205. Navy Case No: 74751 by Richard Scheps for "INTRACAVITY SUM FREQUENCY ACTIVE MIRROR GENERATION USING A TUNABLE LASER CONTAINING AN" on 01/14/94.

206. Navy Case No: 74030 by Monti Aklufi for "METHOD OF FORMING THIN FILMS" on 02/28/94.

207. Navy Case No: 76069 by Stephen Russell for "LASER TEXTURING" on 03/14/94.

k. Identify any in-house staff that are members of the National Academy of Engineering.

None.

l. Identify any in-house staff that are members of the National Academy of Sciences.

None.

m. How many Cooperative Research and Development Agreements (CRDAs) have been signed by the activity since 1 January 1990?

Nine (9) CRDAs were negotiated from 1 JAN 90 to 31 MAR 94. Two (2) are completed; seven (7) are in progress. Eight (8) additional CRDAs are in negotiation.

n. What has been the activity's annual royalty income from CRDAs and patent licenses for each year since 1 January 1990?

Patent Royalty Income:

1990 - $26,914.50
1991 - $ 8,365.00
1992 - $48,210.12
1993 - $33,960.69
1994 - $11,000.00 (through 31 MAR 94)

TOTAL - $128,450.31

CRDA Income: TOTAL - $50,000

o. List and describe any major end item prototypes, either product or process technology, developed in-house by the activity that are currently in production and/or are currently in use by the U.S. Armed Forces or by industry. Cite a published reference that documents the work.

**MARINE SCIENCES**

- NCCOSC RDTE DIV SAN DIEGO CA developed prototype marine mammal systems for tasks related to underwater surveillance and detection for object location, marking, and recovery. These systems are used by the Armed Forces in support of special operations and exercises. Specific examples are:

  Mk 4 Marine Mammal System. Detection, location, and marking of close tethered, deep moored mines. References: (1) Operational and Maintenance Manual, SE420-AE-OMI-010/(S), and (2) Navy Training Plan for Marine Mammal Systems, S-70-8507A.

  Mk 5 Marine Mammal System. Pingered object location, marking, and attachment of recovery hardware. References: (1) Operation and Maintenance Manual, SE420-AF-OMI-010, and (2) Navy Training Plan for Marine Mammal Systems, S-70-8507A.

  Mk 6 Marine Mammal System. Swimmer Defense. References: (1) Operation and Maintenance Manual, SE420-AG-010/(S), and (2) Navy Training Plan for Marine Mammal Systems, S-70-8507A.

Mk 7 Marine Mammal System. Detection, location, and marking of proud and buried bottom mines. References: Operation and Maintenance Manual, SE420-AA-OMI-010/(S), and (2) Navy Training Plan for Marine Mammal Systems, S-70-8507A.

Mk 81 Mod 3 Marker. Marking of underwater objects. Reference: Operation and Maintenance Manual, SW500-AD-OMI-010 and 020.

Mk 83 Mod 0 Marker. Marking of underwater objects. Reference: Operation and Maintenance Manual, SW500-AE-OMI-010 and 020.

Mk 86 Mod 0 Marker. Marking of underwater objects. Reference: Operation and Maintenance Manual, SW500-AA-OMI-010 and 020.

Mk 89 Mod 0 Marker. Marking of underwater objects. Reference: Operation and Maintenance Manual, SW500-AC-OMI-010 and 020.

Cetacean Transport System.This system is in continuous use by the EOD Quick Find system (Mk 7). The device has also been adopted and used in zoos, aquaria,and oceanaria around the world. Reference: Ridgway, S. H. and J. G. Simpson (1967) J. A.V.M.A. 155:1059-1063.

Sea Lion Handling Device. The device is in continuous use by the EOD Quick Find system (Mk 7). The device has also been adopted and used in zoos, aquaria, and oceanaria around the world. Reference: Ridgway, S. H. and J. G. Simpson (1967) J. A.V.M.A. 155:1059-1063.

Suction Cup-Type Biomedical Instrumentation Electrode. This device is in use for medical examination purposes of fleet marine mammal systems (Mk 4, 5, 6, and 7). It is also used as a research tool and has been employed in university laboratories and for swimming exercise monitoring. Reference: Phipps, C.G., S.H. Ridgway, H. O. Knecht, and F. R. Braun, U.S. Patent 3,534,733, 20 October 1970.

- In 1990, an NCCOSC RDTE DIV SAN DIEGO CA/NOSC collaborative development effort began with the U.S. Army Corps of Engineers. NCCOSC RDTE DIV SAN DIEGO CA developed the laser-induced-fluorescence (LIF) chemical sensor technology with an Army Optical Cone Penetrometer(OCP). The result is Site Characterization and Analysis Penetrometer System (SCAPS), a real-time, *in situ* system for detection of petroleum, oil, and lubricant (POL) contaminants at hazardous waste sites that dominate U.S. Navy shore activities as well as other DoD and Federal sites. The effort has expanded to a Tri-Service/DOE/EPA program and is the premier tech transfer example for the Navy's shoreside environmental quality program. The Navy, Army, DOE, and EPA have, or are acquiring, systems for future research and field operations (Quantities of 3, 4, 1, and 1, respectively).

Reference: Lieberman, et al. 1991. "Rapid, Subsurface In Situ Screening of Petroleum Hydrocarbon Contamination Using Laser-Induced Fluorescence Over Optical Fibers," presented/published at Second International Symposium for Field Screening Methods for Hazardous Wastes and Toxic Chemicals.

- NCCOSC RDTE DIV SAN DIEGO CA developed the Marine Environmental Survey Capability (MESC), a system to provide rapid continuous measurement and mapping of environmental parameters in coastal and estuarine environments. The purpose of the MESC is to determine the spatial and temporal variability of physical and chemical water quality characteristics from a moving vessel using state-of-the-art sensors, computer systems, and navigation equipment. A number of direct fleet support studies have been carried out using the MESC including environmental assessment work at Naval Station, Norfolk; Naval Subase, Kings Bay; Naval Station, Charleston; Naval Shipyard, Portsmouth; Naval Shipyard, Bremerton; Naval Shipyard, Hunters Point; and Naval Complex, San Diego. The technology has recently been adopted for commercial applications by Battelle Ocean Sciences (Battelle Ocean Sampling System).

  Selected References: (1) Chadwick, D. B. and M. H. Salazar. 1991. "Integrated Measurement Technologies for Monitoring the Marine Environment," *Proceedings of Oceans '91*, I:343-350; (2) Lieberman, S. H., C. Clavell, and D. B. Chadwick. 1989. "Techniques for Real-Time Environmental Mapping and Monitoring," *Proceedings, 16th Meeting, US-Japan Marine Facilities Panel: United States-Japan Cooperative Program in Natural Resources on Marine Facilities*, pp. 495-499; and (3) McDowell, S., C. Albro, and C.Willauer. 1989. Battelle Builds BOSS for Enhanced Monitoring Capabilities, *Sea Technology*, 30(10):10-17.

- NCCOSC RDTE DIV SAN DIEGO CA has developed a rapid bioassay system (QWIKLITE) for conducting cost-effective bioassay tests on various test materials (NPDES discharges, metals, storm drain discharge, ship hull coatings and discharges). Nearshore coastal and harbor DoD and civilian communities are faced with increasingly stringent environmental regulations. A substantial savings in operational costs can be achieved by use of this system when compared to other standard bioassays. The QWIKLITE system is undergoing final fabrication. The present system has generated commercialization for both licensing and a Cooperative Research and Development Agreement (CRADA).

  References: (1) Lapota, Moskowitz, Rosenberger, and Grovhoug. 1993. "The use of Stimulable Bioluminescence from Marine Dinoflagellates as a Means of Detecting Toxicity in the Marine Environment," in Gorsuch, J.W.et al. (Ed.) ASTM (American Society for Testing and Materials) Special Technical Publication, 1216; and (2) "Environmental Toxicology and Risk Assessment," 2nd volume. 1992, Symposium on Environmental Toxicology and Risk Assessment: Aquatic, Plant, and Terrestrial, Pittsburgh, Pennsylvania, USA, April 26-30, xii+730 pp; pp. 3-18.

- The Benthic Flux Sampling Device (BFSD) was developed to meet the Navy's requirement for realistic methodologies to assess the potential effects of contaminated sediment. The purpose of the BFSD is to provide a means of measuring the release of various chemical toxicants from contaminated marine sediments. Technology transfer to commercial applications is being pursued with a number of industrial partners.

  Selected References: (1) Chadwick, D. B., S. D. Stanley, and S. H. Lieberman. 1993. "A Benthic Flux Chamber for Monitoring Pollution Exchange Rates at the Sediment-Water Interface," *Proceedings of MTS '93*, pp. 196-206; (2) Chadwick, D. B., S. H. Lieberman, C. E. Reamers, and D. Young. 1993. "An Evaluation of Contaminant Flux Rates from Sediments of Sinclair Inlet,WA, Using a Benthic Flux Sampling Device," TD 2434, Naval Command, Control and Ocean Surveillance Center, RDT&E Division, San Diego, CA; (3) Patent Application of S. H. Lieberman, D. B. Chadwick, and D. R. Bower for "Benthic Flux Sampling Device," Navy Case No. 75050; and (4) Patent Application of S. H. Lieberman, D. B. Chadwick, and D. R. Bower for "Feedback-Controlled Oxygen Regulation System," Navy Case No. 75000.

- Ecological Risk Assessment Methodologies is a process technology of methods and procedures for conducting ecological risk assessments for coastal DoD facilities. Standard operating procedures are documented in NCCOSC RDTE DIV SAN DIEGO CA TD 2296 (1), and actual application of methods are documented in NOSC TR 1437 (2) and NCCOSC RDTE DIV SAN DIEGO CA TR 1627 (3). A methodological approach for satisfying specific regulatory requirements under the Resource Conservation and Recovery Act permit using the above described methods for the Portsmouth Naval Shipyard is documented in Johnston, 1993 (4). Other agencies including the Army Corps of Engineers, US EPA, NOAA, state agencies, as well as the private sector are adopting these methodologies and approaches for conducting ecorisk assessments at coastal facilities.

  References: (1) Mueller, C., W. R. Munns, Jr., D. J. Cobb, E. A. Petrocelli, G. G. Pesch, W.G. Nelson, D. M. Burdick, F. T. Short, and R. K. Johnston (eds.) 1992. "Standard Operating Procedures and Field Methods Used in Conducting Ecological Risk Assessment Case Studies: Naval Construction Battalion Center, Davisville, RI, and Naval Shipyard Portsmouth, Kittery, ME." TD2296, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA, 484 pp; (2) Munns, W.R., Jr., C. Mueller, D. J. Cobb,T. R. Gleason, G.G. Pesch, and R. K. Johnston. 1991. "Marine Ecological Risk Assessment at NCBC, Davisville, Rhode Island," NOSC TR 1437, Naval Ocean Systems Center, San Diego, CA, 129 pp; (3) Johnston, R. K., W. R. Munns, Jr., S. N. Miller, F. T. Short, and H. A. Walker (eds.). 1994. (in prep)."Estuarine Ecological Risk Assessment for Portsmouth Naval Shipyard, Kittery, Maine: Phase I Problem Formulation." TR1627, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA; (4) Johnston, R. K. 1993. "Media Protection Standards Proposal for Offshore Media: Sediments and Surface Water." In Media Protection Standards Proposal for Portsmouth Naval Shipyard: Draft Final. Northern Division Naval Facilities Engineering Command, McLaren/Hart

Project No. A00-152, pp 3-1 to 3-85; (5) Johnston, R. K., 1993. "Overview of Case Studies and Application to Regulatory Requirements," Training Class for the Ecological Risk Assessment Training Symposium, Philadelphia, PA, August 17-18; (6) Johnston, R. K. 1993. "Overview of Case Studies and Application to Regulatory Requirements," Training Class for the Ecological Risk Assessment Training Symposium, San Diego, CA, July 27-28, and Philadelphia, PA, August 17-18; (7) Johnston, R. K. 1992. "Assessing Ecological Risk Using Exposure-Response Models --The Allen Harbor Case Study," *Proceedings of the 13th Annual Meeting of the Society of Environmental Toxicology and Chemistry*, Cincinnati, OH, Nov. 12; (8) Johnston, R. K. 1992. "An Estuarine Ecological Risk Assessment for the Piscataqua and Great Bay Estuary," *Proceedings of the 13th Annual Meeting of the Society of Environmental Toxicology and Chemistry*, Cincinnati, OH, Nov. 10; (9) Johnston, R. K. and P. F. Seligman. 1990. "Concepts in Ecological Risk Assessment." Paper presented at the Western Society of Naturalists 71st Annual Meeting, Monterey, CA. December 27-30; and (10) Munns, W. R., Jr., C. Mueller, D. J. Cobb, T. R. Gleason, G. G. Pesch, and R. K. Johnston. 1990. "The Allen Harbor Risk Assessment Pilot Study: Preliminary Assessment and Verification of No Adverse Impact." Paper presented at SETAC '90, Global Environmental Issues: Challenge for the 90s, Society of Environmental Toxicology and Chemistry Eleventh Annual Meeting, Crystal City, Arlington, VA, November 11-15.

- NCCOSC RDTE DIV SAN DIEGO CA developed and established the Coastal Propagation Testbed prototype in the southern California coastal bight for investigations of the variability of coastal atmospheric refractivity.

- NCCOSC RDTE DIV SAN DIEGO CA completed development of the Navy Oceanic Vertical Aerosol Model (NOVAM) for electro-optical systems performance assessment.

- NCCOSC RDTE DIV SAN DIEGO CA developed and released the Engineer's Refractive Effects Prediction System (EREPS), version 2.2.

  Reference: EREPS Software and User's Manual developed by NOSC/NCCOSC RDTE DIV SAN DIEGO CA. Library of Congress Cataloging-in-Publication data: TK 6580. E74;1990; 621. 384; 90-69827; ISBN 0-89006-455-5. Published and available commercially from Artech House, Boston and London.

- NCCOSC RDTE DIV SAN DIEGO CA developed tactical decision aids for sonobuoy performance and airborne surface search radars and transitioned these to the Tactical Environmental Support System (TESS). TESS is installed on all carriers and various other ships as well as many shore installations.

- NCCOSC RDTE DIV SAN DIEGO CA invented (holds a U.S. Patent), developed, tested, and operationally implemented Integrated Refractive Effects Prediction System (IREPS) in the Fleet. IREPS is a system for predicting electromagnetic propagation in the earth's environment and is also a part of TESS.

Reference: Patterson, W. L., C. P. Hatton, H. V. Hitney, R. A. Paulus, K. D. Anderson, and G. E. Linden. 1987. "IREPS 3.0 User's Manual," NOSC TD 1151, Naval Ocean Systems Center, San Diego, CA (Sept).

**OCEAN ENGINEERING**

- The Advanced Development Model (ADM) for the Mine Neutralization System (MNS), including associated handling systems, was designed and developed at NCCOSC RDTE DIV SAN DIEGO CA. Work on the prototype MNS led to our writing the specifications upon which the production units were built. Production continues for use aboard all MCM and MHC minesweepers. NCCOSC RDTE DIV SAN DIEGO CA continues to function as TDA.

  References: (1) Carroll, M. 1992. "AN/SLQ-48(V)2 Saddle/Snubber Assembly Safety Report," NCCOSC RDTE DIV SAN DIEGO CA TD 2339, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (July); and (2) Lemaire, I. 1988. "NOSC and Remotely Operated Vehicles (ROVs) and Autonomous Unmanned Vehicles (AUVs)," NOSC TD 1448, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA.

- NCCOSC RDTE DIV SAN DIEGO CA designed the prototype cutters, Mission Package One (MP-1), used on the Mine Neutralization System (MNS). After the prototype MP-1 was fabricated and tested at NCCOSC RDTE DIV SAN DIEGO CA and 100 exercise MP-1s were delivered for fleet use, it was successfully transitioned to production where 1463 units were manufactured and are operating in the fleet.

  References: (1) Keil, T. J. "Mine Neutralization Vehicle (MNV) System Magnetic Signature and Analysis (U)," NUC TN 1530, Naval Undersea Center, San Diego, CA (May) CONFIDENTIAL; (2) Arriola, A. 1981. "Mine Neutralization System (MNS) Mission Package One (MP-1) Electronics (U)," NOSC TN 1004, Naval Ocean Systems Center, San Diego, CA (June); (3) "Technical Evaluation (TECHEVAL) Test Plan for the EX-1 MOD 0 Mine Neutralization System (MNS) (U)," (July) CONFIDENTIAL; (4) COMOPTEVFOR. 1983. "Operational Evaluation of the Mine Neutralization System (MNS) Ex 1 MOD 0 (U)," OPNAV Report Symbol 3960-12 (March) CONFIDENTIAL; and (5) Stegman, J. M. 1989. "Magnetic Measurements MP-1 (MK 26) Mine Neutralization System (U)," NOSC T 1577, Naval Ocean Systems Center, San Diego, CA (April).

- NCCOSC RDTE DIV SAN DIEGO CA developed the Advanced Unmanned Search Syster (AUSS) to meet the requirements of secret document number OR #101-02-87. The AUSS currently in the final phase of transition to the Office of the Director of Ocean Engineerin Supervisor of Salvage and Diving, Naval Sea System Command (OOC). The AUSS will enhance the Supervisor's ability to conduct cost-efficient searches in the ocean.

  References: (1) Cooke, M. W. 1992. "Advanced Unmanned Search System," TD 2348,

Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (Dec); (2) Hones, H.V. 1992. "Advanced Unmanned Search System (AUSS)," TR 1528, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (Nov); (3) Mackelburg, G. R. and S. J. Bryan. 1992. "Acoustic Communication Link Development," TR 1531, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (Nov); and (4) Uhrich, R. W. and S. J. Watson. 1992. "Deep Ocean Search and Inspection: Advanced Unmanned Search System (AUSS) Concept of Operation," TR 1530, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (Nov).

- NCCOSC RDTE DIV SAN DIEGO CA developed the AUSS Acoustic Communication Link. This is the underwater acoustic communications link developed for AUSS. The technology associated with its development has been exploited by others (the French and Japanese) in the development of similar systems.

  Reference: Mackelburg, G. R., S. J. Watson, and W. D. Bryan. 1992. "Advanced Unmanned Search System (AUSS) Acoustic Communication Link Development," TR 1531, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (Nov).

- The NCCOSC RDTE DIV SAN DIEGO CA-developed Electric Snoopy ROV Design was given to Perry Oceanographic Systems as the basis for their commercial line of small ROVs.

  Reference: "Remotely Manned Undersea Work Systems at NOSC," NOSC TR 237, Naval Ocean Systems Center, San Diego, CA.

- An NCCOSC RDTE DIV SAN DIEGO CA-developed linkage manipulator system is in use on DSV *Turtle*.

  Reference: "CURV Linkage Manipulator," NUC TN 271, Naval Undersea Center, San Diego, CA.

- NCCOSC RDTE DIV SAN DIEGO CA designed and developed the Deep Submergence Vehicle (DSV) Lightweight Cable Cutter, which is in use on DSV *Turtle*.

  Reference: U. S. Patent 4,463,496

- NCCOSC RDTE DIV SAN DIEGO CA developed a prototype Real-Time Optical Mapping System (ROMS). The idea was picked up by industry after the patent lapsed and a functiona model built. Both ART and Westinghouse have working models of this laser line scanning imaging system.

  Reference: NUC TN 1098, July 1973.

- The Launch and Recovery Ramp System, developed by NCCOSC RDTE DIV SAN DIEGO CA for the Advanced Unmanned Search System (AUSS), has been scaled up and used to launch and recover the Applied Remote Technology (ART)/Martin Marietta MUST UUV and two ARPA/Draper Labs UUVs. Perry Corporation is presently operating the MUST UUV and launch/recovery ramp.

  Reference: NCCOSC RDTE DIV SAN DIEGO CA TR 1528, November 1992.

- The NCCOSC RDTE DIV SAN DIEGO CA-developed Project 581/S "COCOON" Launch and Recovery System has been used to launch and recover contractor systems. The Applied Remote Technology (ART) "STARS" launch and recovery system (presently in the testing stages) uses the principles conceived of for the "COCOON" launch and recovery system.

  Reference: U.S. Patent No.4,876,979

- The Advanced Tethered Vehicle (ATV) was developed by NCCOSC RDTE DIV SAN DIEGO CA and delivered to the Navy in February 1993. The overall effort included development, prototyping, testing, and evaluation. The cable, an integral part of the ATV itself, represents a major breakthrough in fiber-optic tether technology and was also developed by NCCOSC RDTE DIV SAN DIEGO CA as part of the overall effort.

  References: (1) ATV System Manual, vol. 1, Type III S9592-A5-MMC-010/ATV-SYS (with Appendices A, B, and C); (2) Morinaga, W. S. and R. T. Hoffman.1991. "The Advanced Tethered Vehicle," *Oceans 91 Conference Proceedings*, vol. 3; and (3) Neller, M. E. and R. A. Bixler. 1991. "Recovery of an Advanced Unmanned Search System Vehicle by the Advanced Tethered Vehicle," *Oceans 91 Conference Proceedings*, vol. 2.

- NCCOSC RDTE DIV SAN DIEGO CA has been extensively involved in developing various process technologies for use in the application of nonmetallic materials for deep submergence. Pressure resistant ceramic housings have been developed for deep submergence systems. Reliable design analysis methods, nonmetallic materials design criteria, and reliable methods of joining cylinders and hemispheres have been prototyped.

  References: (1) Stachiw, J. D. 1988. "Pressure Resistant Ceramic Housings for Deep Submergence Systems," NOSC TD 1294, Naval Ocean Systems Center, San Diego, CA (June); (2) Stachiw, J. D. 1992. "Pressure Resistant Sensor Mast Assembly for Submarine Mounted Dark Eyes Thermal Imaging System (U)," NOSC TR 635, Naval Ocean Systems Center, San Diego, CA (Feb) CONFIDENTIAL; (3) Stachiw, J. D. 1988."Pressure Housin for the Periscope-Mounted CLUSTER NESSIE Electro-Optical System," NOSC TR 1186, Naval Ocean Systems Center (Mar); (4) Stachiw, J. D., R. P. Johnson, and R. R. Kurkchubasche. 1993. "Design and Structural Analysis of Alumina-Ceramic Housings for Deep Submergence Service: Fifth Generation Housings," TR1583, Naval Command, Cont and Ocean Surveillance Center RDT&E Division, San Diego, CA (Mar); and (5) Other

reports and technical documents (too numerous to list separately), many of which have been compiled and published in 11 volumes titled "Ocean Engineering Studies, Volumes I - IV, Compiled 1990," Stachiw J.D., NOSC, and "Ocean Engineering Studies, Volumes V - XI, Compiled 1991," Stachiw, J.D., NOSC, Naval Ocean Systems Center, San Diego, CA.

- NCCOSC RDTE DIV SAN DIEGO CA developed the prototype system of the Teleoperated Vehicle (TOV) initially for the U.S. Marine Corps under the Ground Air Telerobotic Systems program (GATERS), eventually falling under the purvue of the U.S. Marine Corps Unmanned Ground Vehicle Joint Program Office (UGV/JPO). The effort was transitioned to preproduction successfully and multiple (at least four) STVs were produced by industry and delivered to the UGV JPO for in-field testing and evaluation.

  Reference: Aviles, W. A., T. W. Hughes, H. R. Everett, A. Y. Umeda, S. W. Martin, A. H. Koyamatsu, M. R. Solorzano, R. T. Laird, and S. P. McArthur. "Issues in Mobile Robotics: The Unmanned Ground Vehicle Program TeleOperated Vehicle (TOV)."

- NCCOSC RDTE DIV SAN DIEGO CA built and operated a Fiber-Optic Microcable (FOMC) pilot production plant. Due to the unavailability of precision FOMC in the U.S., NCCOSC RDTE DIV SAN DIEGO CA, with support from the Navy's Manufacturing Technology Program (MANTECH), developed an improved manufacturing process. In addition to the cable manufacturing, the winding technology that was needed to produce a precision-wound, long-length cable package was developed. The FOMC and manufacturing process has been patented and successfully transitioned to industry.

- NCCOSC RDTE DIV SAN DIEGO CA prototyped and demonstrated the feasibility of wide-bandwidth duplex signal transmission over a constantly deployed spool of 0.032-inch-diameter, fiber-optic microcable (FOMC), at sea, for distances in excess of 40 nautical miles without repeats.

  References: (1) Fronk, A. D., P. G. Kennedy, and R. E. Patterson. 1992. "Ocean Engineering in Support of Surveillance," TD 2346, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (Sept); (2) Cowen, S. et al. "Fiber Optic Microcable Produced with Radiation Cured Composite," Patent 5,259,055; (3) Cowen, S. 1994. "Expendable Fiber Optic Microcable - A Mature Technology to Support Communications with Advanced Undersea Platforms," 1994 IEEE National Telesystems Conference; and (4) Brininstool, M. and J. Dombrowski. 1992. "NCCOSC RDTE DIV SAN DIEGO CA Undersea Fiber Optic Development and Technology Transfer," 1992 ROV Conference.

- NCCOSC RDTE DIV SAN DIEGO CA successfully developed the Waterside Security System (WSS), which was granted NAVSEA approval for low-rate initial production (LRIP) for installation at U.S. Subase Bangor, WA, and U.S. Subase Kings Bay, GA. The first WSS is scheduled for installation in FY 95. This system provides pier security through the use of radar, imaging sensor, sonar, and an integrated command and control display console.

**ELECTRONIC SCIENCES AND TECHNOLOGY**

- NCCOSC RDTE DIV SAN DIEGO CA performed semiconductor process development and fabrication of a charged coupled device (CCD), consisting of an array of 90 by 90 pixels and used as the stellar sensor within all Trident II Guidance Systems. Prototype devices were built, tested, and demonstrated, and the technology subsequently transferred to Hughes, Semiconductor Division.

  Reference: Charles Stark Draper Laboratory, Inc. "Trident II (Mk 6), Lot 2 and Tactical Guidance System: Electronic Functional Description."

  Trident II (D-5) Missile. NCCOSC RDTE DIV SAN DIEGO CA developed and helped transition to industry the manufacturing process for fabrication of charged-coupled devices used in the Trident II (D-5) star sensor navigation system.

  Reference: Charles Stark Draper Laboratory, Inc. "Trident II (Mk 6), Lot 2 and Tactical Guidance System: Electronic Functional Description."

- NCCOSC RDTE DIV SAN DIEGO CA designed and developed the Missile Test and Readiness Equipment (MTRE), which has the dual purpose of testing a Trident II and preparing the missile for launch. Prototype systems were built, tested, and demonstrated and then transferred to Lockheed Missile and Space Center for the production phase of the program. All Trident II equipped submarines now carry 24 of the MTRE Mk 10s.

  Reference: SSP OP 4618, vol. 1 and 2, Technical Manual, Trident II Missile, UGM 133A, Missile Test and Readiness Equipment Mk 9 and Mk 10.

- NCCOSC RDTE DIV SAN DIEGO CA completed development and installation of the solid-state subassembly in the environmental control unit (ECU) of the D-5 railcar transporter.

- NCCOSC RDTE DIV SAN DIEGO CA developed a high-frequency propagation assessment system known as Prophet.

  References: (1) NOSC CR 292. 1985. "Operational Users Manual for Army Prophet Evaluation System (APES)/Theater Nuclear Forces (TNF) Frequency Management System," SEI Contractor Report for NOSC, Naval Ocean Systems Center, San Diego, CA; and (2) Sailors, D. B. 1987. "Operational User's Manual for Tactical Decision Aids for HF

Communication," NOSC TD 1065, Naval Ocean Systems Center, San Diego, CA (Jul).

- NCCOSC RDTE DIV SAN DIEGO CA developed a Radio Direction Finder Test System, which is used to test Navy Radio Direction Finder Sets aboard surface ships and submarines. Eight major end items were constructed and six installed at various remote land sites.

  Reference: NCCOSC RDTE DIV SAN DIEGO CA Technical Manual for Fleet Operational Readiness Accuracy Check Site (FORACS) 236, Revision One, dated December 1992.

- NCCOSC RDTE DIV SAN DIEGO CA built an Electronic Support Measures Test System prototype. This system synthesizes and provides a radar return to test shipboard Electronic Support Measures Sets. Eight systems were then constructed. Six are installed at various remote land sites and are used extensively in the fleet.

  Reference: NCCOSC RDTE DIV SAN DIEGO CA Technical Manual for Fleet Operational Readiness Accuracy Check Site (FORACS) 236, Revision One, dated December 1992.

- NCCOSC RDTE DIV SAN DIEGO CA designed and built the Sonar Test System, which is an instrumentation system used by operators of the Fleet Operational Readiness Accuracy Check Sites (FORACS) to conduct range and bearing accuracy tests of U.S. and FMS active and passive sonars.

  References: NCCOSC RDTE DIV SAN DIEGO CA documents "STS Operation and Maintenance Manual" and "STS Program Description."

- NCCOSC RDTE DIV SAN DIEGO CA fabricated the world's first diamond transistor with current and voltage gain and then fabricated the first diamond amplifier circuit with positive gain. The device technique has been used by Kobe Steel, U.S. Division, to fabricate industrial prototypes.

  References: (1) Zeisse, C. R., C. A. Hewett, R. Nguyen, J. R. Zeidler, and R. G. Wilson. 1991. "An Ion-Implanted Diamond Metal-Insulator-Semiconductor Field Effect Transistor," *IEEE Electron Device Letters*, vol. 12, pp. 602-605 (Nov); (2) Zeidler, J. R., C. A. Hewett, and R. G. Wilson. 1993. "Carrier Activation and Mobility of Boron-Dopant Atoms in Ion-Implanted Diamond as a Function of Implantation Temperature," *The Physical Review B*, vol. 47, pp. 2065-2071 (Jan); (3) Zeidler, J. R., C. A. Hewett, R. Nguyen, C. R. Zeisse, and R. G. Wilson. 1993. "A Diamond Driver-Active Load Pair Fabricated by Ion Implantation," *Diamond and Related Materials*, vol. 2, pp. 1319-1321 (Aug); and (4) Hewett, C. A. and J. R. Zeidler. 1992. "Diamond Device Fabrication Issues," *Diamond and Related Materials*, vol. 1, pp. 689-691 (Apr).

- NCCOSC RDTE DIV SAN DIEGO CA developed a technique for fabricating ohmic contacts to diamond substrates. The technique has been used to develop electronic and optoelectronic

devices in industry and has been used to attach GaAs high power amplifier chips to diamond substrates for improved heat dissipation on the DoD Cooperative Engagement Capability Antenna Program.

- NCCOSC RDTE DIV SAN DIEGO CA fabricated the first prototype circuit in diamond, a driver-active load pair with a voltage gain of 2.

  References: (1) Zeidler, J. R. and K. Moazed, "Ohmic Contacts for Semiconducting Diamond," U.S. Patent #5,055,424, October 8, 1991; (2) Moazed, K., J. R. Zeidler, and M. J. Taylor. 1990. "A Thermally Activated Solid State Reaction Process for Fabricating Ohmic Contacts to Semiconducting Diamond," *Journal of Applied Physics*, vol. 68, pp. 2246-2255 (Sept); (3) Moazed, K., J. R. Zeidler, M. J. Taylor, and C. A. Hewett. 1991. "Tantalum Ohmic Contacts to Diamond by a Solid State Reaction Process," *Diamond and Diamond-Like Films and Coatings*, NATO Advanced Study Institute Publication Series B: Physics, Vol. 266, pp 781-787, Plenum Press: New York, N.Y.; (4) Roser, M., C. A. Hewett, K. L. Moazed, and J. R. Zeidler. 1992. "High Temperature Reliability of Refractory Metal Ohmic Contacts to Diamond," *Journal of the Electrochemical Society*, vol. 139, pp. 2201-2004 (Aug); and (5) Hewett, C. A. and J. R. Zeidler.1993. "Ohmic Contacts to Epitaxial and Natural Diamond," *Diamond and Related Materials*, vol. 2, pp. 1341-1343 (Aug).

- NCCOSC RDTE DIV SAN DIEGO CA transferred to industry BiCMOS gate array design technology and design efforts in microcircuit emulation. NCCOSC RDTE DIV SAN DIEGO CA also provided technical oversight in the design and prototype of a needed part for the Army's Single Channel Ground-Air Radio System (SINCGARS) radio.

- Fully depleted, ultra-thin silicon-on-sapphire, an advanced integrated circuit (IC) technology was developed at NCCOSC RDTE DIV SAN DIEGO CA under Navy 6.1 and 6.2 funding and transitioned to Peregrine Semiconductor Corporation. This technology has been installed by Peregrine at IBM Corporation in Rochester, MN.

  Reference: Cooperative Research and Development Agreement NCRDA-90-NOSC-001.

- NCCOSC RDTE DIV SAN DIEGO CA developed the laser enhancement process for backside-illuminated CCD. This process is in use by Reticon and Jet Propulsion Laboratory.

  Reference: Russell, S. D. 1993. "Excimer Laser Processing of Backside-Illuminated CCDs," in *Technology 2002 Conference Proceedings*, NASA Conference Publication 3189, 2, 296.

- NCCOSC RDTE DIV SAN DIEGO CA developed the process for integrating high-temperature superconductors and CMOS circuitry. This process is in use by Conductus.

  Reference: Burns, M. J., P. R. de la Houssaye, S.D. Russell, G. A. Garcia, S. R. Clayton, W. S. Ruby, and L. P. Lee. 1993. "Demonstration of YBCO and Complementary Metal-

0xide-Semiconductor Device Fabrication on the Same Sapphire Substrate," in *Appl. Phys. Lett.*, 63(9), 1281.

- NCCOSC RDTE DIV SAN DIEGO CA's efforts and process technology in CMOS (0.5 mcron) design was transitioned to industry during VHSIC effort.

  Reference: Cooperative R&D investigation between NOSC and IBM Federal System (Manassas, VA), Internal IBM Report.

- NCCOSC RDTE DIV SAN DIEGO CA designed and implemented a 2- to 18-GHz EM field probe with a 15 microvolt/meter electric field sensitivity greater than 100-dB dynamic range in a 1-Hz bandwidth that provides maximum EMI immunity and allows measurement standoff distances up to 250 meters.

- Countermeasures Set AN/SLQ-33 (Ship Towed Acoustic Deception Device (STADD) (U). Program details classified. NCCOSC RDTE DIV SAN DIEGO CA provided concept formulation and development of prototype.

  References: (1) Numerous NOSC/NUC Development Program TNs and TRs; (2) Final Report, D/S 646, At-Sea Classification Problem with Both Target and Decoy Present (U), NUC TN 1710, Naval Undersea Center, San Diego, CA; (3) Prime Item Development Specification for Ship Towed Acoustic Deception Device (STADD) (U), NAVSHIPS 0967-489-9610; (4) Critical Item Development Specification for AN/SLQ-33 Synthesizer Unite and Real Time Analyzer Unit (U), NOSC Specification 0105938B; (5) Ship Signature Collection System (U), NOSC Technical Manual TM 525, Naval Ocean Systems Center, San Diego, CA; (6) Technical Evaluation Report Countermeasures Set, AN/SLQ-33, Ship Towed Acoustic Deception Device (STADD), CNO Project 504 (U), NOSC TR 296, Naval Ocean Systems Center, San Diego, CA; (7) AN/SLQ-33 Ship Towed Acoustic Deception Device, OPTEVFOR Tactics Guide; (8) OPTEVFOR Evaluation Report AN/SLQ-33 Ship Towed Acoustic Deception Device (STADD), Project 504; and (9) Operation and Maintenance Manual, Countermeasures Set AN/SLQ-33 (U), NAVSEA Manual EE461-AB-OMI-010, Naval Sea Systems Command.

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"NRaD Brief," 1992. Naval Command, Control and Ocean Surveillance Center (NCCOSC RDTE DIV SAN DIEGO CA. (April).

"Naval Ocean Systems Center Brief," 1990. Naval Ocean Systems Center Brief," 1990. Naval Ocean Systems Center (NOSC), San Diego, CA. (30 September).

"Naval Ocean Systems Center Brief," 1989. Naval Ocean Systems Center (NOSC), San Diego, CA. (30 September).

"Naval Ocean Systems Center Brief," 1988. Naval Ocean Systems Center (NOSC), San Diego, CA. (30 September).

"NOSC Technical Accomplishments 1980-1989," 1990. NOSC TD 1795. Naval Ocean Systems Center (NOSC), San Diego, CA. (December).

"Command History, Calendar Year 1993," 1994 (in review). NRaD TD 2624. Naval Command, Control and Ocean Surveillance Center (NCCOSC RDTE DIV SAN DIEGO CA). (June).

"Command History, Calendar Year 1991," 1992. NRaD TD 2255. Naval Command, Control and Ocean Surveillance Center (NCCOSC RDTE DIV SAN DIEGO CA). (June).

"Command History, Calendar Year 1990," 1991. NOSC TD 1990. Naval Ocean Systems Center (NOSC), San Diego, CA. (June).

"Command History, Calendar Year 1989," 1990. NOSC TD 1732. Naval Ocean Systems Center (NOSC), San Diego, CA. (June).

"Command History, Calendar Year 1988," 1989. NOSC TD 1542. Naval Ocean Systems Center (NOSC), San Diego, CA. (June).

"Command History, Calendar Year 1987," 1988. NOSC TD 1256. Naval Ocean Systems Center (NOSC), San Diego, CA. (January).

"Fifty Years of Research and Development on Point Loma, 1940-1990," 1990. NOSC TD 1940. Naval Ocean Systems Center, San Diego, CA. (September).

## NAVIGATION SUPPORT

- NCCOSC RDTE DIV SAN DIEGO CA developed the Global Positioning System user equipment (UE) for Navy aircraft, surface ships, and submarines. NCCOSC RDTE DIV SAN DIEGO CA is the lead laboratory in GPS UE and directs other participating activities and industry in support of this Joint Service Program.

- NCCOSC RDTE DIV SAN DIEGO CA's GPS Trainer provides PC-based software simulation of GPS equipment.

- The GPS has been integrated into the HC/KC-130 "HC/KC-130 GPS CDNU Integration System."

- NCCOSC RDTE DIV SAN DIEGO CA designed and developed the Satellite Signal Generator and Cryptographic Derivative, which is now being used by industry. The industry name to identify this equipment is the STEL 7200.

- NCCOSC RDTE DIV SAN DIEGO CA is currently developing the prototype high Anti-Jam GPS Antenna for use on naval platforms.

- NCCOSC RDTE DIV SAN DIEGO CA Warminster developed the method of laboratory testing of GPS User Equipment and these methods have been put into a comprehensive JPS-Sponsored Center of Excellence Test Plan for use by industry in the certification of GPS UE.

- NCCOSC RDTE DIV SAN DIEGO CA developed and transitioned the Ring Laser Gyro Navigator (RLGN) for the Fleet. This equipment is the next-generation inertial navigation system for surface ships. NCCOSC RDTE DIV SAN DIEGO CA continues to make subsequent product improvements as TDA. NCCOSC RDTE DIV SAN DIEGO CA also provides an extended performance capability, a significantly improved reliability, and a much lower life-cycle cost.

- NCCOSC RDTE DIV SAN DIEGO CA is developing the Navigation Sensor System Interface (NAVSSI), which is an interface designed to integrate the shipboard navigation sensors and systems and to provide a single best source of navigation information to all users. NCCOSC RDTE DIV SAN DIEGO CA is also developing and providing preplanned product improvement of the NAVSSI including incorporation of ship navigation planning aids, digital nautical charts, plotting capabilities, addition of navigation sources and users, and accuracy improvements.

- NCCOSC RDTE DIV SAN DIEGO CA completed development of a NAVSSI module to allow NAVSSI availability at any Naval Tactical Control System-Afloat (NTCS-A) terminal. This is a major step required to fully integrate the NAVSSI into the Joint Maritime Command Information System (JMCIS) program.

- NCCOSC RDTE DIV SAN DIEGO CA successfully completed the in-house development, land-based test, and TECHEVAL of the basic NAVSSI, which will integrate the various navigation equipments aboard CVs and other surface ships.

- NCCOSC RDTE DIV SAN DIEGO CA prototyped and developed the following inertial navigation products:

  Reference: The High Speed Velocity Log (HSVL) on LCAC Vehicles; NADC Report NADC--80185-40; Plenum Mounted CW Doppler Radar Operability and Performance Demonstration, 20 Aug 1980.

  The AN/WSN-5 Surface Ship Navigation System was introduced into the Fleet.

- NCCOSC RDTE DIV SAN DIEGO CA developed unique application Tech Transfer Guidelines including the following:

  Guidelines for INS and inertial components.

  DoD policy regarding International Transfer and Export Control of Inertial Navigation Systems, Gyroscopes, Acellerometers, other sisters and rélated technology

  Reference: DoD Directive 2040.2) 30 Apr 1992.

- NCCOSC RDTE DIV SAN DIEGO CA developed and tested the Range/Range LORANS-C Navigation Technique

- NCCOSC RDTE DIV SAN DIEGO CA developed and tested statistical reset techniques for SINS and LORAN-C

- NCCOSC RDTE DIV SAN DIEGO CA developed and tested the AN/BRN-5 LORAN-C sensor

- NCCOSC RDTE DIV SAN DIEGO CA developed and tested the Integrated Tactical Navigation System (ITNS) that integrates INS and TOA radio measurements to perform relative navigation

- NCCOSC RDTE DIV SAN DIEGO CA developed gravity passive navigation algorithms that are being used in real-time demonstrations on Trident II submarines and USNS *Vanguard*.

- NCCOSC RDTE DIV SAN DIEGO CA develops experimental navigational systems and performs feasibility demonstrations aboard air platforms. The end result usually leads to a prototype system for future production/implementation into the fleet. NCCOSC RDTE DIV SAN DIEGO CA provided technical consulting to Attitude and Heading Reference System

(AHRS) users on system application and integration and provided technical assistance to PMA during the design of the Compass Attitude and Heading Reference System (C/AHRS).

- In its Ocean Survey Program (OSP), NCCOSC RDTE DIV SAN DIEGO CA produces ocean bottom contour charts for direct use by the Fleet using a precise navigation subsystem and a multibeam sonar array subsystem integrated with an advanced data processing complex. NCCOSC RDTE DIV SAN DIEGO CA conducts a continuous program to extend the capability, accuracy, reliability, and maintainability of these systems by advancing the state-of-the-art in navigation, sonar, and data enhancement techniques in response to increasingly stringent fleet requirements for bathymetry, gravity, magnetics, and other geophysical parameters.

- NCCOSC RDTE DIV SAN DIEGO CA developed an integrated communications-navigation-identification system featuring multichannel, multinet, high-data-rate communications, and relative navigation capabilities for tactical operations known as the Joint Tactical Information Distribution System (JTIDS).

- NCCOSC RDTE DIV SAN DIEGO CA developed an analytic tool (Relative Navigation Analytic Simulator (RNAS)/Post Processor) for assessment of JTIDS navigation performance. NCCOSC RDTE DIV SAN DIEGO CA designed the upgrade of the navigation systems models for JTIDS System Integration Facility (SIF).

- As the Lead Service Design Agent, NCCOSC RDTE DIV SAN DIEGO CA Warminster delivered Build 1 of the Joint Service Network Design Aid (NDA) prototype to the Marine Corps, Air Force, Navy, and the JTIDS Jointly Project Office for review. The NDA is a JTIDS/Link-16 communi-cations system configuration (network) design tool for fleet operator use. The system was developed in the ADA programming language in accordance with DoD-STD-2167A.

  References: System Segment Specification, System Segment Design Document, Software Test Plan, Software Development Plan, Software Requirements Specification, Software Design Document, Build 1 Detailed Design, Build 1 Software Test Description, and the Build 1 Software User's Manual.

- As part of the Joint NDA project, a Graphical User Interface prototype for the Man-Machine Interface was developed for early hands-on review by the Joint Service users.

- NCCOSC RDTE DIV SAN DIEGO CA developed the four-stage process for initializing Link-16. The four-stage process for initializing Link-16 are network design, communication planning, initialization, and control. Appropriate hardware and software systems were developed to support the various stages of the process. The four-stage Network Management System (NMS) process will soon be implemented at a Joint Service and Bi-Lateral (UK) level.

UIC: N66001

Relevant document: System Specification for the Link-16 Network Management System

- NCCOSC RDTE DIV SAN DIEGO CA developed Link-16 communications planning, which is Stage 2 of the Link-16 Network Management System. The process includes network selection for the mission, assigning capacity access identifiers, assigning network roles, and producing the OPTASKLINK message instruction for Link-16. The end item is in use in the Fleet.

  Relevant documents: Link-16 Communications Planning User's Guide; Quick Reference Guide; OPTASKLINK User's Guide (Link-16 Supplement).

- As the Navy Network Design Facility, NCCOSC RDTE DIV SAN DIEGO CA Warminster designs, develops, and distributes the Navy's JTIDS Network Library (JNL). The JNL is currently in use by the COMCRUDESGRU THREE Battle Group for initializing Link-16. The Networks in the library support mission areas such as Joint Service AAW Operations, Power Projection, Air Superiority and ASUW..

  Document released to Fleet: Network Description Specification for Networks 01D, 02C, 03C, 04C, 05A, 09, 10, 11.

- NCCOSC RDTE DIV SAN DIEGO CA develops the processes required for use in training the operator to use JTIDS. These processes are used in the Fleet and are documented in the following:

  Command and Control Processor (C2P) Normal Operating and Trouble Shooting Reference Guide for Link-16 Operations -- dtd 12 Aug 1993

  E-2C Normal Operating and Trouble Shooting Reference Guide for Naval Flight Officers -- dtd 12 Aug 1993

  F-14D Normal Operating and Trouble Shooting Reference Guide for Naval Flight Officers -- dtd 12 Aug 1993

  Part III of Link-16 Communications Planning User's Guide -- dtd 7 Feb 1994

  Multilink Operations Normal Operating and Trouble Shooting Reference Guide for the Antiair Warfare Commander (AAWC), Force Track Coordinator (FTC), and Air Intercept Controller (AIC) -- dtd 15 Feb 1994

- NCCOSC RDTE DIV SAN DIEGO CA delivered foreign military sales (FMS) antenna, an NCCOSC RDTE DIV SAN DIEGO CA design of the JTIDS antenna, to the United Kingdom and France.

- NCCOSC RDTE DIV SAN DIEGO CA designed and developed the following transceiver system components, which are currently in use by the Armed Forces.

  AN/ARC-182 UHF.VHF Radio XMIT/PA

  AN/ARC-210 UHF.VHF Radio XMIT/PA and Guard Receiver

- NCCOSC RDTE DIV SAN DIEGO CA prototyped the following Marine Corps Radio Systems

  Tactical Reconnaissance Sensor System (TRSS)

  Counter-Intelligence Communication System (CCS)

- The following in-house, turnkey developments are currently operational aboard the Navy's survey ships:

  SASS Phase IV Multi-Beam Sonar System

  Doppler Velocity Profiler System (Patent Awarded)

  Multi-Channel Acoustic Simulator (Patent Awarded)

  Automatic Track-Keeping System (Patent Pending)

  Ships Attitude Data Converter (Patent Pending)

  Mission Control and Processing System

  References: Ocean Survey Program Systems Manual OSP-50, Volumes 1 through 4

**COMMAND AND CONTROL**

- Today, NCCOSC RDTE DIV SAN DIEGO CA is a central figure in support of the Naval Tactical Command System-Afloat (NTCS-A) program, with major roles in development, system integration, system engineering, and field support, and is responsible for software life-cycle support. NTCS-A is the first program to receive production approval using nondevelopmental item (NDI) and commercial off-the-shelf (COTS) software and open system standards.

NCCOSC RDTE DIV SAN DIEGO CA designed and implemented the full-scale major fleet software release for NTCS-A which is designated NTCS-A 1.1.3.

NCCOSC RDTE DIV SAN DIEGO CA developed a Space and Electronic Warfare Command (SEWC) capability within the NTCS-A system. This process prototype was deployed on USS *Ranger* (CV 61), USS *Saratoga* (CV 60), USS *Mt. Whitney* (LCC 20), USS *Coronado* (AGF 11), and USS *Kitty Hawk* (CV 63).

NCCOSC RDTE DIV SAN DIEGO CA integrated new electronic intelligence (ELINT) correlator, SEWC, Strike Plot, imagery exploitation, Navy Intelligence Processing System (NIPS), Air Tasking Order Processing, and additional tactical decision aids into NTCS-A 2.0.

NCCOSC RDTE DIV SAN DIEGO CA converted from a prototype development to a fully integrated module, STRIKEPLOT, which is part of the Naval Tactical Command System-Afloat (NTCS-A).

- NCCOSC RDTE DIV SAN DIEGO CA developed the Xpress Transfer Protocol (XTP) specification for a low-latency and reliable multicast network protocol which has been transitioned to the Survivable Adaptable Fiber-Optic Network (SAFENET) Navy standard communications architecture.

- NCCOSC RDTE DIV SAN DIEGO CA developed the prototype of the Remote Database Access (RDA) Draft International Standard, which has transitioned to the National Institute for Standards and Technology. RDA allows for wide-area network data pull from heterogeneous relational databases using the Structured Query Language standard.

- NCCOSC RDTE DIV SAN DIEGO CA developed the Cronus Distributed Computing Environment, which has transitioned to the ARPA Dynamic Analytical Replanning Tool (DART) used in Desert Shield/Storm and in Navy Capabilities Assessment, Simulation, and Evaluation System (CASES) programs.

- NCCOSC RDTE DIV SAN DIEGO CA developed portions of the Navy Next-Generation Computing Resource (NGCR, SPAWAR-32) specification for the computer operating system and database interfaces. These standard interfaces, now used by the Armed Forces, promote interoperability among DoD systems.

- NCCOSC RDTE DIV SAN DIEGO CA designed, developed, and participated in the fielding of Network Interface Units to USS *Carl Vinson* and USS *Belknap* where they provided advanced network access to multiple stand-alone command and control systems in order to provide new capabilities to the commander.

- NCCOSC RDTE DIV SAN DIEGO CA developed and transitioned real-time scheduling

mechanisms and policies into the following programs: AN/BSY-1 688 Los Angeles Class and AN/BSY-2 Next-Generation attack submarines, ARPA MACH operating system and Ada Real-time Extension development, NASA Space Station Freedom and commercial developments.

- NCCOSC RDTE DIV SAN DIEGO CA designed, developed, and transitioned high-performance secure local and wide-area networking technologies to the Fourth Secure Tactical Data Network (STDN-4) Tri-Service demonstration.

- NCCOSC RDTE DIV SAN DIEGO CA designed the architecture for the CINCPACFLT network infrastructure that provides secure and unsecure integrated information communications for the Pacific Command.

- NCCOSC RDTE DIV SAN DIEGO CA integrated Battle Force Tactical Training (BFTT) equipments with Army tank and aircraft simulators using advanced simulator networking (SIMNET) techniques. This is presently used by the services as a baseline for joint warfighting training through long-haul realtime distributed interactive simulation.

- NCCOSC RDTE DIV SAN DIEGO CA upgraded the strike $C^3$ Impact on Tactical Effectiveness (CITE) Model for F/A-18 communications analysis.

- NCCOSC RDTE DIV SAN DIEGO CA completed the first of a series of $C^3$ Simulation and Technology exercises using Synthetic Environments for Requirements and Concepts Evaluation and Synthesis (SERCES) with the Vertical Take-Off and Landing (VTOL) Unmanned Aerial Vehicle (UAV) as the case study.

- NCCOSC RDTE DIV SAN DIEGO CA is providing the next-generation Marine Corps Tactical Training System. Specific to this is the development of the Marine Air/Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS).

  Reference: "MTWS User Manual," 31 Jan 1994.

- The Research, Evaluation, and Systems Analysis (RESA) is a large-scale Naval interactive wargaming system. Developed as a major prototype for wargaming centers, RESA is maintained and operated at NCCOSC RDTE DIV SAN DIEGO CA. It has become the approved Naval Model for Joint training exercises using the confederation of certified Aggregate Level Simulation Protocols (ALP) Models. NCCOSC RDTE DIV SAN DIEGO CA provides a large-scale computer simulation/wargaming system supporting architecture assessment, concept of operations development, advanced technology evaluation, joint exercises, and test evaluation of advanced systems. Used by U.S. and multinational Armed Forces:

  NCCOSC RDTE DIV SAN DIEGO CA RESA supported the worldwide joint training

exercise called ULCHI FOCUS LENS (UFL)-92, sponsored by the Combined Forces Command (CFC) Republic of Korea (ROK), to demonstrate support technologies for worldwide model and simulation connectivity.

NCCOSC RDTE DIV SAN DIEGO CA RESA supported DYNAMIC FUTURE, a multinational exercise held in the Mediterranean theater of operations; the exercise included the U.S., Germany, Italy, Turkey, France, Greece, and Spain.

NCCOSC RDTE DIV SAN DIEGO CA RESA supported BLONDE GIRL, a joint Air Force-Navy exercise in the Baltic Sea theatre of operations; the exercise included the U.S., Germany, Norway, and Denmark.

NCCOSC RDTE DIV SAN DIEGO CA RESA supported CERTAIN CARAVAN, a multiservice and multinational exercise for the reenforcement of Europe.

NCCOSC RDTE DIV SAN DIEGO CA installed RESA at French Naval War College.

Reference: "RESA User Guide, Version 5.5," 1 Jan 1992.

- NCCOSC RDTE DIV SAN DIEGO CA provides process technology support in the design, modeling, and analysis of electromagnetic compability (EMC) of torpedoes for ship topside communications suites and land-based antenna farms. NCCOSC RDTE DIV SAN DIEGO CA also performs simulation and modeling in both software and hardware ranges to minimize interference among systems.

- NCCOSC RDTE DIV SAN DIEGO CA completed development of a high-performance visualization system to display computational electromagnetic phenomena. This is a prototype display of EM Modeling Analysis.

- NCCOSC RDTE DIV SAN DIEGO CA developed an automated $C^2$ Operations Support System (OSS) to receive, process, display, and assess the readiness and warfighting capabilities of own and allied forces to carry out the full range of Navy missions and to receive, correlate, and display neutral and enemy positional data in near realtime.

NCCOSC RDTE DIV SAN DIEGO CA's OSS successfully passed Operational Test (OT) and was judged "suitable" for interim use by the fleet and for continued development through OSS Phase II OPEVAL in FY 95.

Presently, OSS Releases 91-1.1 and 92-1 are installed at nine sites worldwide.

NCCOSC RDTE DIV SAN DIEGO CA completed initial Increment I installations at the command centers at USCINCLANT, USCINCPAC, CINCLANTFLT, CINCPACFLT,

CNO/NCC, CNE (LONDON), and CNE/JOCC (NAPLES).

- NCCOSC RDTE DIV SAN DIEGO CA delivered, installed, and tested the latest Command and Control Processor ($C^2P$) operational program, Version M4V1B7, aboard USS *Carl Vinson* and USS *Antietam*; NCCOSC RDTE DIV SAN DIEGO CA installed the $C^2P$ on USS *Arkansas*.

- NCCOSC RDTE DIV SAN DIEGO CA conducted an ashore installation of the Fleet Mobile Operational Command Center (FMOCC) prototype. From there, FMOCC was refined and made ready for operations deployment resulting in Central Command having the most advanced command, control, communications, computers, and intelligence ($C^4I$) capability available.

- NCCOSC RDTE DIV SAN DIEGO CA develops and maintains CV, CVN, LCC, LHA, and LHD combat direction system computer programs, other support programs, and related documentation of the Advanced Combat Direction System Block 0 (ACDS Block 0).

  References: (1) ACDS level 8 Block 0 C48F.1 program; (2) ACDS Block 0 operational computer Level 7.

- NCCOSC RDTE DIV SAN DIEGO CA is developing the Advanced Combat Direction System Block 1 (ACDS Block 1), a replacement and upgrade for the Naval Tactical Data System, providing significant enhancements in the areas of sensor management, tactical data exchange, warfare area coordination, and system reliability.

- NCCOSC RDTE DIV SAN DIEGO CA developed a prototype airborne surveillance/tracking system using dual-array, realtime coherent signal processing. The Sonobuoy Thinned Random Array Program (STRAP) is presently in the Advanced Development Model (ADM) stage of acquisition. This prototype demonstrated realtime dual-array targeting, detection and tracking at sea.

- NCCOSC RDTE DIV SAN DIEGO CA developed the entire AN/USQ-74 Programmable Data Terminal Set, which is a component of the AN/USC-74 Link-11 System. Algorithms were developed in-house. NCCOSC RDTE DIV SAN DIEGO CA personnel hold the basic patent on the AN/USQ-74 system.

- NCCOSC RDTE DIV SAN DIEGO CA developed the Receive-Only Link-11 NTDS System, a realtime track display system for non-TDS ships. It is used extensively in the fleet aboard FF class ships.

- Using rapid prototyping and EPLD hardware, NCCOSC RDTE DIV SAN DIEGO CA developed a PC-based hardware/software device to allow the capture of NTDS high-speed parallel data known as PRODAC, Programmed Data Acquisition. PRODAC's special

features, portability, and low cost have had a discernible impact on solving fleet problems both shipboard and at lab sites.

- Currently in use by the operational forces, NCCOSC RDTE DIV SAN DIEGO CA designed, developed, installed, documented, trained, and provided maintenance until transition to on-site life-cycle services of the Developmental Aircraft Reports Tracker (DART).

- NCCOSC RDTE DIV SAN DIEGO CA designed, developed, installed, documented, trained, and provided maintenance until transition to on-site life-cycle services of the Developmental Submarine Analysis Tool (DSAT). DSAT became operational and passed security accreditation for system high use.

- NCCOSC RDTE DIV SAN DIEGO CA designed, developed, installed, documented, trained and provided maintenance until transition to on-site life-cycle services of the Developmental Unified ELINT Tracker (DUET).

- Currently in use in the fleet is the NCCOSC RDTE DIV SAN DIEGO CA-developed Flag Data Display System (FDDS), also called Increment II. It is a subsystem of the Tactical Flag Command Center (TFCC), which provides information to the tactical commander.

- NCCOSC RDTE DIV SAN DIEGO CA developed and integrated the JINTACCS Translator Unit (JTU), which translates incoming JINTACCS (Joint Interoperability of Tactical Command and Control Systems) messages into the RAINFORM message format used by Navy processing systems. The JTU program included the development of hardware and a software program that was deployed to nearly 20 Navy command and control sites ashore and afloat.

- NCCOSC RDTE DIV SAN DIEGO CA completed the design and development of the Maritime Defense Zone (MARDEZ) hardware and software. Eleven Coast Guard/Navy sites installed.

- Completed design, development, and certification of an automated information system (AUTODIN) subscriber terminal, the Message Distribution Terminal (MDT). Operational sites include JTF-5, PACAREA, Alameda, CA, MDZ sectors at Hawaii, Long Beach/LA, San Diego, and New York.

- Conditional Event Algebra, a process technology, developed by Dr. I. Goodman, Code 4221, NCCOSC RDTE DIV SAN DIEGO CA, one of the pioneers in developing this new branch of probability, has direct applications to the fusing of conditional information, as well as to the modeling of C3I systems. One byproduct of this, combined with previous work on connecting linguistic-based information with probability descriptions has led to an improved generic tracker-correlator algorithm, PACT (Possibilistic Approach to Correlation and

Tracking), which has been put in a prototype implementation form, toward the goal of fleet usage.

References: (1) Goodman, I. R. 1992. "A Revised Approach to Combining Linguistic and Probabilistic Information," TR 1386, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (July); and (2) Goodman, I. R. (to appear). "Applications of PACT Algorithm to Undersea Surveillance Data Fusion."

**DESIGN ENGINEERING, TESTING, AND PROTOTYPE DEVELOPMENT**

- NCCOSC RDTE DIV SAN DIEGO CA developed the prototypes for Acoustic Data Compression. These prototypes are used by industry in the SURTASS program.

  Reference: Patent No. 4,381,428, Robert Kolesar.

- The NCCOSC RDTE DIV SAN DIEGO CA developed Adjustable Diversity Acoustic Telemetry System (ADATS) has been transitioned to industry and is now commercially available from a local firm, Applied Remote Technology. ADATS has been used with several vehicle systems, both military and commercial.

  Reference: Mackelburg, G. R. 19912. "Acoustic Data Links for UUVs," *Oceans 91 Proceedings*, vol. 3, pp. 1400-1406.

- Three Engineering Development Models (EDMs) of the Control Panel Mk 309 MOD 2 have been built at NCCOSC RDTE DIV SAN DIEGO CA. Eighteen production units will be produced by NUWC, Keyport, Washington. Fleet introduction will be early FY 96 on FFG 7 class ships. Currently being marketed to foreign military for Vertical Launch ASROC (VLA) control applications.

  References: (1) Control Panel Mk 309 Mod 2 Prime Item Development Spec, ORDALT 16369, WS 33094 (1 Dec 1992); and (2) Control Panel Mk 309 Mod 2 Software Requirements Spec, ORDALT 16369, WS 33248 (4 Jan 1994).

- The prototypes of the Analog Multiplier, Nonvolatile Analog Memory, and Novel Resistor Elements have been built by NCCOSC RDTE DIV SAN DIEGO CA Neural Network Program. The prototypes and the process to fabricate them are being used by Hughes Research Laboratories in an Advanced Technology Demonstration.

  Reference: Shimabukuro, R. L., P. A. Shoemaker, and M. Stewart. 1989. "Circuitry for Artificial Neural Networks with Non-Volatile Analog Memories," *Proceedings of the '1989 IEEE International Symposium on Circuits and Systems*, Portland, OR, 2, 1217.

- NCCOSC RDTE DIV SAN DIEGO CA fabricated for UNIFET, Inc. the ISFET pH Sensor prototype.

  (Unpublished/under agreement with company.)

**OCEAN SURVEILLANCE**

- NCCOSC RDTE DIV SAN DIEGO CA is developing a submarine electromagnetic surveillance system that provides wide-band extended frequency coverage capability and high probability of signal intercept for the extended frequency range.

- NCCOSC RDTE DIV SAN DIEGO CA integrated a suite of in-house experimental tools (based on Advanced Propagation Forecasting Terminal [PROPHET] technology) to support communications analyses, exercise planning, and research relating to HF propagation.This effort is referred to under the name of Cassandra.

- NCCOSC RDTE DIV SAN DIEGO CA developed the Advanced PROPHET 4.0 incorporating significantly improved propagation models and multilevel help commands.

- NCCOSC RDTE DIV SAN DIEGO CA developed and successfully fielded at multiple sites an improved system using Ada software based on the Desktop Computer II hardware suite. This system is the Universal Communications Processor (UCP R6/7).

- NCCOSC RDTE DIV SAN DIEGO CA implemented the initial phase of the NCCOSC RDTE DIV SAN DIEGO CA Integrated Surveillance System (ISS) alpha test site in STIC, which will be used to prototype and evaluate advanced ISS architectures, concepts, algorithms, and displays prior to actual development. The STIC Test Management Control System was completed and entered operational usage. The "Block 2" upgrade of the ISS system software was integrated, tested, and certified in the STIC laboratory prior to fleet deployment.

- NCCOSC RDTE DIV SAN DIEGO CA conceived, designed, specified, built, tested, integrated, installed, and documented the Inter-Array Communications (IAC) through Engineering Development Model (EDM) and full production phases. The IAC is a subsystem of the Integrated Undersea Surveillance System (IUSS).

- NCCOSC RDTE DIV SAN DIEGO CA is designing and developing a large-scale, high-resolution, all-source $C^3CM$ simulation and analysis system that simulates in fine detail analytical cases ranging from one-on-one situations to global campaigns to support warfare appraisals and associated analysis. This Countermeasures Assessment System (CMAS) is undergoing formal certification.

- NCCOSC RDTE DIV SAN DIEGO CA is developing the first implementation of a fully automated expert system in an operational signals intelligence (SIGINT) environment that screens incoming messages for routine and operator-specified high-interest items. NCCOSC RDTE DIV SAN DIEGO CA successfully deployed the first Navy cryptologic expert system to two Eurotheater sites. The prototype for effort was developed in the 1980s by NCCOSC RDTE DIV SAN DIEGO CA.

- NCCOSC RDTE DIV SAN DIEGO CA was the sole developer of SCORE, the SIGINT Classification of Recognized Emitters, and was the SCORE software support activity (SSA) for all operational sites until the NSGD Pensacola SSA came on-line.

- NCCOSC RDTE DIV SAN DIEGO CA developed and installed a prototype SIGINT tool, the SIGINT Waterfall Display, to visually detect the presence of signals within the RF environment. NCCOSC RDTE DIV SAN DIEGO CA fielded the prototype at an overseas test site and it is still being used today.

- NCCOSC RDTE DIV SAN DIEGO CA is designing, developing, fielding, and operating the Polar Equatorial Near-Vertical-Incidence Experiment (PENEX), an HF field strength data collection system based on digital spread-spectrum technology. NCCOSC RDTE DIV SAN DIEGO CA's PENEX transmitter in Alaska began formal operations.

- NCCOSC RDTE DIV SAN DIEGO CA achieved sign-off of the SPINNAKER memorandum of understanding for joint arctic field work between the U.S. and Canada and successfully designed, carried out, and analyzed ICESHELF-92, a major arctic field experiment.

- NCCOSC RDTE DIV SAN DIEGO CA developed and integrated all parts of the Quick Reaction Surveillance System (QRSS) system except array and processing equipment. QRSS is a containerized, rapidly deployable towed array used for high performance ASW applications.

- NCCOSC RDTE DIV SAN DIEGO CA performed total system design and development of Millimeter Wavelength (MMW) Receiving Systems employing MMW integrated circuit technology. NCCOSC RDTE DIV SAN DIEGO CA designed, fabricated, tested, evaluated, and installed several high-probability-of-intercept broadband millimeter wavelength receiving system prototypes.

- NCCOSC RDTE DIV SAN DIEGO CA designed, built, and brought the Instrumentation Radar Range into operation. The facility is employed to locate and measure sources of backscatter on scheduled ships and aircraft by using range profile and Inverse Synthetic Aperture Radar (ISAR) techniques. Total RCS versus target azimuth aspect is also determined.

The Adaptive Line Enhancer (ALE) developed by NCCOSC RDTE DIV SAN DIEGO CA is in operational use on SSNs and on surface ships. It is used by the FBI, police departments and other agencies for acoustic surveillance. Patent licensed by Adaptive Digital Systems. Used by AT&T to correct phase jitter in voiceband and data communications modems. Discussed in most graduate level textbooks on Adaptive Signal Processing. Also proposed by academia and industry for optimal frequency estimation and interference removal in spread spectrum communications.

Reference: Zeidler, J. R. 1990. "Performance Analysis of LMS Adaptive Prediction Filters," *Proceedings of the IEEE*, vol. 78, pp. 1781-1806 (Dec).

- NCCOSC RDTE DIV SAN DIEGO CA constructed an Adaptive Lattice Filter and used it for SSN surveillance applications. Industry has developed a version for commercial use. Research has been done to evaluate performance for various commercial and military applications.

  References: (1) North, R. C., J. R. Zeidler, W. H. Ku, T. R. Albert. 1993. "A Floating Point Arithmetic Error Analysis of Direct and Indirect Coefficient Updating Techniques for Adaptive Lattice Filters," *IEEE Transactions on Signal Processing*, vol. 41, pp 1809-1823 (May); and (2) Chew, K. C., T. Soni, J. R. Zeidler, and W. H. Ku. 1994. "Tracking Model of an Adaptive Lattice Filter for a Linear Chirp Signal in Noise," *IEEE Transactions on Signal Processing* (to be published, August).

- NCCOSC RDTE DIV SAN DIEGO CA developed adaptive image processing techniques to detect small objects in clutter. These techniques were applied to the detection of point objects in clouds and terrain clutter. Currently being evaluated by academia and industry for biomedical and other applications.

  Reference: Soni, T., J. R. Zeidler, and W. H. Ku. 1993. "Performance Evaluation of Two Dimensional Adaptive Prediction Filtering for the Detection of Small Objects in Image Data," *IEEE Transactions on Image Processing*, vol. 2, pp 327-340 (July).

## INTEGRATION OF SPACE COMMUNICATION AND SURVEILLANCE SYSTEMS

- NCCOSC RDTE DIV SAN DIEGO CA successfully designed, tested, and manufactured the TRE prototype system. The TRE System passed OPEVAL, approved for full-scale production, then transitioned to industry. NCCOSC RDTE DIV SAN DIEGO CA fielded more than 100 TRE Systems to the U.S. Navy, U.S. Air Force, U.S. Marine Corps, and the U.S. Army and are still in use today.

- NCCOSC RDTE DIV SAN DIEGO CA developed a receiver system in a 3/4 ATR enclosure that provides the user with the capability to simultaneously receive, decrypt, filter, correlate, and distribute the data contained on up to four UHF broadcasts.The system is known as the Multimission Advanced Tactical Terminal (MATT). Further, NCCOSC RDTE DIV SAN

DIEGO CA developed the Prototype Information Correlation Exploitation System (PICES) and demonstrated an embedded correlator to automatically correlate and construct tracks of all contact reports received from the TRAP broadcast in a small amount of memory at 2000 contacts per hour.

## COMMUNICATIONS

- NCCOSC RDTE DIV SAN DIEGO CA implemented and demonstrated Communications Support System (CSS) prototype software in the NCCOSC CSS emulation test bed. NCCOSC RDTE DIV SAN DIEGO CA also completed an on-air demonstration implementing the Navy EHF communication controller.

- NCCOSC RDTE DIV SAN DIEGO CA was SPAWAR's lead laboratory for the Navy EHF Satellite Program (NESP) for the entire NESP development period. NCCOSC RDTE DIV SAN DIEGO CA was also in charge of the TECHEVAL testing of the NESP terminal.

- NCCOSC RDTE DIV SAN DIEGO CA developed and fabricated the prototype hardware and led the shipboard proof of concept testing for Adaptive Line Canceller and Enhancer (ALICE), a tool for at-sea utilization of adaptive signal processing technology to improve surface ship passive acoustic detection and classification.

- Probe Alert, an underwater acoustic communications system, was invented, prototyped, developed, technically and operationally evaluated, and installed in a majority of platforms by NCCOSC RDTE DIV SAN DIEGO CA personnel. Initial feasibility demonstration units were deployed in SEVENTHFLT. Equipments were installed on attack class submarines and on surface ships with a major ASW mission.

- NCCOSC RDTE DIV SAN DIEGO CA designed, developed, and fielded the Radio Wireline Interface secure ship-to-shore secure voice interface system.

- The following ManTech projects, which are in and of themselves either prototypes or process technologies, were developed at NCCOSC RDTE DIV SAN DIEGO CA, deployed at locations indicated or transitioned to production:

Two Focused Ion Beam Systems were developed and are in use for fabrication of special microelectronics devices at Hughes and NCCOSC RDTE DIV SAN DIEGO CA.

The Robotics and Artificial Intelligence Database (RAID) is in operation at Rome Lab for use by all Government agencies and U.S. Government contractors.

The Ion Implantation System was used to fabricate special devices for the ARPA Mini-HALO program at Hughes.

Fiber-Optic Transmitter Modules and High-Radiance Diodes were deployed in Ground-Launched Cruise Missiles, Canadian shipboard multiplex systems (SHINPADS), Air

ForceAN/AYK-15a, Navy AN/AYK-14, advanced shipboard computers AN/UYK-43 and 44, and all aircraft integrated inertial sensor assemblies.

Fiber-Optic Digital Receiver Modules were installed on USS *Wainwright* TACAN antenna and 13 additional ships.

The Crossed Field Amplifier Tube is deployed on the Advanced AEGIS AN/SPY-1 radar.

The Liquid Crystal Light Valves at Hughes have been installed in Navy and Air Force large-screen displays for tactical command and control including USS *Ticonderoga*, CG47s, CG48s, 3rd Fleet Command, two each in Air Force installations in Colorado, CINCPAC, and other sites.

The S-Band Coaxial Magnetron was installed in Navy and Air Force radars including AN/SPN-43, AN/MPM-14, and AN/GPN-20.

The High Average Power Crossed Field Amplifier was installed in fleet AN/SPS-48 radars.

The High-Power Klystron ("F Version") was deployed by Varian in all PHALANX shipboard systems.

An Automated Test System for Phased Arrays (ANFATS Nearfield Test) was introduced into production on the AN/SPY-1 radar at RCA, now GE Corporation.

A special Fiberglass Radome was installed on all fleet PHALANX systems by GD Pomona.

Composite Material Missile Fins were put in production on the SM-2 missile program at GD Pomona.

Single Fiber Star Couplers and Tee Duplex Couplers were developed and installed on the Submarine Advanced Combat System (SUBDACS), TAOC-85, and DMAS programs.

The Dual-Robot Automated Inspection of Fusion Welds was put into production at GD on the Cruise Missile system.

The AN/SPS-40 Radar Microwave Transmitter Modules were put into production at Westinghouse.

Robotic Assembly of Microwave Modules was put into production at Gould NAVCOM for the Navy and Air Force Combined Altitude Radar Altimeter (CARA) system.

UIC: N66001

C-Band GaAs Transmitter/Receiver Modules now being developed at ITT are being used for engineering development tests and will become full production units for the Cooperative Engagement Capability (CEC) system in FY 95-96. Platforms include all battlegroup combatant ships, E2-C, and AWACS aircraft, and Army Patriot missile systems.

- The High Data Rate (HDR) LAMPS MARK III Communication System was conceived by NCCOSC RDTE DIV SAN DIEGO CA and implemented into ships of the Atlantic fleet and used for successful demonstration testing of ship-to-ship video teleconferencing and HDR communication at a 3.1 Mbps data rate. This new capability has evolved from the reengineering of the LAMPS MARK III system that has been in the Fleet about 10 years and is on about 80 ships.

  References: (1) 1994. "Reengineering the LAMPS Mark III to Provide a LOS Ship-to-Ship Teleconferencing Mode," *Proceedings of the Fourth Systems Reengineering Technology Workshop*, (8 Feb 1994); (2) 1994. "System Investigation into the Applicability of LAMPS MARK III Assets to Implement a High-Data-Rate, Ship-to-Ship Communication System," TR 1562, Naval Command, Control and Ocean Surveillance Center RDT&E Division, San Diego, CA (Feb).

- NCCOSC RDTE DIV SAN DIEGO CA developed the Standard Navy Diving Boat, which is now in production; several are in operation.

- NCCOSC RDTE DIV SAN DIEGO CA developed a revolutionary process to insulate Personnel Transfer Capsules for Navy diving operations. The process is now being applied to all PTCs.

**SUBMARINE ARCTIC WARFARE**

- NCCOSC RDTE DIV SAN DIEGO CA developed underwater cameras, Submarine Remote Video Systems (SRVS), to support an improved upward-looking video system that allows observation of the underside of the ice.

- NCCOSC RDTE DIV SAN DIEGO CA twice deployed a conventional sea floor mapping system, the Submarine Side-Scan Sonar, upgraded with automatic tuning capability and used it to map the underside of the arctic ice canopy.

- NCCOSC RDTE DIV SAN DIEGO CA upgraded the submarine ice avoidance sonar AN/BQS-14A with a MILSPEC design based on features of the Arctic Pulsed Experimental (APEX) Ice-Avoidance Sonar. First installation occurred in 1990.

- NCCOSC RDTE DIV SAN DIEGO CA designed, produced, and tested APEX, an ice-piloting sonar system, an "add-on" unit to the AN/BQS-14 sonars installed on *Sturgeon* class submarines. Over 20 systems built at NCCOSC RDTE DIV SAN DIEGO CA.

## ANTISUBMARINE WARFARE

- NCCOSC RDTE DIV SAN DIEGO CA designed and prototyped service life extension package for Mk 309 control panel.

- NCCOSC RDTE DIV SAN DIEGO CA provided algorithm research and development, prototype hardware design and development, determination of shipboard system requirements, system-level design and specification, documentation preparation, and training for Submarine Sonar Adaptive Processor (SSAP), an adaptive signal processor that improves the acoustic target detection and classification capabilities of current submarine sonar systems.

## FACILITIES AND EQUIPMENT

6. **Special Facilities/Equipment Resources.** Include a copy of the form provided at Tab B of this data call for each facility and "major" piece of equipment located at this activity. Include information on separate detachments. The following definitions will apply:

Facilities - Will include such things as rocket firing bays, towing tanks, anechoic chambers, hypervelocity gun ranges, hyperbaric chambers, wind tunnels, simulation/emulation laboratories, etc. Include buildings that are integral to the facility/equipment. Do not include major outdoor ranges or land.

Also, describe modeling and simulation capabilities, hardware in-the-loop facilities and analysis or wargaming capabilities.

Equipment - Resources used to support the operation of the site with a replacement value of $500,000 or greater. Do not include land or buildings in this category. In reporting equipment, provide information to indicate the degree of portability of the equipment.

Class 3 Personal Property items ("plant equipment" or "equipment in place") by definition are highly portable and can be moved easily. Some Class 2 Installed Equipment, such as Main-frame computers, test stands and small hyperbaric chambers, require more extensive utilities support and assembly of components, but can be relocated without damage to the facility or equipment, and therefore are considered "moveable" assets. Other Class 2 items are so large and/or integral to the facility that houses them that major demolition and construction would be required to relocate them, and therefore are considered "fixed" assets. Where appropriate, pieces of equipment can be aggregated for the purposes of completing Tab B.

**Data provided in Tab B.**

7. **General Facilities.**

a. Is there any cash revenue generated by this activity? Example: Electricity generated at this activity and sold to the local community. If yes, describe.

b. What MILCON projects are currently programmed to be completed by the end of FY1995? For each project provide: **None**

(1) A description of the proposed facility with title and project number. Be sure to include the trailing alpha designator for BRACs-88, 91 and 93 realignment projects, i.e., P-xxxR, P-xxxS, P-xxxT .

UIC: N66001

(2) The functional support area(s) that the new facility will support. Refer to Appendix A.

(3) Identify installed equipment to be provided based on the threshold guidance of paragraph 6, page 12, of this data call.

(4) The additional square footage that this project will provide to the functional support area(s).

(5) The current working estimate (CWE) & planned beneficial occupancy date (BOD) of the project.

c. What MILCON projects are currently programmed to be executed/completed after FY1995? For each project provide:

(1) A description of the proposed facility with title and project number.

P123 Demolition of Morris Dam Test Facility
P125 North Light Pier Replacement at San Clemente Island

(2) The functional support area(s) the new facility will support.

P123 (N/A)
P125 Ocean Engineering and Communications

(3) The identified installed equipment to be provided based on the threshold guidance of paragraph 6, page 12, of this data call.

P123 (N/A)
P125 (N/A)

(4) The additional square footage this project will provide to the functional support area(s).

P123 (N/A)
P125 (N/A)

(5) CWE & planned BOD.

P123 $2.5 Million BOD not yet determined.
P125 $1.8 Million, BOD (N/A).

UIC: N66001

d. What is the distance (in miles) to the nearest military airfield and/or pier not located at your site? Describe. Assume all previous BRAC closures have been executed.

The nearest military pier is located at SUBBASE San Diego approximately 1/2 mile from NCCOSC RDTE DIV SAN DIEGO CA. The nearest military airfield is located at NAS North Island which is located within 1/4 mile across San Diego Bay, however, surface street distance around the bay is approximately 15 miles.

e. How many certified magazines, used for the storage of explosives, does this activity own or control? What is the total explosive weight storage capacity? N/A

## LOCATION

8. **Geographic Location.**

a. Is there an imperative in facility, function or synergy that requires the installation/base/facility to be in its present location? If yes, describe.

Yes, this facility is located on 508 acres on Point Loma in San Diego, California. The Point Loma area is a RF/EM quiet area throughout the frequency spectrum (DC to Light). This permits many research and development programs to be worked in normal laboratories instead of requiring RF/EMI screen rooms. This saves millions of dollars in construction costs plus reduces R&D program costs.

b. What is the importance of the present location relative to customers supported?

The present location permits line-of-sight operations with Naval Station San Diego, Naval Submarine Base San Diego, Naval Base Imperial Beach, NAS North Island, Naval Telecommunications Station San Diego (transmitter and receiver sites), NTC San Diego, MCRD San Diego, Camp Pendleton, and Coast Guard Station San Diego. This location also overlooks the entire San Diego harbor complex and several islands off the Southern California coast. This location is in the footprint of several satellites that support operational command (joint & allied) in the Atlantic and Pacific oceans.

This command supports C4I and Surveillance programs from initial research and development, through production and installation in operational units and joint forces, and provides follow-on lifecycle support for the programs. Our customers include numerous Army, Air Force, Navy, Marine, Coast Guard, other government agencies (federal, state, county, city) and allies. The proximity of fleet operational forces cannot be overemphasized.

This location permits testing of R&D programs with simulated battle group spacing using remote nodes located at other local commands and on the off-shore islands. Joint program development is enhanced by the proximity of Camp Pendleton and Coast Guard Station, San Diego. The ability to test high data rate, multimedia C4I and Surveillance programs from a laboratory environment with battle group reality and spacing is most beneficial for both operational and cost saving reasons. This location also permits operational testing of these programs using operational battle groups in the Navy's southern California operating areas or while berthed in San Diego harbor.

Environmental Quality:

The proximity of San Diego Bay to the NCCOSC RDTE DIV SAN DIEGO CA's Environmental Sciences Division Ocean Sciences Laboratory is key to the success of the Marine Environmental Quality Program. San Diego Bay located, less than 100 yards from the Ocean

Sciences Laboratory, is a marine embayment that supports the San Diego naval complex and several cities surrounding the bay. The bay is used constantly by the Environmental Sciences Division as a resource and test bed for environmental quality RDT&E. Specifically, the bay is necessary and used for the following purposes:

1) San Diego Bay is the source of pumped seawater into the Ocean Sciences Laboratory and the Portable Environmental Test Facility for marine biological and chemistry studies to evaluate Navy environmental issues.

2) San Diego Bay is used as an effective test bed for environmental instrumentation, sensors and ecological risk assessment methods developed by Environmental Sciences Division. The close proximity of the San Diego navy "megaport," including navy fleet assets, shore facilities and environmental areas such as aquatic hazardous waste sites, is needed for effective technology demonstration and transfer. The proximity of a full spectrum of Navy ships is important for on-going projects to evaluate the impact of shipboard effluents and hull coatings.

3) San Diego Bay is used extensively to develop and test coating materials for antifouling properties and durability; test the Marine Environmental Survey Capability (MESC) housed on a 40 ft craft; provides a number of areas for the study of marine pollution; and allows for housing of marine mammals for environmental health and care research. Piers for small boats and the MESC system, as well as test platforms, are required in close proximity of the Ocean Sciences Laboratory to carry out ongoing RDT&E programs and to support the in-house Marine Environmental Support Office, a support office of the Naval Facilities Command, Naval Environmental Protection Support Service (OPNAVINST 5090.1A).

Additionally, the close proximity of NAS North Island permits rapid deployment of the operational units wherever required.

## FEATURES AND CAPABILITIES

9. **Computational Facilities.**

**Note: As indicated in the "GENERAL NOTE" found at the front of this data call response, mission, technical and support functions, and workload are integrated at the NCCOSC Division level. Therefore, the data in this section of the data submission reflects technical and support functions for NCCOSC RDTE DIV and its detachments**

a. Describe the general and special computational capabilities at this site. Include super computing, parallel computing, distributed computing and networking. Include high-speed data transfer, fiber optic links, microwave links, network interconnectivity and video teleconferencing capabilities. Do not discuss desktops and laptops except as they relate to networking.

**PHYSICAL NETWORK INFRASTRUCTURE**

Over the last five years fiber optic cable has been laid between many of the major building sites. Many feeder fiber cables have also been installed to connect smaller buildings and work groups to the fiber optic backbone.

This network supports 8 major population centers over 12 square miles connecting over 160 buildings and supporting 5000 employees and contractors with over 10,000 network connections.

A list of the buildings include the following:

Buildings 33, 1, 605, 606, 605, 40, C60, 376, 382, 15, 660, 106, 111, 27, A83, A80, 184T, 560N, 30, 2, 200, 32T.

Buildings to be connected up in the near future include: bldg. A1, A7, A4, A88, 91/96, 374, 661, and all of the barracks.

**UNCLASSFIED NETWORKING INFRASTRUCTURE**

The NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA High Speed Data Transfer Network is a vital part of the Defense Data Network (DDN), the Defense Research Engineering Network (DREN) and the Internet community. NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA is the pivot point at which the networking community accesses Southern California DOD resources.

The NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA High Speed Data Transfer Network consists of 155Mb (Megabit) Asynchronous Transfer Mode (ATM) over Fiber Optic Cable; 100Mb Fiber Distributed Data Interface (FDDI) over Fiber Optic Cable; 10Mb Baseband Ethernet over Coaxial Cable (10Base2), Twisted Pair Cable (10BaseT) and Fiber Optic Cable (10BaseF); and 5Mb CATV

Broadband over Coaxial Cable (10Broad5) and Fiber Optic Cable.

The 155Mb ATM portion of the NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA network is a multi-vendor ATM testbed designed to assist the networking community with interoperablilty testing and product development. This ATM testbed serves as a learning tool for the NCCOSC RDTE DIV SAN DIEGO CA staff so as to remain at the forefront of this emerging technology. More importantly this ATM testbed has provided NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA with a method of exposing vendor products that are not interoperable. NCCOSC RDTE DIV SAN DIEGO CA is now in the process of procuring equipment to expand this ATM testbed environment as the next step toward implementation as a NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA center-wide ATM Backbone Solution. It is planned that this ATM backbone solution will become the NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA Corporate Data Backbone by the end of this fiscal year (FY94). The bandwidth on this ATM backbone is scalable to 1.6Gb (GigaBit) thus providing the necessary headroom for future expansion as network bandwidth demands increase.

The current NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA Corporate Backbone is a FDDI Network implementation running over multi-mode fiber optic cabling. This FDDI portion of the NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA High Speed Data Transfer Network connects the major center areas (i.e. bayside, topside, seaside, cliffside) with inter-building high bandwidth connections. This has decreased the network congestion that the NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA Data Backbone was experiencing before FDDI's incursion. FDDI is also used as the networking solution for high data volume implementations such as CAD/CAM workgroups and real-time data transfers.

The third piece in the NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA High Speed Data Transfer Network is the 10Mb ethernet distribution segment. This 10Mb level of data network connection is the access point for the majority of individual users into the Corporate Backbone. NCCOSC RDTE DIV SAN DIEGO CA's twisted pair standard is Category 5. This standard cabling will allow NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA to implement higher bandwidth network solutions to the desktop with a minimum of installation effort.

The final part of the NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA Data Network is the CATV Broadband cable plant. This broadband system supplies connectivity for remote user areas (5Mb ethernet), four thousand Sytek network access units (Tboxes), multiple 9600 bit-per-second (bps) dedicated data modem links. The broadband system also provides distributed voice and video. This voice and video capacity is utilized for training and information dissemination.

## CLASSFIED NETWORKING INFRASTRUCTURE

High Speed Classified Data Transfer is performed over a three-tiered, internal, backbone network with a diverse set of work centers, high performance computers, work group computers and special devices connected to it. The open system architecture of this environment provides Center computers the ability to share data at the SECRET/NOFORN level. The three tiers of the internal network

based upon Ethernet, Fiber Distributed Data Interface (FDDI) and Asynchronous Transfer Mode (ATM) technologies. Ethernet supports data transfer at the 10 million bits per second (Mbps) rate. Intrusion Detection Optical Communications Systems (IDOCS) provides communications links between major geographic areas at the 10 Mbps rate at the SECRET/NOFORN level. FDDI supports data transfer at the 100 Mbps rate. NCCOSC will soon be participating in wide area ATM connectivity at OC-3 speeds and experimenting with the use of high speed encryption devices.

The classified network connects the work groups located in geographically diverse locations of NCCOSC San Diego. This provides a means to share data, run simulations and access long haul access resources such as SHF transmitters, Defense Research Engineering Network, and other encrypted links to other DOD facilities. The network provides researchers access to the High Performance Computing Environment resources.

## INTERNET NETWORKING INFRASTRUCTURE

**NCI**: NCCOSC has implemented and maintains an Enterprise wide Internet covering 6 time zones. This network has been named the NCCOSC Command Internet (NCInet) and provides full network connectivity for a dozen NCCOSC locations. The NCInet is a T-1 (1.5 Mbit) based packet network. Each NCCOSC campus uses this network to interoperate with every other campus and the global Internet. Each campus has a variety of media to meet local bandwidth and distribution requirements. These primarily include ethernet, FDDI, ATM, and other technologies. Individual workstations typically participate in a workgroup network which attaches via the local distribution. This network provides 1 Mbps packet rates to any location with a round trip delay of less than 100 milliseconds. NCCOSC provides many services in support of its infrastructure. These include routing service, time synchronization service, name services, directory and registration services, email services, remote access, file transfer at various levels, and many others. Other higher level services that are provided are public file repositories and information services such a gopher, Web, and WAIS. These services are centrally managed and maintained which yields a very good cost/benefit ratio and benefits the entire enterprise. To provide connectivity to other organizations, NCCOSC has established links to other networks. We maintain a T-3 (45 Mbps) link to the San Diego Supercomputer Center for access to the High Performance Computing assets there. This link also provides NCCOSC with connectivity to the NSFnet, also a T-3 network. NCCOSC is also a major node on the DREN network at T-3 speeds and will soon be participating in wide area ATM connectivity at T-3 and SONET speeds. NCCOSC has a DSInet node as well. Because of the exceptional connectivity within NCCOSC, many other DoD organizations have been coming to NCCOSC for networking service. As a result, NCCOSC has high speed links to all the other Navy Warfare centers plus high speed connectivity to much of the rest of the DoD R&D community.

**DREN:** NCCOSC is a major participant in the establishment of the Defense Research and Engineering Network (DREN). NCCOSC is the site of one of the major backbone hubs for DREN and is the only Navy site with a backbone hub. The NCCOSC hub is strategic in that it is at the western edge of the cross country backbone and provides the linkage to the Federal Internet Exchange (west coast) and High Performance Computing assets in Hawaii. It is also viewed as

strategic because it is the only one of the DREN sites that is in close proximity to the newly sponsored National Science Foundation very high speed network backbone linking national supercomputers including the San Diego Supercomputer Center and will be used as the location for linking these 2 major national backbones. The capability that is installed today provides 45 Mb/sec

(T-3) network connectivity to major DoD research and engineering sites as well as the Federal Exchange.

**Microwave interconnectivity:** The only microwave link we have knowledge of is the link we are trying to establish between NCCOSC RDTE DIV SAN DIEGO CA and NISE West, which is not yet in place.

**NSAP and TRINET Email**

NCCOSC RDTE DIV SAN DIEGO CA provides the central hosts for electronic communications and training support to NSAP (Navy Science Assistance Program). In 1993, the Army (AMC-FAST) and Air Force (AFTriNet) became joint users of NEMO and the Email Support Team, and the name TriNet (Tri-Service Technology Network) was introduced for this tri-service venture. Using the DDN and/or dial-up access, NSAP, FAST, and AFTriNet Field Team Members and Representatives access NEMO (the unclassified host) and CRAB (classified/ /SECRET host) to use electronic mail, access public files, and submit problems, questions and answers. Annually NCCOSC RDTE DIV SAN DIEGO CA conducts training programs to instruct new Field Team Members and other TriNet users in the capabilities and use of the host and their own computers and its utilities. These users depend heavily on electronic communications, particularly electronic mail. To facilitate the rapid exchange of information, mailing lists and shared files are maintained on the NCCOSC RDTE DIV SAN DIEGO CA host computers. In summary, the NSAP/TriNet email support task benefits the NSAP Navy and Marine Corps members, AMC-FAST Army, and AFTriNet Air Force, and participating labs and organizations by providing 24-hr/day network connectivity, hotline support, email training, documentation, and free software (dialup Umail and unix-like DOS tools). Besides providing Email support and training to NSAP, the NSAP Headquarters have expanded the NSAP Email task to include procurement and support of ADP related hardware and software to meet their growing needs to improve communications between NSAP members, NSAP support per-sonnel, and supported commands and throughout the world. It also provides FLAG officer and fleet users the ability to communicate via email.

Currently, the Army, Navy and Air Force share operations and maintenance costs of host computer systems. These systems are maintained by the Navy and are located at the Naval Command, Control and Ocean Surveillance Center RDT&E Division (NCCOSC RDTE DIV SAN DIEGO CA) in San Diego, California. The computer systems ensure communications among all three services and are maintained in both secured and non secured modes using electronic mail.

TriNET is designed to enhance the communication and the flow of technology information throughout the Department of Defense (DOD). TriNET will enable the Army, Navy and Air Force

to share technology information to help solve user problems. The network must have the capability to transmit information during wartime as well as peacetime. TriNET will improve communications between the DOD research and development communities and the operating/field commands. TriNET will provide access to technical experts via specific points of contact in each service (the Navy Program Managers, the Army Quick Reaction Coordinators and the Air Force Technology Focal Points). TriNET will be used to help Army, Navy and Air Force personnel who have problems (e.g., performance readiness, maintainability, deployability, availability) query the technology and operational communities of all three services to identify a technological solution. TriNET will enhance inter-service exchange of technology information allowing for rapid responses to technology issues/problems and encouraging combined efforts in solving problems thereby avoiding duplication. TriNET will also allow the three services to gain access to technology information from other government agencies.

## HIGH PERFORMANCE COMPUTING

NCCOSC RDTE DIV SAN DIEGO CA is dedicated to providing a High Performance Computing environment (HPCE) enabling its scientists and engineers to solve challenging R&D problems. Two physically separate HPCEs are installed, one for classified processing, and one for unclassified processing. The HPCE provides vector computer systems, a collection of medium-to large-scale parallel computing systems of diverse architectures, and scientific visualization and virtual environment systems interconnected with multiple internal networks. This combination of resources provides a processing and analysis capability unique within the Navy. The Defense Advanced Research Projects Agency (DARPA) uses this site as a model of the way that high performance computing should be integrated with existing local computers and networking. Replacement of the current facility would require in excess of $8 million.

The HPCEs are used to support computationally intensive, highly classified command and control, intelligence, communications, and ocean surveillance programs. Via external classified and unclassified networks, these HPCEs are available to other Navy and DoD sites on a nationwide basis. The unclassified networking capability also permits NCCOSC RDTE DIV SAN DIEGO CA personnel to utilize existing commercial and DoD/DoE computers at other sites to supplement the HPCE capabilities. Planned DoD/DoE classified computers will be used as they become available, but the special needs of projects performing top secret and compartmented processing require that their processing be done locally.

This site is a recognized leader within the DoD in the application of massively parallel computers and high performance computing techniques to Navy and DoD programs. In 1993, NCCOSC RDTE DIV SAN DIEGO CA was selected by the DoD High Performance Computing Modernization Program to host an Intel Paragon XP-5 computer system. This is a large-scale parallel computer with 336 compute nodes and a peak performance rating of 25 GLOPS/S. Currently, it has an aggregate 6.4 GB of RAM. In addition to use by on-site NCCOSC RDTE DIV SAN DIEGO CA and other DoD personnel, the facility supports SECRET processing to national DoD users via DREN access with NES encryption units.

NCCOSC RDTE DIV SAN DIEGO CA is also the site of a Convex Exemplar SPP-1, one of the newest scalable parallel processing systems. The SPP-1 is a single node system with 8 processors, and a peak performance of 1.6 GFLOPS. The system can support up to 16 nodes, with a peak performance of 25.6 GFLOPS. As part of an "early access" agreement with Convex Computer Corporation, NCCOSC RDTE DIV SAN DIEGO CA personnel are working with Convex to produce a parallel computing environment, which provides not only computing power, but sophisticated software tools to facilitate the development of high-performance parallel applications.

The classified HPCE includes an internal network with a diverse set of computers and special purpose devices connected to it, all operating up to the SECRET level. Parallel computers in this environment are the 336-node Intel Paragon XP-5, an Intel 32-processor Touchstone Gamma, an Encore 10-processor Multimax Model 520-3, an Intel 64 processor iWARP, and several Active Memory Technology 1,024 processor Distributed Array Processor (DAP) Model 510 computers. Silicon Graphics visualization workstations with Reality Engine graphics provide state-of-the-art scientific visualization capabilities. Via the classified network, many workstations and personal computers have access to these resources.

The unclassified HPCE includes an internal network with a diverse set of computers and special purpose devices connected to it. Parallel computers in this environment are the Convex Exemplar SPP-1, an Encore 6-processor Multimax Model 510-3 and an Intel 64-processor iWARP. Vector supercomputing capability is provided by a 4-processor Convex Model C-3240. Two Silicon Graphics visualization workstations with Reality Engine graphics provide state-of-the-art scientific visualization capabilities. Via the unclassified network, many workstations and personal computers have access to these resources.

This environment is interconnected with the external National Science Foundation network (NSFNET) and Defense Data Network (DDN) by a T-3 link, and to the external DMSO DSInet by a separate T1 link. A T-3 link to the San Diego Supercomputer Center provides access to the high performance computing assets located at that facility.

In addition to the classified and unclassified computing resources, there are other resources installed which have the capability of operating at classification levels above SECRET. These include a variety of workstations, minicomputers, and massively parallel computers, which reside in physically separate and electronically secure facilities. These secure facilities represent a unique resource capable of performing many types of highly classified processing in support of Navy and DoD programs. Because of the nature of their physical construction, the facilities are an integral part of the building containing them.

## BUSINESS SYSTEMS

NFAS (NCCOSC Finance and Accounting System) originally was a NIF (Navy Industrial Fund) accounting system servicing NCCOSC RDTE DIV SAN DIEGO CA. In 1993 this system was converted to NFAS, following the quidelines and requirements of the Joint Financial Management

Improvement Program (JFMIP), to service NCCOSC and all of its field activities. NCCOSC is comprised of previously separate Navy commands that have been reorganized and consolidated into a single command. The function is to operate and maintain the NFAS in support of a variety of application functions including, but not limited to:

| | |
|---|---|
| Funds Resource System | (FRS) |
| Financial Control System | (FCS) |
| DoD Civilian Pay System Interface | (DCPS) |
| Civilian Labor System | (CLS) |
| Military Labor System | (MLS) |
| Document Entry System | (DES) |
| Project Reporting System | (PRS) |

NFAS operations and maintenance support is critical to the Command-wide financial and accounting information and the communications capability required to transmit this data between field activities and NCCOSC Headquarters. All NCCOSC components are able to connect to the NCCOSC Command Internet and interface with internal local area networks.

NFAS is supported by a Digital Equipment 8820 class computer with 42GB of data storage.

NCCOSC RDTE DIV SAN DIEGO CA business base and query systems is in a DEC cluster with 2-8650's an 8820 and an 8830 class computers with 42GB of data storage. Supporting this environment is an 8650 as a maintenance computer and a micro-vax III as an I/O computer.

**PC Networks**

PC Networks are a growing segment of networking at NCCOSC RDTE DIV SAN DIEGO CA. NCCOSC RDTE DIV SAN DIEGO CA's PC Network is currently made up of 40 Novell Netware file servers.

These file servers are generally high end PC 486 machines with large disk drives for data storage. Each file server has been placed in service for a specific community of NCCOSC RDTE DIV SAN DIEGO CA users. Most user communities are organizationally defined, i.e., a branch or a division, but some are more broadly focused (.e.g. a building of users in multiple organizational units or a type of user such as all branch and division heads). While access to each server is limited to its defined community of users, each server is accessible from virtually all locations of NCCOSC RDTE DIV SAN DIEGO CA's large campus. These servers provide several functions:

1) They are the lingua franca of NCCOSC RDTE DIV SAN DIEGO CA for PCs (DOS\Windows\OS/2), UNIXs (Suns, Nexts, ...), and Apple computers.

2) They are the foundation of a robust mail service for most server users and of a calendaring/scheduling service for a more limited number of users.

3) They provide printer sharing services for most communities and both input and output FAX sharing for some communities.

4) They provide application service, data storage, and data sharing services. Properly configured many users have discovered that they can now have access to their data and applications from any network accessible PC at NCCOSC RDTE DIV SAN DIEGO CA.

**VTC NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA Video Teleconferencing (VTC)**

The NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA Video Teleconferencing (VTC) facility, located in A33 room 3038A, is connected to the Defense Commercial Telecommunications Network (DCTN). Currently, there are 130+ DOD sites connected to the network. DCTN is an AT&T private, switched network providing integrated video, voice, and data services for the Defense Communications Agency (DCA). DCTN is the largest video teleconferencing network to support the Department of Defense (DOD). All DOD sites have the capability to connect with AT&T AccuNet and U.S. Sprint Meeting Channel facilities.

All video teleconferencing services are provided entirely on a terrestrial, fiber optic backbone. The AT&T Network Control Center located in Dranesville, Virginia is responsible for the management of network connectivity between DCTN sites and Control Access Points (CAP's) for bridging into Sprint and AT&T's Accunet rooms. Connectivity between sites can be point-to-point, multipoint, or secure point-to-point (DOD sites only). Point-to-point provides interactive video and audio conference capabilities between any two sites. Multipoint allows dynamically reconfigurable meeting arrangements involving different sites. Up to 25 sites can be connected to participate in the same meeting.

Secure point-to-point allows voice, video, and high-resolution graphics signal encryption between two sites that have the appropriate COMSEC equipment.

The NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA VTC has been used to support command and control, local training, distance learning, project administration, crisis management, contract administration; and recruiting.

The main VTC features include simultaneous transmission and reception of full-motion, color video, voice, and high-resolution (HIRES) color or black-and-white graphics (i.e., viewgraphs, documents, maps/drawing, computer-generated information, etc.); broadcast quality VHS and UMATIC tape capability.

## NCCOSC/NCCOSC RDTE DIV SAN DIEGO CA VTC CAPABILITY

Tempest Approved and cleared for handling/transmitting classified information up to the SECRET level.

COMM EQUIPMENT:

| | |
|---|---|
| LINK: | 1 - T1 (1.544) (Carrier: AT&T) |
| INTERFACE: | 1 - 740 Muxiplexor RS-449/422 (2 ports) |
| CODEC: | 2 - CLI Rembrandt II/VP video codec |

ROOM EQUIPMENT:

**Cameras:** Full-Motion video
- 2 - Pan & Tilt
- 1 - Fixed
- 1 - Graphics (overhead) for HIRES display

**Video:** Full-Motion Video and Graphics Display
- 2 - 35" Color monitors - for remote participates
- 1 - 35" Color monitor - HIRES graphics
- 1 - 19" Color monitor - for presentation viewing

**Audio:** Full-Duplex with telephone add-ons - room can be configured for audio conferences only
- 2 - front speakers (above monitors)
- 3 - microphones on conference table
- 2 - microphones for gallery

**COMSEC:** COMSEC equipment for SECURE point-to-point VTC
- 2 - KG-94A

**Printers:** Video printer for Hard Copy Graphics Generation
- 1 - Laser - for black and white hard copy
- 1 - black-and-white image HIRES scanner

**Video Tape:** Video Tape Recording and Playback 1\2" VHS, 3/4" UMATIC, Beta

| | |
|---|---|
| **ROOM CAPACITY:** | 24 |
| Conference table: | 6 chairs |
| Gallery: | 5 chairs |
| Additional seating: | 4 chairs |
| Standing room: | 9 |

UIC: N66001

10. **Mobilization Responsibility and Capability.**

**Note: As indicated in the "GENERAL NOTE" found at the front of this data call response, mission, technical and support functions, and workload are integrated at the NCCOSC Division level. Therefore, the data in this section of the data submission reflects mission and technical functions for NCCOSC RDTE DIV and its detachments**

a. Describe any mobilization responsibility officially assigned to this site. Cite the document assigning the responsibility.

NCCOSC RDT&E Division (NCCOSC RDTE DIV SAN DIEGO CA) is to be the principle RDT&E center for command, control, communications, ocean surveillance and submarine Arctic warfare. During mobilization, the basic mission elements are not expected to change; however, the emphasis will change from long-term development programs to short-term "warstopper" type programs. The following changes in basic roles and responsibilities would be expected during the shift from peacetime to wartime: provide troubleshooting and design modification for deployed systems;provide field technical advisors to the operating forces; accelerate development of equipment and systems; provide contracting officers representatives (CORs) support in award and administration of production contracts; provide testing and evaluation of equipment and systems; support intelligence evaluation and threat assessment; and support technical training requirements on new equipment and systems at the RDT&E test ranges.

Document assigning responsibility: Logistic Support Mobilization Plan (LMSP), SPAWARSYSCOM JAN 1990.

(1) What functional support area(s) does this responsibility support? Refer to Appendix A for the list of functional support areas?

1. Platforms:
   1.1 Undersea
   1.2 Aircraft
   1.3 Surface Ship
   1.4 Space Satellites
   1.5 Ground Vehicles

3. Combat System Integration:
   3.1 Subsurface
   3.2 Air
   3.3 Surface
   3.4 Multiplatform

5. Sensors:
   5.1 Sonar Systems

5.2 Radar Systems
5.3 Special Sensors
5.4 Space Sensor/Surveillance Systems
5.5 Ocean Surveillance

6. Navigation:
6.1 Submarine Navigation Systems
6.2 Aircraft Navigation Systems
6.3 Surface Ship Navigation Systems
6.4 Weapons Navigation Systems
6.5 Satellite Navigation Systems

7. Command, Control, Communications and Intelligence:
7.1 Submarine
7.2 Airborne
7.3 Shipboard
7.4 Land based
7.5 Space Communications Systems
7.6 Non-Tactical Data Systems
7.7 Air Traffic Control Systems
7.8 Intelligence Information Systems

8. Defense Systems:
8.3 Electronic Warfare (EW) Systems

11. General Technology Base:
11.1 Computers
11.2 Software
11.3 Communication Network
11.4 Electronic Devices
11.5 Materials and Processes

(2) What portion of the work years and dollars, as reported in each applicable functional support area reported in Tab A, are spent solely on maintaining your activity's readiness to execute the mobilization responsibilities?

Zero.

(3) How many additional personnel (military & civilian) would be assigned to your activity as part of the mobilization responsibility? Include separately any contractor assets that would be added.

UIC: N66001

| | |
|---|---|
| Officers: | 35 |
| Enlisted: | 194 |
| Civilians: | 545 |
| **TOTAL:** | **774** |

b. Does your activity have adequate facilities to support your mobilization responsibilities? (yes/no) **Yes**.

(1) If yes, is any space assigned for the sole purpose of maintaining mobilization readiness? (yes/no) If yes, list the square footage assigned. **No**.

(2) If no, what repairs, renovations and/or additions are required to provide adequate facilities? What is the estimated cost of this work?

Only minor alterations of existing facilities and equipment acquisition will be required in the Solid State Electronics facility, which develops electronic components and devices, and the Support Engineering prototype manufacturing facility, which supports high technology projects.

(3) Are there any restrictions that would prevent work (noted in paragraph 10.b.(2) above) from taking place (i.e., AICUZ, environmental constraints, HERO, etc.)? If yes, describe. **No**.

c. Describe any production facilities that would be activated in case of a future contingency.

The production facilities for solid state devices and engineering prototype devices, as discussed in item 10.b.(2), will be expanded. These facilities are capable of expanding to around the clock operations to produce electronic components and devices of either new technology or out-of-production items urgently needed by the fleet.

d. Is your activity used as a Reserve Unit mobilization and/or training site?

Yes. NCCOSC Unit 119 is currently conducting monthly and annual training on site in support of operations of the center; individual annual training is provided for reservists from numerous units throughout the reserve organization; and NCCOSC RDTE DIV SAN DIEGO CA is one of the sites used by various MIUWU units for their training periods.

11. **Range Resources.** Include a copy of the form provided at Tab C of this data call for each range located at this activity or operated by this activity. Also, report ranges at detachments and sites not receiving a separate data call. The following definition of a range will apply:

Range - An instrumented or non-instrumented area that utilizes air, land, and/or water space to support test and evaluation, measurements, training and data collection functions, but is not enclosed within a building.

Information is provided in TAB C.

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## QUALITY OF LIFE

12. **Military Housing**

(a) Family Housing:

NOTE: All information on family housing was provided by the COMNAVBASE San Diego Military Family Housing Office.

(1) Do you have mandatory assignment to on-base housing? (circle) yes **no**

(2) For military family housing in your locale provide the following information:

| Type of Quarters | Number of Bedrooms | Total number of units | Number Adequate | Number Substandard | Number Inadequate |
|---|---|---|---|---|---|
| Officer | 4+ | 194 | 194 | 0 | 0 |
| Officer | 3 | 341 | 341 | 0 | 0 |
| Officer | 1 or 2 | 24 | 24 | 0 | 0 |
| Enlisted | 4+ | 1605 | 1605 | 0 | 0 |
| Enlisted | 3 | 2853 | 2853 | 0 | 0 |
| Enlisted | 1 or 2 | 2648 | 2648 | 0 | 0 |
| Mobile Homes | | 0 | 0 | 0 | 0 |
| Mobile Home lots | | 108 | 0 | 108 | 0 |

(3) In accordance with NAVFACINST 11010.44E, an inadequate facility cannot be made adequate for its present use through "economically justifiable means". For all the categories above where inadequate facilities are identified provide the following information: N/A. There are no inadequate facilities per NAVFAC 11010.44E guidelines.

Facility type/code:
What makes it inadequate?
What use is being made of the facility?
What is the cost to upgrade the facility to substandard?
What other use could be made of the facility and at what cost?
Current improvement plans and programmed funding:
Has this facility condition resulted in C3 or C4 designation on your BASEREP?

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(4) Complete the following table for the military housing waiting list.

| Pay Grade | Number of Bedrooms | Number on List[1] | Average Wait |
|---|---|---|---|
| O-6/7/8/9 | 1 | 0 | N/A |
| | 2 | 0 | N/A |
| | 3 | 0 | N/A |
| | 4+ | 28 | 18-19 MONTHS |
| O-4/5 | 1 | 0 | N/A |
| | 2 | 16 | 11-12 MONTHS |
| | 3 | 92 | 18-19 MONTHS |
| | 4+ | 38 | 19-20 MONTHS |
| O-1/2/3/CWO | 1 | 0 | N/A |
| | 2 | 141 | 30-31 MONTHS |
| | 3 | 67 | 13-14 MONTHS |
| | 4+ | 38 | 23-24 MONTHS |
| E7-E9 | 1 | 0 | N/A |
| | 2 | 72 | 22-23 MONTHS |
| | 3 | 185 | 23-24 MONTHS |
| | 4+ | 127 | 36-37 MONTHS |
| E1-E6 | 1 | 50 | 8-9 MONTHS |
| | 2 | 1684 | 16-17 MONTHS |
| | 3 | 1575 | 27-28 MONTHS |
| | 4+ | 722 | 23-24 MONTHS |

[1]As of 31 March 1994.

(5) What do you consider to be the top five factors driving the demand for base housing? Does it vary by grade category? If so provide details.

| | Top Five Factors Driving the Demand for Base Housing |
|---|---|
| 1 | COST. San Diego is one of the most expensive CONUS living areas. Average monthly rental rates exceed Maximum Allowable Housing Cost (MAHC) for most paygrades. Generally, E1-E6 personnel can only afford to rent homes in high crime neighborhoods. E1-E3 can afford only one bedroom homes. E4-E6 can only afford 2 bedroom homes. Four bedroom homes are out of reach for all but O-4 and above personnel. A December 1992 market analysis indicates this problem will worsen within the next five years. Average price of a single family home in 1993 was $219,609 - well above the means of most military families. |
| 2 | SECURITY. Because of the high cost of housing, many families are forced to live in high crime areas. Gang activity and other types of crime common to major metropolitan areas are prevalent within the region. Security is a major concern for family members who must fend for themselves during a spouse's deployment. |
| 3 | PROXIMITY TO WORK/LOCATION. Military family housing sites are within minutes of all eleven major installations in the San Diego area and most are located close to support facilities such as Family Service Centers, Exchanges and Commisaries. Many service members prefer to reside close to work to limit commute time, save money, and facilitate rapid recall. |
| 4 | COMMUNITY SUPPORT. Many service members and their dependents cite the strong bond and support they receive from military neighbors as a primary reason for applying for family housing. This is especially important to families with sponsors attached to afloat commands. |
| 5 | QUALITY OF FACILITIES. There are many different types of military housing available in San Diego. Age, style, and amenities vary at each site. Single family, duplex, townhome and apartment style homes are available. Many new sites have been acquired through the "Direct Purchase Program", which enables the government to purchase entire communities from developers. These military housing communities blend in with civilian homes as they were constructed to be rental or sales properties. |

**Note the while the top five factors apply to all grade categories, they vary in importance according to grade. Senior officers are more likely to choose family housing due to proximity to work/location or community support. Cost and security are the primary concerns of enlisted personnel.

(6) What percent of your family housing units have all the amenities required by "The Facility Planning & Design Guide" (Military Handbook 1190 & Military

Handbook 1035-Family Housing)?

79%

(7) Provide the utilization rate for family housing for FY 1993.

| Type of Quarters | Utilization Rate |
|---|---|
| Adequate | 98.39% |
| Substandard | N/A |
| Inadequate | N/A |

(8) As of 31 March 1994, have you experienced much of a change since FY 1993? NO. If so, why? N/A. If occupancy is under 98% ( or vacancy over 2%), is there a reason? N/A.

(b) BEQ: NCCOSC RDTE DIV SAN DIEGO CA personnel utilize the BEQ located at SUBASE San Diego. Items (1) thru (3) are answered as they pertain to the SUBASE BEQ.

(1) Provide the utilization rate for BEQs for FY 1993.

| Type of Quarters | Utilization Rate |
|---|---|
| Adequate | 100 |
| Substandard | 0 |
| Inadequate | 0 |

(2) As of 31 March 1994, have you experienced much of a change since FY 1993? If so, why? If occupancy is under 95% (or vacancy over 5%), is there a reason? There has been no change since FY 93.

(3) Calculate the Average on Board (AOB) for geographic bachelors as follows:

$$\text{AOB} = \frac{\text{(\# Geographic Bachelors x average number of days in barracks)}}{365}$$

AOB = 119 days

(4) Indicate in the following chart the percentage of geographic bachelors (GB) by category of reasons for family separation. Provide comments as necessary. There are only three NCCOSC RDTE DIV SAN DIEGO CA enlisted personnel that are geographic bachelors.

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| Reason for Separation from Family | Number of GB | Percent of GB | Comments |
|---|---|---|---|
| Family Commitments (children in school, financial, etc.) | 0 | 0 | |
| Spouse Employment (non-military) | 1 | 33 1/3 | |
| Other | 2 | 66 2/3 | 1-in process of divorce<br>1-arrived knowing billet going away in 8 months; precludes 2 moves in a CY. |
| **TOTAL** | 3 | 100 | |

(5) How many geographic bachelors do not live on base? Zero.

(c) BOQ: NCCOSC RDTE DIV SAN DIEGO CA personnel utilize the BOQ located at SUBASE San Diego. Items (1) thru (3) are answered as they pertain to the SUBASE BOQ.

(1) Provide the utilization rate for BOQs for FY 1993.

| Type of Quarters | Utilization Rate |
|---|---|
| Adequate | 100 |
| Substandard | 0 |
| Inadequate | 0 |

(2) As of 31 March 1994, have you experienced much of a change since FY 1993? If so, why? If occupancy is under 95% (or vacancy over 5%), is there a reason?

There has been no change since FY 93.

(3) Calculate the Average on Board (AOB) for geographic bachelors as follows:

$$\textbf{AOB} = \frac{\textbf{(\# Geographic Bachelors x average number of days in barracks)}}{\textbf{365}}$$

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AOB = 0 (There are no geographic bachelors living in the SUBASE BOQ.)

(4) Indicate in the following chart the percentage of geographic bachelors (GB) by category of reasons for family separation. Provide comments as necessary.

| Reason for Separation from Family | Number of GB | Percent of GB | Comments |
|---|---|---|---|
| Family Commitments (children in school, financial, etc.) | 0 | | |
| Spouse Employment (non-military) | 0 | | |
| Other | 0 | | |
| **TOTAL** | 0 | 100 | |

(5) How many geographic bachelors do not live on base? Zero.

(d) BOQ/BEQ Housing and Messing. N/A. There are no BOQs, BEQs or messing facilities assigned or projected to be assigned to NCCOSC RDTE DIV SAN DIEGO CA's plant account.

(1) Provide data on the BOQs and BEQs assigned to your current plant account. The desired unit of measure for this capacity is people housed. Use CCN to differentiate between pay grades, i.e., E1-E4, E5-E6, E7-E9, CWO-O2, O3 and above. N/A.

| Facility Type, Bldg. # & CCN | Total No. of Beds | Total No. of Rooms | Adequate | | Substandard | | Inadequate | |
|---|---|---|---|---|---|---|---|---|
| | | | Beds | Sq Ft | Beds | Sq Ft | Beds | Sq Ft |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

(2) In accordance with NAVFACINST 11010.44E, an inadequate facility cannot be made adequate for its present use through "economically justifiable means". For all the categories above where inadequate facilities are identified provide the following information:

N/A

a. FACILITY TYPE/CODE:
b. WHAT MAKES IT INADEQUATE?
c. WHAT USE IS BEING MADE OF THE FACILITY?
d. WHAT IS THE COST TO UPGRADE THE FACILITY TO SUBSTANDARD?
e. WHAT OTHER USE COULD BE MADE OF THE FACILITY AND AT WHAT COST?
f. CURRENT IMPROVEMENT PLANS AND PROGRAMMED FUNDING:
g. HAS THIS FACILITY CONDITION RESULTED IN C3 OR C4 DESIGNATION ON YOUR BASEREP?

(3) Provide data on the BOQs and BEQs projected to be assigned to your plant account in FY 1997. The desired unit of measure for this capacity is people housed. Use CCN to differentiate between pay grades, i.e., E1-E4, E5-E6, E7-E9, CWO-O2, O3 and above.

N/A

| Facility Type, Bldg. # & CCN | Total No. of Beds | Total No. of Rooms | Adequate | | Substandard | | Inadequate | |
|---|---|---|---|---|---|---|---|---|
| | | | Beds | Sq Ft | Beds | Sq Ft | Beds | Sq Ft |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

(4) In accordance with NAVFACINST 11010.44E, an inadequate facility cannot be made adequate for its present use through "economically justifiable means". For all the categories above where inadequate facilities are identified provide the following information:

N/A

a. FACILITY TYPE/CODE:
b. WHAT MAKES IT INADEQUATE?
c. WHAT USE IS BEING MADE OF THE FACILITY?
d. WHAT IS THE COST TO UPGRADE THE FACILITY TO SUBSTANDARD?
e. WHAT OTHER USE COULD BE MADE OF THE FACILITY AND AT WHAT COST?
f. CURRENT IMPROVEMENT PLANS AND PROGRAMMED FUNDING:
g. HAS THIS FACILITY CONDITION RESULTED IN C3 OR C4 DESIGNATION ON YOUR BASEREP?

(5) Provide data on the messing facilities assigned to your current plant account.

N/A

| Facility Type, CCN and Bldg. # | Total Sq. Ft. | Adequate | | Substandard | | Inadequate | | Avg # Noon Meals Served |
|---|---|---|---|---|---|---|---|---|
| | | Seats | Sq Ft | Seats | Sq Ft | Seats | Sq Ft | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

(6) In accordance with NAVFACINST 11010.44E, an inadequate facility cannot be made adequate for its present use through "economically justifiable means". For all the categories above where inadequate facilities are identified provide the following information:

N/A

a. FACILITY TYPE/CODE:
b. WHAT MAKES IT INADEQUATE?
c. WHAT USE IS BEING MADE OF THE FACILITY?
d. WHAT IS THE COST TO UPGRADE THE FACILITY TO SUBSTANDARD?
e. WHAT OTHER USE COULD BE MADE OF THE FACILITY AND AT WHAT COST?
f. CURRENT IMPROVEMENT PLANS AND PROGRAMMED FUNDING:
g. HAS THIS FACILITY CONDITION RESULTED IN C3 OR C4 DESIGNATION ON YOUR BASEREP?

(7) Provide data on the messing facilities projected to be assigned to your plant account in FY 1997.

N/A

| Facility Type, CCN and Bldg. # | Total Sq. Ft. | Adequate | | Substandard | | Inadequate | | Avg # Noon Meals Served |
|---|---|---|---|---|---|---|---|---|
| | | Seats | Sq Ft | Seats | Sq Ft | Seats | Sq Ft | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

(8) In accordance with NAVFACINST 11010.44E, an inadequate facility cannot be made adequate for its present use through "economically justifiable means". For all the categories above where inadequate facilities are identified provide the following information:

N/A

a. FACILITY TYPE/CODE:
b. WHAT MAKES IT INADEQUATE?
c. WHAT USE IS BEING MADE OF THE FACILITY?
d. WHAT IS THE COST TO UPGRADE THE FACILITY TO SUBSTANDARD?
e. WHAT OTHER USE COULD BE MADE OF THE FACILITY AND AT WHAT COST?
f. CURRENT IMPROVEMENT PLANS AND PROGRAMMED FUNDING:
g. HAS THIS FACILITY CONDITION RESULTED IN C3 OR C4 DESIGNATION ON YOUR BASEREP?

13. **MWR Facilities**. For on-base MWR facilities[10] available, complete the following table for each separate location. For off-base government owned or leased recreation facilities indicate distance from base. If there are any facilities not listed, include them at the bottom of the table.

NCCOSC RDTE DIV SAN DIEGO CA has no MWR facilities of its own. It is supported by facilities located at Naval Training Center, San Diego and Naval Submarine Base, San Diego. The table below has been modified to reflect availability of facilities at NTC and SUBASE. (Units of measure were not available.)

**LOCATION** **Naval Training Center** **DISTANCE** **5 miles**
**Naval Submarine Base** **1 mile**

| Facility | Unit of Measure | NTC | SUBASE |
|---|---|---|---|
| Auto Hobby | Indoor Bays | YES | YES |
| | Outdoor Bays | YES | YES |
| Arts/Crafts | SF | NO | NO |
| Wood Hobby | SF | NO | NO |
| Bowling | Lanes | YES | NO |
| Enlisted Club | SF | YES | YES |
| Officer's Club | SF | YES | YES |
| Library | SF | YES | NO |
| Library | Books | 40,000 | N/A |
| Theater | Seats | NO | NO |
| ITT | SF | YES | YES |
| Museum/Memorial | SF | NO | NO |
| Pool (indoor) | Lanes | YES | NO |
| Pool (outdoor) | Lanes | YES | YES |
| Beach | LF | NO | YES |

[10]Spaces designed for a particular use. A single building might contain several facilities, each of which should be listed separately.

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| Facility | Unit of Measure | NTC | SUBASE |
|---|---|---|---|
| Swimming Ponds | Each | NO | NO |
| Tennis CT | Each | YES | YES |

| Facility | Unit of Measure | Total | Profitable (Y,N,N/A) |
|---|---|---|---|
| Volleyball CT (outdoor) | Each | NO | YES |
| Basketball CT (outdoor) | Each | YES | YES |
| Racquetball CT | Each | YES | YES |
| Golf Course | Holes | YES | NO |
| Driving Range | Tee Boxes | YES | NO |
| Gymnasium | SF | YES | YES |
| Fitness Center | SF | YES | YES |
| Marina | Berths | YES | NO |
| Stables | Stalls | NO | NO |
| Softball Fld | Each | YES | YES |
| Football Fld | Each | YES | YES |
| Soccer Fld | Each | YES | YES |
| Youth Center | SF | YES | NO |
| CPO Club | | YES | NO |

(a) Is your library part of a regional interlibrary loan program? N/A

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14. **Base Family Support Facilities and Programs.**

a. Complete the following table on the availability of child care in a child care center on your base. There is no government owned/operated child care facility at NCCOSC RDTE DIV SAN DIEGO CA. However, a privately-owned child care center, La Petite, is located on NCCOSC RDTE DIV SAN DIEGO CA property and is available to NCCOSC RDTE DIV SAN DIEGO CA personnel for daytime care. Information for this facility is contained in the table below.

| Age Category | Capacity (Children) | SF | | | Number on Wait List | Average Wait (Days) |
|---|---|---|---|---|---|---|
| | | Adequate | Substandard | Inadequate | | |
| | | | | | | |
| 0-12 Mos | 12 | XX | | | 8 | 4-6 Mos |
| 12-24 Mos | 12 | XX | | | 12 | 6-12 Mos |
| 24-36 Mos | 21 | XX | | | 0 | 0 |
| 3-5 Yrs | 63 | XX | | | 0 | 0 |

b. In accordance with NAVFACINST 11010.44E, an inadequate facility cannot be made adequate for its present use through "economically justifiable means." For all the categories above where inadequate facilities are identified provide the following information:

N/A.

Facility type/code:
What makes it inadequate?
What use is being made of the facility?
What is the cost to upgrade the facility to substandard?
What other use could be made of the facility and at what cost?
Current improvement plans and programmed funding:
Has this facility condition resulted in C3 or C4 designation on your BASEREP?

c. If you have a waiting list, describe what programs or facilities other than those sponsored by your command are available to accommodate those on the list. Other San Diego area base child care centers are listed below.

d. How many "certified home care providers" are registered at your base? N/A.

e. Are there other military child care facilities within 30 minutes of the base? State owner and capacity (i.e., 60 children, 0-5 yrs).

| LOCATION | CAPACITY | AGES |
|---|---|---|
| SUBASE | 78 | 6 wks - 5 yrs |
| NTC | 270 | 6 wks - 5 yrs |
| NAS Miramar | 266 | 6 mo - 5 yrs |
| NAVSTA (3 centers) | 362 | 6 wks - 5 yrs |

f. Complete the following table for services available on your base. If you have any services not listed, include them at the bottom.

| Service | Unit of Measure | Qty |
|---|---|---|
| Exchange | SF | 0 |
| Gas Station | SF | 0 |
| Auto Repair | SF | 0 |
| Auto Parts Store | SF | 0 |
| Commissary | SF | 0 |
| Mini-Mart | SF | 0 |
| Package Store | SF | 0 |
| Fast Food Restaurants | Each | 0 |
| Bank/Credit Union | Each | 1 |
| Family Service Center | SF | 0 |
| Laundromat | SF | 0 |
| Dry Cleaners | Each | 0 |
| ARC | PN | 0 |
| Chapel | PN | 0 |
| FSC Classrm/Auditorium | PN | 0 |

15. **Proximity of Closest Major Metropolitan Areas** (provide at least three):

| City | Distance (Miles) |
|---|---|
| San Diego | 0 |
| Los Angeles | 125 |
| Chula Vista | 15 |

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16. **Standard Rate VHA Data for Cost of Living:**

NOTE: Information obtained from PSD Point Loma.

| Paygrade | With Dependents | Without Dependents |
|---|---|---|
| E1 | 218.36 | 122.17 |
| E2 | 211.66 | 133.11 |
| E3 | 206.44 | 152.11 |
| E4 | 228.51 | 159.48 |
| E5 | 261.55 | 182.62 |
| E6 | 301.89 | 205.51 |
| E7 | 339.62 | 235.92 |
| E8 | 352.67 | 266.62 |
| E9 | 358.64 | 272.25 |
| W1 | 391.25 | 297.14 |
| W2 | 386.34 | 303.02 |
| W3 | 386.73 | 314.37 |
| W4 | 403.06 | 357.37 |
| O1E | 386.33 | 286.94 |
| O2E | 348.28 | 277.68 |
| O3E | 414.92 | 351.02 |
| O1 | 345.66 | 254.71 |
| O2 | 332.79 | 260.12 |
| O3 | 342.83 | 288.64 |
| O4 | 411.69 | 358.00 |
| O5 | 454.49 | 375.85 |
| O6 | 477.20 | 394.99 |
| O7 | 486.52 | 395.29 |

17. **Off-base Housing Rental and Purchase**

NOTE: Off-base housing information obtained from Market Profiles, Inc. Rental Trends reports dated September 1993 and March 1994. Monthly utilities obtained from San Diego Gas & Electric. (Provided by COMNAVBASE San Diego Family Housing Office.)

(a) Fill in the following table for average rental costs in the area for the period 1 April 1993 through 31 March 1994.

| Type Rental | Average Monthly Rent | | Average Monthly Utilities Cost |
|---|---|---|---|
| | Annual High | Annual Low | |
| Efficiency | 521 | 521 | 29 |
| 1 Bedroom | 581 | 581 | 32 |
| 2 Bedroom | 700 | 698 | 34 |
| 3 Bedroom | 823 | 821 | 62 |
| 4+ Bedroom | 1026 | 988 | 97 |
| **Numbers include apartments, | | | |
| condominiums, townhomes, and | | | |
| single family homes. | | | |
| | | | |

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(b) What was the rental occupancy rate in the community as of 31 March 1994?

| Type Rental | Percent Occupancy Rate |
|---|---|
| Efficiency | 95.04% |
| 1 Bedroom | 94.63% |
| 2 Bedroom | 93.89% |
| 3 Bedroom | 93.07% |
| 4+ Bedroom | 93.96% |
| **Number include apartments, | |
| condominiums, townhomes, and | |
| single family homes. | |
| | |

(c) What are the median costs for homes in the area?

| Type of Home | Median Cost |
|---|---|
| Single Family Home (3 Bedroom) | 175,000 |
| Single Family Home (4+ Bedroom) | 175,000 |
| Town House (2 Bedroom) | 128,000 |
| Town House (3+ Bedroom) | 128,000 |
| Condominium (2 Bedroom) | 128,000 |
| Condominium (3+ Bedroom) | 128,000 |

(d) For calendar year 1993, from the local MLS listings provide the number of 2, 3, and 4 bedroom homes available for purchase. Use only homes for which monthly payments would be within 90 to 110 percent of the E5 BAQ and VHA for your area.

E5 BAQ + VHA = $677.05 90% = $609 110% = $745

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The following assumptions were made:

- that the monthly payment would include mortgage, taxes and homeowners fees.
- that an E5 would not be able to afford a large down payment
- that a purchase cost range of $55,000 to $73,000 would be appropriate to include varying interest rates and a minimal down payment.

For the month of APR 94, homes available in this price range are as follows:

2 Bedrooms - 223
3 Bedrooms - 24
4 Bedrooms - 3

** Historical data is not available for the table below.

| Month | Number of Bedrooms | | |
|---|---|---|---|
| | 2 | 3 | 4+ |
| January | | | |
| February | | | |
| March | | | |
| April | | | |
| May | | | |
| June | | | |
| July | | | |
| August | | | |
| September | | | |
| October | | | |
| November | | | |
| December | | | |

(e) Describe the principle housing cost drivers in your local area. Cost drivers identified in a DEC 92 Market Analysis prepared by Robert D. Neihaus, Inc. are listed below:

Housing cost is closely correlated with location, amount of land and number of locations. Southern California coastal regions are among the most costly in CONUS. Temperatures in both summer and winter are moderated by nearby waters of the Pacific Ocean. Average daily maximum temperature are 65F during the winter and 75F during the summer. Temperatures below freezing rarely occur. Annual rainfall averages approximately nine inches. Although most households are likely to prefer housing close to the amenities associated with coastal communities, the cost of housing in these communities is generally higher than locations farther inland.

A well-developed regional road transportation system of interstate, state and county highways serves the area, as does a system of causeways linking the mainland with Coronado and North Island. Air service is available at San Diego International Airport (Lindberg Field), Montgomery Field, and Ramona Airport. Passenger and freight rail service are provided by AMTRAK and the Sante Fe Railroad, respectively. Bus and trolley services are available within the area for local transportation.

San Diego has a diversified economic base characterized by several key elements:

- A wide range of manufacturing and service activities
- A large military presence
- An active tourism sector
- An educational complex consisting of campuses of both the University of California and California State University systems, as well as five other private universities and colleges
- A growing research and development sector specializing in health care services.

Local forecasts of population growth indicate expected increases through 1996 averaging 2.1 percent annually. Both the job and population projections reflect a reduction in expected growth compared to the rapid rate of the past two decades.

The major industry sectors in the county are the services sector, the wholesale and retail trade sectors, and the civilian government. A mild recovery is projected for the county with employment increasing slowly.

18. **For the top five sea intensive ratings in the principle warfare community your base supports, provide the following:**

N/A. NCCOSC RDTE DIV SAN DIEGO CA is not a base.

| Rating | Number Sea Billets in the Local Area | Number of Shore billets in the Local Area |
|---|---|---|
| OS | 1994 | 1877 |
| EW | 412 | 376 |
| BM | 1747 | 1602 |
| MM | 2635 | 2295 |
| | | |

19. **Complete the following table for the average one-way commute for the five largest concentrations of military and civilian personnel living off-base.**

Military and civilian personnel reside throughout San Diego County. There is no data available for largest "concentrations" of residents. The average commute time for NCCOSC RDTE DIV SAN DIEGO CA personnel is 30 minutes.

| Location | Number Employees | Distance (mi) | Time(min) |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

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20. **Complete the tables below to indicate the civilian educational opportunities available to service members stationed at the installation (to include any outlying sites) and their dependents:**

(a) List the local educational institutions which offer programs available to dependent children. Indicate the school type (e.g. DODDS, private, public, parochial, etc.), grade level (e.g. pre-school, primary, secondary, etc.), what students with special needs the institution is equipped to handle, cost of enrollment, and for high schools only, the average SAT score of the class that graduated in 1993, and the number of students in that class who enrolled in college in the fall of 1994.

The following information was obtained from the San Diego County Office of Education and the individual school districts located throughout San Diego County:

a. The San Diego County public school system is comprised of 43 separate school districts. The total number of schools is:

| | Total | Total offering Special Ed |
|---|---|---|
| High Schools | 57 | 51 |
| Middle/Junior High | 29 | 29 |
| Elementary | 127 | 112 |

b. SAT statistics were not available for each individual high school. However, the county-wide average for 1993 was 907 (421 verbal and 486 math).

c. In 1991 (the last year for which statistics are available), 54.2 percent of all high school graduates in San Diego County went on to higher education in-state. Out of state statistics and statistics for each high school were not available.

d. The state of California provides funding to each school district as follows (dollar values are per student per year):

| | |
|---|---|
| Grades K-8 | $3300 |
| Grades 9-12 | $3900 |

Additionally, there are over 200 private/parochial schools in the San Diego area, each with its own academic curriculum, special programs, tuition and fees. A comprehensive listing was not available.

| Institution | Type | Grade Level(s) | Special Education Available | Annual Enrollment Cost per Student | 1993 Avg SAT/ACT Score | % HS Grad to Higher Educ | Source of Info |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

(b) List the educational institutions within 30 miles which offer programs off-base available to service members and their adult dependents. Indicate the extent of their programs by placing a "Yes" or "No" in all boxes as applies.

NOTE: All information below was provided by the Subase San Diego Navy Campus Office.

| Institution | Type Classes | Program Type(s) | | | | |
|---|---|---|---|---|---|---|
| | | Adult High School | Vocational/ Technical | Undergraduate | | Graduate |
| | | | | Courses only | Degree Program | |
| CHAPMAN COLLEGE | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | YES | YES | YES |
| CAL STATE SAN MARCOS | Day | NO | NO | YES | YES | YES |
| | Night | NO | NO | NO | NO | NO |
| NATIONAL UNIVERSITY | Day | NO | NO | YES | YES | YES |
| | Night | NO | NO | YES | YES | YES |
| POINT LOMA NAZARENE COLLEGE | Day | NO | NO | YES | YES | YES |
| | Night | NO | NO | YES | YES | YES |

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| Institution | Type Classes | Program Type(s) | | | | |
|---|---|---|---|---|---|---|
| | | Adult High School | Vocational/ Technical | Undergraduate | | Graduate |
| | | | | Courses only | Degree Program | |
| UNIVERSITY OF SAN DIEGO LAW SCHOOL | Day | NO | NO | NO | NO | YES |
| | Night | NO | NO | NO | NO | NO |
| WESTERN STATE SCHOOL OF LAW | Day | NO | NO | NO | NO | YES |
| | Night | NO | NO | NO | NO | YES |
| UNIVERSITY OF SAN DIEGO | Day | NO | NO | YES | YES | YES |
| | Night | NO | NO | NO | NO | NO |
| UNIVERSITY OF PHOENIX | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | NO | YES | YES |
| CUYAMACA COLLEGE | Day | NO | YES | YES | YES | NO |
| | Night | NO | YES | YES | YES | NO |
| GROSSMONT COLLEGE | Day | NO | YES | YES | YES | NO |
| | Night | NO | YES | YES | YES | NO |
| KELSEY-JENNEY COLLEGE | Day | NO | NO | YES | YES | NO |
| | Night | NO | NO | YES | YES | NO |
| PALOMAR COLLEGE | Day | NO | NO | YES | YES | NO |
| | Night | NO | NO | YES | YES | NO |
| SOUTH-WESTERN COLLEGE | Day | NO | NO | YES | YES | NO |
| | Night | NO | NO | YES | YES | NO |

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| Institution | Type Classes | Program Type(s) | | | | |
|---|---|---|---|---|---|---|
| | | Adult High School | Vocational/ Technical | Undergraduate | | Graduate |
| | | | | Courses only | Degree Program | |
| SAN DIEGO MESA COLLEGE | Day | NO | NO | YES | YES | NO |
| | Night | NO | NO | YES | YES | NO |
| SAN DIEGO MIRAMAR COLLEGE | Day | NO | NO | YES | YES | NO |
| | Night | NO | NO | YES | YES | NO |
| SAN DIEGO CITY COLLEGE | Day | NO | NO | YES | YES | NO |
| | Night | NO | NO | YES | YES | NO |
| SAN DIEGO STATE UNIVERSITY | Day | NO | NO | YES | YES | YES |
| | Night | NO | NO | NO | NO | NO |
| UNIVERSITY OF SAN DIEGO | Day | NO | NO | YES | YES | YES |
| | Night | NO | NO | NO | NO | NO |
| UNITED STATES INTERNA-TIONAL UNIVERSITY | Day | NO | NO | YES | YES | YES |
| | Night | NO | NO | NO | NO | NO |
| APOLLO COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| ASSOCIATED TECHNICAL COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| CENTURY BUSINESS COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |

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| Institution | Type Classes | Program Type(s) | | | | |
|---|---|---|---|---|---|---|
| | | Adult High School | Vocational/ Technical | Undergraduate | | Graduate |
| | | | | Courses only | Degree Program | |
| NEW SCHOOL OF ARCHITEC-TURE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| COLEMAN COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| CONCORDE CAREER INSTITUTE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| SAN DIEGO COLLEGE/ MEDICAL & DENTAL | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| DESIGN INSTITUTE OF SAN DIEGO | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| WATERSON COLLEGE PACIFIC | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| WESTERN TRUCK | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| MARIC COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| CENTURY SCHOOLS | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |

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| Institution | Type Classes | Program Type(s) | | | | |
|---|---|---|---|---|---|---|
| | | Adult High School | Vocational/ Technical | Undergraduate | | Graduate |
| | | | | Courses only | Degree Program | |
| NORTH PARK COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| PACIFIC COAST COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| PLATTE COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| SOUTHWEST COLLEGE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| EDUTEK | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |
| ITT TECHNICAL INSTITUTE | Day | NO | YES | NO | NO | NO |
| | Night | NO | YES | NO | NO | NO |

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(c) List the educational institutions which offer programs on-base available to service members and their adult dependents. Indicate the extent of their programs by placing a "Yes" or "No" in all boxes as applies.

| Institution | Type Classes | Program Type(s) | | | | |
|---|---|---|---|---|---|---|
| | | Adult High School | Vocational/ Technical | Undergraduate | | Graduate |
| | | | | Courses only | Degree Program | |
| SAN DIEGO CITY COLLEGE | Day | NO | YES | YES | YES | NO |
| | Night | NO | YES | YES | YES | NO |
| | Corres-pondence | NO | NO | NO | NO | NO |
| CHAPMAN UNIVERSITY | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | YES | YES | YES |
| | Corres-pondence | NO | NO | NO | NO | NO |
| SOUTHERN ILLINOIS UNIVERSITY | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | NO | NO | NO |
| | WEEK-ENDS** | NO | NO | YES | YES | NO |
| UNITED STATES INTERNA-TIONAL UNIVERSITY | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | YES | NO | NO |
| | Corres-pondence | NO | NO | NO | NO | NO |

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| Institution | Type Classes | Program Type(s) | | | | |
|---|---|---|---|---|---|---|
| | | Adult High School | Vocational/ Technical | Undergraduate | | Graduate |
| | | | | Courses only | Degree Program | |
| MIRAMAR COLLEGE | Day | NO | YES | YES | YES | NO |
| | Night | NO | YES | YES | YES | NO |
| | Corres-pondence | NO | NO | NO | NO | NO |
| UNIVERSITY OF LAVERNE | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | YES | YES | YES |
| | Corres-pondence | NO | NO | NO | NO | NO |
| NATIONAL UNIVERSITY | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | YES | YES | YES |
| | Corres-pondence | NO | NO | NO | NO | NO |
| SOUTH-WESTERN COLLEGE | Day | NO | YES | YES | YES | NO |
| | Night | NO | YES | YES | YES | NO |
| | Corres-pondence | NO | NO | NO | NO | NO |
| WEBSTER UNIVERSITY | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | NO | NO | YES |
| | Corres-pondence | NO | NO | NO | NO | NO |
| UNIVERSITY OF REDLANDS | Day | NO | NO | NO | NO | NO |
| | Night | NO | NO | NO | NO | YES |
| | Corres-pondence | NO | NO | NO | NO | NO |

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21. **Spousal Employment Opportunities.**

Provide the following data on spousal employment opportunities.

Information on spousal employment opportunities is not available.

The San Diego County employment rate for February 1993 was 7.9% (obtained from the San Diego Chamber of Commerce.)

| Skill Level | Number of Military Spouses Serviced by Family Service Center Spouse Employment Assistance | | | Local Community Unemployment Rate |
|---|---|---|---|---|
| | 1991 | 1992 | 1993 | |
| Professional | | | | |
| Manufacturing | | | | |
| Clerical | | | | |
| Service | | | | |
| Other | | | | |

22. **Medical/Dental.**

a. Do your active duty personnel have any difficulty with access to medical or dental care, in either the military or civilian health care system? Develop the why of your response.

NO. Military medical care is available at NAVMEDCEN San Diego and the branch clinic located at Naval Training Center, San Diego. Dental care is provided by the Fleet ASW Training Center's dental clinic. All three facilities are within reasonable distance of NCCOSC RDTE DIV SAN DIEGO CA.

b. Do your military dependents have any difficulty with access to medical or dental care, in either the military or civilian health care system? Develop the why of your response.

NO. Medical care is available at NAVMEDCEN San Diego, six NAVCARE facilities and over 60 civilian hospitals and redi-care facilities. Extensive medical and dental care is also readily available at numerous clinics and private practices throughout the San Diego area.

23. **Crime Rate**. Complete the table below to indicate the crime rate for your air station for the last three fiscal years. The source for case category definitions to be used in responding to this question are found in NCIS - Manual dated 23 February 1989, at Appendix A, entitled "Case Category Definitions." Note: the crimes reported in this table should include 1) all reported criminal activity which occurred on base regardless of whether the subject or the victim of that activity was assigned to or worked at the base; and 2) all reported criminal activity off base.

| Crime Definitions | FY 1991 | FY 1992 | FY 1993 |
|---|---|---|---|
| **1. Arson (6A)** | 0 | 1 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 1 | 0 |
| **2. Blackmarket (6C)** | 0 | 0 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **3. Counterfeiting (6G)** | 0 | 0 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **4. Postal (6L)** | 0 | 0 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |

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| Crime Definitions | FY 1991 | FY 1992 | FY 1993 |
|---|---|---|---|
| **5. Customs (6M)** | 0 | 0 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **6. Burglary (6N)** | 1 | 5 | 1 |
| Base Personnel - military | 0 | 1 | 0 |
| Base Personnel - civilian | 1 | 4 | 1 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **7. Larceny - Ordnance (6R)** | 0 | 0 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **8. Larceny - Government (6S)** | 53 | 24 | 18 |
| Base Personnel - military | 2 | 0 | 0 |
| Base Personnel - civilian | 24 | 12 | 6 |
| Off Base Personnel - military | 1 | 2 | 1 |
| Off Base Personnel - civilian | 26 | 10 | 11 |

| Crime Definitions | FY 1991 | FY 1992 | FY 1993 |
|---|---|---|---|
| **9. Larceny - Personal (6T)** | 55 | 50 | 27 |
| Base Personnel - military | 0 | 0 | 1 |
| Base Personnel - civilian | 19 | 11 | 6 |
| Off Base Personnel - military | 1 | 0 | 0 |
| Off Base Personnel - civilian | 35 | 39 | 20 |
| **10. Wrongful Destruction (6U)** | 6 | 7 | 6 |
| Base Personnel - military | 0 | 1 | 1 |
| Base Personnel - civilian | 6 | 6 | 5 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **11. Larceny - Vehicle (6V)** | 1 | 1 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 1 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 1 | 0 | 0 |
| **12. Bomb Threat (7B)** | 0 | 4 | 4 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 2 | 3 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 2 | 1 |

| Crime Definitions | FY 1991 | FY 1992 | FY 1993 |
|---|---|---|---|
| **13. Extortion (7E)** | 0 | 0 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **14. Assault (7G)** | 3 | 4 | 3 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 2 | 4 | 3 |
| Off Base Personnel - military | 1 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |
| **15. Death (7H)** | 3 | 1 | 1 |
| Base Personnel - military | 1 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 1 | 0 | 1 |
| Off Base Personnel - civilian | 1 | 1 | 0 |
| **16. Kidnapping (7K)** | 0 | 0 | 0 |
| Base Personnel - military | 0 | 0 | 0 |
| Base Personnel - civilian | 0 | 0 | 0 |
| Off Base Personnel - military | 0 | 0 | 0 |
| Off Base Personnel - civilian | 0 | 0 | 0 |

**Activity: NCCOSC RDTE DIV SAN DIEG0 CA**

**Data Call Number Five**

## TAB A

## TECHNICAL OPERATIONS

## FUNCTIONAL SUPPORT AREA - LIFE CYCLE WORK AREA FORM

Note: As indicated in the "GENERAL NOTE" found at the front of this data call response, mission, technical and support functions, and workload are integrated at the NCCOSC Division level. Therefore, the data in this section of the data submission reflects technical and support functions for NCCOSC RDTE DIV and its detachments.

**TECHNICAL OPERATIONS**
**FUNCTIONAL SUPPORT AREA - LIFE CYCLE WORK AREA FORM**

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 1.1 Undersea |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.77 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 500.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) .4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
**UIC: N66001**

## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 1.1 Undersea |
| Life Cycle Work Area | 3. Advanced Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.28 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 429.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 16.9

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
**UIC: N66001**

## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 1.1 Undersea |
| Life Cycle Work Area | 5. Manager Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 497.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 25.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
**UIC: N66001**

## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 1.1 Undersea |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.99 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 296.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 208.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 1.2 Aircraft |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.19 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 27.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 2.1 Gun Systems |
| Life Cycle Work Area | 17. Training/Operational Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .10 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 21.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 10.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 2.2 Guided Missiles |
| Life Cycle Work Area | 7. Production |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.9 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1,636.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 542.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 86.6

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 2.2 Guides Missiles |
| Life Cycle Work Area | 8. Acceptance Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 130.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 2.3 Free fall Weapons & Rockets |
| Life Cycle Work Area | 14. In-Service Engineering |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.53 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 211.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0.7

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 94.2

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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**TECHNICAL FUNCTIONS**
**FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM**

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 2.4 Torpedoes |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.73 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 316.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 95.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 52.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 2.4 Torpedoes |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 11.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2319.9

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2077.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 2.4 Torpedoes |
| Life Cycle Work Area | 5. Manager Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.63 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 339.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 22.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 2.4 Torpedoes |
| Life Cycle Work Area | 10. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 57.01 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 12915.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2942.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 321.5

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 2.4 Torpedoes |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.52 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 263.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 324.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 2.9 Fire Control |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 6.78 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1287.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 141.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 637.6

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 2.9 Fire Control |
| Life Cycle Work Area | 13. Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.98 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 591.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 710.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 2.9 Fire Control |
| Life Cycle Work Area | 14. In-Service Engineering |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 26.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 4,473.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 438.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 6,864.9

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 2.12 Weapons Propulsion |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.42 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 300.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL OPERATIONS
## FUNCTIONAL SUPPORT AREA - LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 3.4 Combat System Integration, Multiplatform |
| Life Cycle Work Area | 4. Engineering Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 5.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1038.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 292.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 2969.2

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 3.4 Multiplatform Combat System Integration |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 72.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 12043.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 4140.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 9475.3

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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# TECHNICAL FUNCTIONS
# FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 3.4 Multiplatform Combat System Integration |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 72.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 12043.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 4140.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 9475.3

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL OPERATIONS
## FUNCTIONAL SUPPORT AREA - LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 3.4 Combat System Integration, Multiplatform |
| Life Cycle Work Area | 10. Acquisition-Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1048.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 202.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 623.1

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO |
| Functional Support Area | 4.2 Coastal/Special Warfare Support |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 15.08 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3146.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 488.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 2011.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 5.1 Sonar Systems |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .44 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 88.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) .3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 5.1 Sonar Systems |
| Life Cycle Work Area | 2. Exp. Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 57.25 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 10194.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1968.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 11132.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 5.1 Sonar Systems |
| Life Cycle Work Area | 3. Advance Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 28.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 4134.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 551.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 7369.8

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.1 Sonar Systems |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 355.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 5.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV |
| Functional Support Area | 5.1 Sonar Systems |
| Life Cycle Work Area | 13. Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 96.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.1 Sonar Systems |
| Life Cycle Work Area | 18. Simulation Modelling & Analysis |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.09 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 20.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.2 Radar Systems |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 126.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 3.7

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutio private individuals.

**TAB**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.2 Radar Systems |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 10.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1663.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 345.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 3154.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.2 Radar Systems |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 587.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 92.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.2 Radar Systems |
| Life Cycle Work Area | 4. Engineering & Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.67 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 575.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 62.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 12.6

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.2 Radar Systems |
| Life Cycle Work Area | 7. Production |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 29.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.2 Radar Systems |
| Life Cycle Work Area | 8. Acceptance Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 14.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2,271.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 5.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 354.9

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.2 Radar Systems |
| Life Cycle Work Area | 11. Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 52.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0.9

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 4.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 746.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 92.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 6.57 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1115.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1084.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 23.9

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 31.99 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 5115.9

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 956.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 3533.4

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 4. Engineering & Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 11.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1743.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1354.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 488.6

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 5. RDTE Management Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 214.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 5.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 6.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1,171.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 47.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 7. Production |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 13.0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2,499.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 405.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 796.1

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 11. Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 10.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1,888.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 623.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 197.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.3 Special Sensors |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 391.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.4 Space Sensor/Surveillance Systems |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 5.9 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1,035.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.4 Space Sensor/Surveillance Systems |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 31.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 5,450.9

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 811.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 6,529.9

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.4 Space Sensor/Surveillance System |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 55.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surveillance |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 4.12 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 648.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 94.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 176.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surveillance |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 21.63 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3853.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 453.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 5,832.2

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surv. |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 65.9 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 11,765.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2,928.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 9,165.4

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surv. |
| Life Cycle Work Area | 4. Eng. & Mfg. Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 34.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 6,171.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 3,141.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 3,227.6

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV<br>SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surv. |
| Life Cycle Work Area | 5. RDT&E Mgmt. Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 84.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 679.7

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surv. |
| Life Cycle Work Area | 6. Operational Sys. Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 4.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 770.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 132.7

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1,545.2

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surv. |
| Life Cycle Work Area | 7. Production |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 532.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 117.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 5.5 Ocean Surv. |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 23.0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3,948.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 648.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 2,040.7

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.3 Surface Ship Navigation Systems |
| Life Cycle Work Area | 9. Acquisition Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 10.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1495.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 212.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 87.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.3 Surface Ship Navigation Systems |
| Life Cycle Work Area | 10. Acquisition Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 210.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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TECHNICAL FUNCTIONS
FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.3 Surface Ship Navigation Systems |
| Life Cycle Work Area | 11. Life-Time Support Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 161.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 20.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 25.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.3 Surface Ship Navigation Systems |
| Life Cycle Work Area | 15. Life-Time Support Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 59.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.4 Weapons Navigation Systems |
| Life Cycle Work Area | 4. RDTE Engineering & Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 11.99 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1139.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 150.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 105.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.4 Weapons Navigation Systems |
| Life Cycle Work Area | 7. Acquisition Production |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 32.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 150.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.5 Satellite Navigation System |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 4.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 600

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 180

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 4565

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.4 Weapons Navigation System |
| Life Cycle Work Area | 11. Life-Time Support Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 533.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 450.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 6.5 Satellite Navigation Sys. |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 211.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 5.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.1 Airborne |
| Life Cycle Work Area | 2. Exploratory Dev |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 55

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 20

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 125

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.1 Submarine |
| Life Cycle Work Area | 4. Engineering and Manufacturing Dev |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 24.9 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3243

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 889

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 3119

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.1 Submarine |
| Life Cycle Work Area | 6. Operational System Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 57.0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 7417

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1172

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 2150

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.1 Submarine |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 500

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 34

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 650

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.1 Submarine |
| Life Cycle Work Area | 11. Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 78

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.2 Airborne |
| Life Cycle Work Area | 1. Basic research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 4.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 610

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 53

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 368

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.2 C3I Airborne |
| Life Cycle Work Area | 3. RDTE Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 5.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 799.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 380.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 2000.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.2 C3I Airborne |
| Life Cycle Work Area | 4. RDTE Engineering & Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 6.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1223.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 105.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 678.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.2 Airborne |
| Life Cycle Work Area | 5. RDTE Management Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 300

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 32

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 165

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.2 C3I Airborne |
| Life Cycle Work Area | 6. RDTE Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 65.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.2 Command, Control, Communications & Intell., Airborne |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 20.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1,326.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 924.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Shipboard |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 10.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1357

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 383

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Command, Control, Comms., & Intell., Shipboard |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 53.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 6671.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2244.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 4443.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Command, Control, Comms., & Intell., Shipboard |
| Life Cycle Work Area | 4. Engineering and Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 42.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 5534.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1575.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 15013.7

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Command, Control, Comms., & Intell., Shipboard |
| Life Cycle Work Area | 6. Operational System Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 30.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 4458.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 660.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 3408.9

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Command, Control, Comms., & Intell., Shipboard |
| Life Cycle Work Area | 8. Acceptance Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 135

b. **Out-of-House Expenditures.** Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 115

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Command, Control, Comms., & Intell., Shipboard |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 106.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 12977.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 12096.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 8146.2

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Command, Control, Comms., & Intell., Shipboard |
| Life Cycle Work Area | 10. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 10.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1768.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1360.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1936.4

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Shipboard |
| Life Cycle Work Area | 11. Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 305

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 14

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1027

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Shipboard |
| Life Cycle Work Area | 12. Repair |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 59

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Shipboard |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 415

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1040

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Shipboard |
| Life Cycle Work Area | 17. Training/Operational Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 571

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1065

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.3 Command, Control, Comms., & Intell., Shipboard |
| Life Cycle Work Area | 18. Simulation, Modeling and Analysis |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 25.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 5,032.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 3,922.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 11,571.9

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Command, Control, Comms., & Intell., Landbased |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1,431.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 41.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 638.9

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 $C^3I$ Land-Based |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 10.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1467.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 173.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 537.5

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 C3I Land-Based |
| Life Cycle Work Area | 4. RDTE Engineering & Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 19.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2564.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2155.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 256.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Land-Based |
| Life Cycle Work Area | 6. Operational System Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 29.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3908.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 800.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1301.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Command, Control, Comms., & Intelligence, Landbased |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 34.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 6203.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 3788.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 4263.1

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Command, Control, Comms., & Intelligence Landbased |
| Life Cycle Work Area | 10. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 16.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3167.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 10605.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 467.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Command, Control, Comms., & Intelligence Landbased |
| Life Cycle Work Area | 12. Repairs |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 78

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Command, Control, Comms., & Intelligence Landbased |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 223.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1184.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Command, Control, Comms., & Intelligence Landbased |
| Life Cycle Work Area | 17. Training/Opertional Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 51

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 729

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.4 Command, Control, Comms., & Intelligence Landbased |
| Life Cycle Work Area | 18. Simulation, Modeling and Analysis |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 637.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 298.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 3,223.6

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.5 $C^3I$ Space Communications Systems |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.65 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 341.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 35.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.5 Space Communications |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 15.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1992.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 655.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 526.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.5 $C^3I$ Space Communications Systems |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 38.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 4990.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 703.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 498.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.5 $C^3I$ Space Comm. Sys. |
| Life Cycle Work Area | 7. Production |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. _0_WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) _7.7_

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) _0_

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K)_0_

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.5 Space Communications |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 54.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 7027.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1008.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 3311.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.5 Space Communications |
| Life Cycle Work Area | 11. Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 22.3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2900.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2341.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 481.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.6 Non-Tactical Data System |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 22.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2961.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 800.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1000.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.6 Non-Tactical Data System |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.4 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 180.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 20.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.7 Command, Cntrl, Comms., & Intel., Air Traffic Control |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 9.0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1325.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 510.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 5557.7

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.8 Intelligence Information System |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 350.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 152.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.8 Command, Control, Comms., & Intelligence, Intelligence Information Systems |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3010.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1172.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1882.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.8 Command, Control, Communications & Intelligence, Intelligence Information Systems |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 606.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 273.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 832.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.8 Command, Control, Communications & Intelligence, Intelligence Information Systems |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 21.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 4118.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2811.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1264.7

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.8 Command, Control, Communications & Intelligence, Intelligence Information Systems |
| Life Cycle Work Area | 11. Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 32

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.8 Command, Control, Communications & Intelligence, Intelligence Information Systems |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 332

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 240

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 7.8 Command, Control, Communications & Intelligence, Intelligence Information Systems |
| Life Cycle Work Area | 17. Training/Operational Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 420

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 8.2 Countermeasures |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .15 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 21.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 20.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL OPERATIONS
## FUNCTIONAL SUPPORT AREA - LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 8.2 Countermeasures |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.23 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1472.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2131.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 8.2 Countermeasures |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 11.26 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3769.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 412.7

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 283.1

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 8.2 Countermeasures |
| Life Cycle Work Area | 5. RDT&E Management Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 7.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1121.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 74.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 8.2 Countermeasures |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.81 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 306.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 58.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 8.2 Countermeasures |
| Life Cycle Work Area | 14. In Service Engineering |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 21.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 5660.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 346.9

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 4390.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 8.3 Electronic Warfare (EW) Systems |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .15 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2257.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 100.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 9.1 Navy Strategic Systems |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .95 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3151.9

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 399.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 9.1 Navy Strategic Systems |
| Life Cycle Work Area | 10. Acquisition Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 51 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 6415.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1902.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1098.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.1 General Mission Support Personnel & Training |
| Life Cycle Work Area | 10. Acquisition Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 546.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 165.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 125.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.1 Weapons Related Training Systems |
| Life Cycle Work Area | 17. Training Operational Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .58 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 301.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 23.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct suppo services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direc (customer funded, mission oriented) performed or to be performed by other than th organizational entity. Out-of-house performers may include other departmental or organizational entities, industrial firms, educational institutions, not-for-profit in private individuals.

## TECHNICAL OPERATIONS
## FUNCTIONAL SUPPORT AREA - LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.2 Logistics Planning & Implementation |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 434.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1550.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.2 Logistics Planning and Implementation |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .03 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 216.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.4 Diving, Salvage, and Ocean Engineering |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .22 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 45.9

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) .3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.4 Diving, Salvage, and Ocean Engineering |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 16.55 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3310.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 668.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.08 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 463.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 30.9

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.73 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3457.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1238.5

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 529.5

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 14.9 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2819.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1760.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 837.8

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction |
| Life Cycle Work Area | 5. Manager Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .05 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 58.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction & Effects |
| Life Cycle Work Area | 6.0 Operational System Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 96.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 57.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction |
| Life Cycle Work Area | 7. Production |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.32 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 266.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 52.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 507.5

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction |
| Life Cycle Work Area | 13. Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 64.6

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 135.3

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 50.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.5 Environmental Description, Prediction |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.65 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 681.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1088.8

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 180.9

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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**TECHNICAL FUNCTIONS**
**FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM**

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.6.4 Medic Research & Combat Cas. Care |
| Life Cycle Work Area | 4. Engineering & Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.68 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 258.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) .2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.7 Major Range Development & Operation |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.74 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 599.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 33.9

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.7 Major Range Development & Operation |
| Life Cycle Work Area | 13. Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1844.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 741.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1621.2

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.
Also interacts with: 9. Modernization, 10. Program Support, 11. Maintenance

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.7 Major Range Development & Operation |
| Life Cycle Work Area | 15. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .05 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1587.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 219.7

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.8 Other Subsidiary System or Components |
| Life Cycle Work Area | 17. Training/Operational Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.02 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 150.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 127.1

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 10.9 Activity Mission & Function Support |
| Life Cycle Work Area | 10. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 237.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.1 Computers |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 186.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 2.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 49.8

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.1 Computers, Generic Technology Base |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 12.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1926.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1393.9

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.1 Computers, Generic Technology Base |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.97 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1648.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 871.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 229.4

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.1 Computers, Generic Technology Base |
| Life Cycle Work Area | 4. Engineering Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 22.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3441.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 262.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.1 Computers, Generic Technology Base |
| Life Cycle Work Area | 10. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2075.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) .1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.2 Software |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 353.2

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 18.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 207.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.2 Software, Generic Technology Base |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 19.9 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3320.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 636.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1176.2

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.2 Software, Generic Technology Base |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 15.7 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2543.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 664.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 2178.1

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.2 Software, Generic Technology Base |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 4.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 716.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 374.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 648.6

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.3 Generic Technology Base Software |
| Life Cycle Work Area | 2. RDTE Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 25.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.3 Generic Technology Base Communication Networking |
| Life Cycle Work Area | 3. RDTE Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 383.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.3 Generic Technology Base Communications Networking |
| Life Cycle Work Area | 9. Modernization |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 3.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 589.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 233.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.4 Electronic Devices |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 6.03 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1159.8

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K)41.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.4 Generic Technology Base Electronic Devices |
| Life Cycle Work Area | 2. RDTE Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 2.92 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1351.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K)214.6

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 2865.8

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.4 Electronic Devices |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 10.46 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2004.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K)249.7

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 826.9

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.5 Material and Processes |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .91 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 148.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K)3.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.5 Material and Processes |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.5 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 200.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 54.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 10613.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.5 Materials & Processes |
| Life Cycle Work Area | 4. Engineering & Manufacturing Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 29.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3786.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 739.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 4276.0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.5 Materials & Processes |
| Life Cycle Work Area | 6. Operational System Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 17.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 2240.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 354.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 25.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.5 Materials & Processes |
| Life Cycle Work Area | 8. Acceptance Testing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 6.9 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 903.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 46.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1640.0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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**TECHNICAL FUNCTIONS**
**FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM**

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.5 Materials & Processes |
| Life Cycle Work Area | 12. Repair |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .3 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 34.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.7 Propulsion and Energy Coversion |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .93 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 150.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 71.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.9 Human-system Interface |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .29 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 65.9

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.9 Generic Technology base, Human-System Interface |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 22.0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 3619.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 1763.4

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 1093.8

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.9 Generic Technology Base, Human-System Interface |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.8 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1535.1

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 613.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 615.5

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.9 Generic Technology Base, Human-System Interface |
| Life Cycle Work Area | 4. Engineering and Manufacturing |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 317.0

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 41.1

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

**TAB A**
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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.9 Generic Technology Base, Human-System Interface |
| Life Cycle Work Area | 6. Operational Systems Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.6 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 279.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 54.0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 580.4

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.9 Generic Technology Base, Human-System Interface |
| Life Cycle Work Area | 10. Program Support |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 8.1 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 1362.5

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 44.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.10 Other Technology Base Programs |
| Life Cycle Work Area | 1. Basic Research |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .12 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 19.7

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.10 Other Technology Base Programs |
| Life Cycle Work Area | 2. Exploratory Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. .99 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 194.9

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.10 Other Technology Base Programs |
| Life Cycle Work Area | 3. Advanced Development |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 1.0 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 176.4

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:

In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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## TECHNICAL FUNCTIONS
## FUNCTIONAL SUPPORT AREA/LIFE CYCLE WORK AREA FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Functional Support Area | 11.10 Other Technology Base Programs |
| Life Cycle Work Area | 11. Maintenance |

Note: An example of a functional support area - life cycle work area is "1. Platform, 1.1 Undersea, - 10. Program Support".

1. **In-House Work Years.** Provide the number of in-house government employee (civilian and military) work years for FY1993 that were performed in this functional support area - life cycle work area. Workyears are to be consistent with those used in the preparation of inputs to the President's budget. 0.2 WYs

2. **Expenditures.**

a. **In-House Expenditures.** Provide the total in-house cost in FY1993 for this functional support area - life cycle work area. $(K) 31.3

b. **Out-of-House Expenditures**. Provide the total funds expended during FY1993 for this functional support area - life cycle work area. **Do not** include direct cite funding. $(K) 0.2

c. **Direct Cites.** Provide total direct cite funds expended on contract during FY1993 for this functional support area - life cycle work area. $(K) 0

Note:
In-House Expenditures - Is comprised of the total obligation authority for direct labor, direct material, direct travel, direct equipment, direct computer support, other direct support services and all overhead.

Out-of-House Expenditures - Is comprised of total obligational authority for direct work (customer funded, mission oriented) performed or to be performed by other than the organizational entity. Out-of-house performers may include other departmental or DoD organizational entities, industrial firms, educational institutions, not-for-profit institutions and private individuals.

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11. Historical utilization average for fiscal years 1989-1993: facility utilization has been growing by 20% per year to the current utilization 15 man-years per year.

12. Projected utilization to FY 1997:

| | |
|---|---|
| 1994 | 15 man-years |
| 1995 | 20 man-years |
| 1996 | 22 man-years |
| 1997 | 26 man-years. |

13. The approximate number of personnel used to operate the OSIS/OED Laboratory is 15.

14. The approximate number of personnel used to maintain the OSIS/OED Laboratory is 1.

15. One 8 1/2 x 11 B&W photo follows.

10. Functional Support Areas: 7.3, 7.6, 7.8, 11.1, 11.2, 11.3.

11. Historical utilization average for fiscal years 1989-1993: facility utilization has been growing by 20% per year to the current utilization 15 man-years per year.

12. Projected utilization to FY 1997:

| | |
|---|---|
| 1994 | 15 man-years |
| 1995 | 20 man-years |
| 1996 | 22 man-years |
| 1997 | 26 man-years. |

13. The approximate number of personnel used to operate the Navy Intelligence Development, Integration and Test Facility is 15.

14. The approximate number of personnel used to maintain the Navy Intelligence Development, Integration and Test Facility is 1.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | High Performance Computing and Theater Level Planning Laboratory |

1. The primary purpose of the High Performance Computing and Theater Level Planning Laboratory is to provide a landbased test site of a major theater level planning system; support development, integration and interoperability testing; and adapt technology and the use of modern high performance computers to increase the accuracy, performance and timeliness of the planning.

2. A significant amount of the High Performance Computing and Theater Level Planning Laboratory consists of workstations which are moveable.

3. Replacement value of the High Performance Computing and Theater Level Planning Laboratory equipment is $1,790,000.

4. The volume of this facility is 23,220 cubic feet and the area is 2,322 square feet.

5. The High Performance Computing and Theater Level Planning Laboratory requires the following special utility support in addition to normal electrical power:

Security control system
Halon (or equivalent) fire suppression system
Uninterruptable power system (UPS)
Raised deck computer flooring
Ethernet coax, twisted pair, fiber optic network wiring.

6. The High Performance Computing and Theater Level Planning Laboratory requires RF enclosure and TEMPEST approved building spaces.

7. The High Performance Computing and Theater Level Planning Laboratory requires air conditioning (for air cooled equipment) and humidity control.

8. The High Performance Computing and Theater Level Planning Laboratory would not be terribly difficult to replicate if all of the networks, communications connectivity and support facilities were provided. The biggest concern would relate to the down time and subsequent programmatic impact.

9. The High Performance Computing and Theater Level Planning Laboratory was part of a MILCON facility constructed in 1990. Lab equipment has been installed since that time primarily through project funding from CNO sponsored programs.

10. Functional Support Areas: 7.3, 7.6, 7.8, 11.1, 11.2, 11.3.

11. Historical utilization average for fiscal years 1989-1993: facility utilization has been growing by 20% per year to the current utilization 18 man-years per fiscal year.

12. Projected utilization to FY 1997:

| | |
|---|---|
| 1994 | 18 man-years |
| 1995 | 20 man-years |
| 1996 | 22 man-years |
| 1997 | 26 man-years. |

13. The approximate number of personnel used to operate the High Performance Computing and Theater Level Planning Laboratory equipment is 18.

14. The approximate number of personnel used to operate the High Performance Computing and Theater Level Planning Laboratory equipment is 1.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Combat Direction System (CDS) Development and Evaluation Site (CDES) |

1. The Combat Direction System Development and Evaluation Site (CDES) is a dedicated multi-configurable development center designed to support the Navy's effort in the design, development, test, and evaluation of new concepts, equipment, and software associated with a family of highly complex, automated Advanced Combat Direction Systems (ACDS), Command and Control Processor (C2P), Range NTDS Upgrade System (RNUS), Data Links (Link 11, Link 4A, Link 16), and Advanced Display Systems (ADS) planned for deployment on current and future surface combatants. The CDES is a separate entity from the critical path of shipbuilding programs and is capable of life-cycle support throughout the development and certification of new systems. It also provides a means of training those shipboard personnel scheduled for involvement in initial system Operational Evaluation (OPEVAL).

2. The Combat Direction System Development and Evaluation Site (CDES) is a fixed facility. Construction of adequate RF enclosures and a TEMPEST approved building would be required at an alternate site.

3. The estimated replacement cost of the CDES is $95.7M as follows:
   Building / Utilities: $20,000,000
   Facility/Equipment: $75,700,000

4. The gross weight and cube of the CDES facility follows:
   Volume of facility: 117,760 cubic feet
   Area of facility: 11,776 square feet
   Gross weight: N/A

5. CDES requires the following special utility support other than normal electrical power:

   400Hz delta & wye power
   Security control system
   Halon (or equivalent fire suppression system)
   Uninterruptable Power System (UPS)
   Raised deck computer flooring
   EtherNet wiring plant.

6. CDES requires adequate RF enclosures and a TEMPEST approved building .

7. CDES has the following environmental control requirements for the facility/equipment:

Chilled Water (for water cooled equipment)
Air-conditioning (for air-cooled equipment).

8. Relocation of this facility would be extremely complex and costly both in dollars and impact to the tactical data system programs essential to the combat effectiveness of battle groups. The location of the facility in the Southern California operating area provides important access to operational fleet surface and air units, and an ocean test range. The environment in and around this site is extremely advantageous to providing a flexible and secure test and development environment.

9. The CDES site has evolved over the past 25 years. It has come about via MILCON (for buildings) and assignment of military assets via NAVSEA, NAVAIR and SPAWAR, and the acquisition of equipment funded by both OPN and RDT&E lines of funds. Equipment has arrived via truck transportation.

10. Functional Support Areas: 7.2, 7.3, 7.4, 7.6.

11. Historical utilization average for fiscal years 1989-1993 (There were 5 groups available between FY 89 and FY 93. Hours available per group are based upon 21 hours/day, 7 days/ week, 50 weeks/year.):

FY 89: 27,344 group hours
FY 90: 19,448 group hours
FY 91: 30,084 group hours
FY 92: 29,639 group hours
FY 93: 28,430 group hours.

12. Projected utilization to FY 1997 (There are 8 groups available between FY 94 and FY 97. Hours available per group are based upon 21 hours/day, 7 days/week, 50 weeks/year.):

FY 94: 41,000 group hours
FY 95: 42,000 group hours
FY 96: 43,000 group hours
FY 97: 43,000 group hours.

These facilities will be utilized well into and beyond the year 2000. The ships classes supported and projects funded are life-cycle and development projects that have no planned end date.

13. The approximate number of personnel used to operate the CDES facility is 45.

14. The approximate number of personnel needed to maintain the CDES is 27.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Over the Horizon-Targeting (OTH-T) Reconfigurable Land Based Test Site (RLBTS) |

1. The primary purpose of the Over the Horizon-Targeting (OTH-T) Reconfigurable Land Based Test Site (RLBTS) is to provide world wide connectivity to OTH-T systems and laboratories for all Services and Allied Countries in support of:

a. OTH-T C4I Configuration Validation Studies.
b. Validation of C4I system requirements and architecture.
c. Management of ADP and telecommunications standards by the Commander, Naval Computer Telecommunications Command (NAVCOMTELCOM).
d. OTH-T Interoperability Testing.
e. Fleet OTH-T systems engineering.
f. Fleet exercise/Command Center support, for overall responsibility for the end-to-end effectiveness of the Navy's C4I systems in the Fleet.
g. Battle Group Network analysis and feedback to PACFLT and LANTFLT Command Centers.

2. The OTH-T RLBTS is a fixed asset. OTH-T RLBTS components cannot be moved without damage. In addition, construction of adequate RF enclosures and a TEMPEST approved building would be required at any alternate location. Connectivity to world wide communications facilities are indigenous to the NCCOSC RDTE DIV SAN DIEGO CA infrastructure.

3. The estimated replacement cost of the OTH-T RLBTS facility is $5M. In addition, the cost to construct adequate RF enclosures, TEMPEST approved building and reestablish existing connectivity to NCCOSC RDTE DIV SAN DIEGO CA OTH-T systems and world wide communications circuits to other OTH-T facilities would be well in excess of a similar amount.

4. OTH-T RLBTS gross weight is about 100,000 pounds. It occupies approximately 20,000 cubic feet.

5. Other than extensive "normal" electrical power, OTH-T RLBTS requires multiple (at present, 12) telephone lines that are conditioned and filtered for secure voice and data transfers. OTH-T RLBTS facility also requires to be TEMPEST maintained at Level 1 classification.

6. OTH-T RLBTS must be enclosed in a maintained TEMPEST shielded enclosure.

7. The OTH-T RBLTS facility must be air conditioned and humidity controlled due to numerous electrical equipment operating on a continual basis.

8. Relocation of this facility would be extremely complex and costly in both dollar and impact to the Over The Horizon Targeting (OTH-T) Program which is essential to the Common Tactical Picture effectiveness of battle groups. The location of the facility in the Southern California operating area provides an advantageous site that allows for access to both PACFLT and LANTFLT command centers, ships at sea and the OTH-T Systems Engineers that rely on OTH-T RLBTS for support. It is important to note that the OTH-T RLBTS Interconnectivity System provides the capability to support interoperability testing, Fleet Systems Engineering Support and data collection for remote sites located world wide.

9. The facility construction began on site in 1986 and has continued to be expanded and enhanced (in place) in support of additional C4I, OTH-T and RDT&E activities.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.8, 11.3.

11. Historical utilization average for fiscal years 1989-1993:

FY 1989 2250 lab hours; 9.0 hrs/day, 5 days/week, 50 weeks
FY 1990 2250 lab hours; 9.0 hrs/day, 5 days/week, 50 weeks
FY 1991 2425 lab hours; 9.7 hrs/day, 5 days/week, 50 weeks
FY 1992 2625 lab hours, 10.5 hrs/day, 5 days/week, 50 weeks
FY 1993 2750 lab hours; 11.0 hrs/day, 5 days/week, 50 weeks.

12. Projected utilization to FY 1997:

FY 1994 2750 lab hours; 11 hrs/day, 5 days/week, 50 weeks
FY 1995 4500 lab hours; 18 hrs/day, 5 days/week, 50 weeks
FY 1996 4500 lab hours; 18 hrs/day, 5 days/week, 50 weeks
FY 1997 8400 lab hours; 24 hrs/day, 7 days/week, 50 weeks.

13. The approximate number of personnel used to operate the OTH-T RLBTS facility is 15.

14. The approximate number of personnel needed to maintain the OTH-T RLBTS facility equipment is 6.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Systems Integration Facility (SIF) |

1. The primary purpose of the System Integration Facility (SIF) is to conduct integration testing of Link-16 systems, including

a. Joint Tactical Information Distribution System (JTIDS)
b. MultiFunction Information Distribution System (MIDS)
c. Advanced Combat Direction Systems (ACDS)
d. Airborne Tactical Data Systems (ATDS)
e. Command and Control Processor (C2P)

on Tactical Aircraft and Surface Combatants. SIF also provides C4I test support in preparation for Carrier Battle Group deployments.

2. The JTIDS System Integration Facility (SIF) is a fixed asset. SIF components cannot be moved without damage. In addition, construction of adequate RF enclosures and a TEMPEST approved building would be required at any alternate location.

3. The estimated value of the SIF system is given in two parts as listed below:

Equipment Cost:

| | |
|---|---|
| RF Network | $7.0M |
| 2 Main Computers & CSBC's | 2.0M |
| 8 JTIDS Terminals | 9.5M |
| Terminal Enclosures | 1.0M |
| Power Conditioners | 0.2M |
| TEMPEST Shielding | 1.0M |
| Subflooring, Cable | 0.5M |
| Air Cooling | 0.5M |
| Misc. Equipment & Interfaces | 2.0M |
| **Total Cost (hardware)** | **$23.7M** |

Software Cost:

| | |
|---|---|
| Software Rehost | $10.0M |
| Integration & Validation | 5.0M |
| **Total Cost (software)** | **$15.0M** |

4. Weight for the SIF is 120,000 pounds. It is 27,000 cubic feet in size.

5. Power requirements for the SIF include 400 Hz delta and wye connections, 28 VDC aircraft power, and 220 VAC single phase and three phase. These power sources, totaling over 340 amps, must be conditioned including filtering, power leveling and TEMPEST isolation from the main power source.

6. The SIF must be located inside an RF TEMPEST certified screen. Additional special requirements include individual shelters for each JTIDS/MIDS terminal with 171 dB isolation.

7. Facility must be air conditioned due to numerous electrical equipment operating on a continual basis.

8. Relocation of this facility would be extremely complex and costly both dollar and impact to the tactical data system programs essential to the combat effectiveness of battle groups. The location of the facility in the SOCAL operating area provides important access to flat terrain and an ocean test range. SOCAL weather conditions are the best and most consistent in CONUS. This reduces negative test schedule impacts and improves critical areas such as range safety, quality of flight, stability of test data for analysis, and cost of operation.

It is important to note that the JTIDS SIF Gateway provides the capability to support integration testing of remote air units and surface combatants. This means that groups of platforms located on the East Coast and the West Coast can be tested as if they were collocated in the same battle group.

9. The facility construction began on site in the early 1980s and has continued to be expanded and enhanced (in place) in support of additional C4I and DT&E activities.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.7.

11. Historical utilization average for fiscal years 1989-1993:

FY 1989 (Test bed under development)
FY 1990 1920 lab hours (May-Sept, 16 hrs/day, 6 days/week, 20 weeks)
FY 1991 4200 lab hours (14 hrs/day, 6 days/week, 50 weeks)
FY 1992 5400 lab hours (18 hrs/day, 6 days/week, 50 weeks)
FY 1993 4800 lab hours (16 hrs/day, 6 days/week, 50 weeks).

12. Projected utilization to FY 1997:

FY 1994 4200 lab hours (14 hrs/day, 6 days/week, 50 weeks)
FY 1995 4800 lab hours (16 hrs/day, 6 days/week, 50 weeks)
FY 1996 4800 lab hours (16 hrs/day, 6 days/week, 50 weeks)

FY 1997 5400 lab hours (18 hrs/day, 6 days/week, 50 weeks).

13. The approximate number of personnel used to operate the SIF is 14.

14. The approximate number of personnel needed to maintain the SIF is 6.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | E-2C Airborne Tactical Data Systems (ATDS) Integration Laboratory |

1. The E-2C Airborne Tactical Data Systems (ATDS) Integration Laboratory is a dedicated multi-configuration development center designed to support the Navy's effort in the design, development, test, and evaluation of tactical software, software development tools and simulation. As the Navy's only software support facility for E-2C aircraft three configurations of E-2C aircraft are supported. Development and evaluation of software for Foreign Military Sales cases are also supported in this facility. This laboratory is designated the software support activity for intelligence files utilized by the E-2C aircraft. This facility supports Navy and Joint interoperability systems testing.

2. The E-2C ATDS Integration Laboratory is a fixed facility. Construction of adequate RF enclosures and a TEMPEST approved building would be required at an alternate site.

3. The replacement value of the E-2C ATDS Integration Laboratory (facility/equipment only) is estimated to be $15.6M.

4. The E-2C ATDS Integration Laboratory occupies 5,000 square feet and has a gross weight of 206,000 pounds.

5. The E-2C ATDS Integration Laboratory requires the following special utility support other than normal electrical power:

400Hz delta & wye power
Security Control system
Halon (or equivalent fire suppression system)
Uninterruptable Power System (UPS)
Raised deck computer flooring
EtherNet wiring plant.

6. There are no special budget requirements for the E-2C ATDS Integration Laboratory.

7. The E-2C ATDS Integration Laboratory has the following environmental control requirements for the facility/equipment:

Air-conditioning (for air-cooled equipment)
3 inch/water at 55 degrees F

8. Relocation of this facility would be extremely complex and costly both in dollars and impact to the tactical data system programs essential to the combat effectiveness of battle groups. The location of the facility in the Southern California operating area provides important access to operational fleet surface and air units, and an ocean test range. The environment in and around this site is extremely advantageous to providing a flexible and secure test and development environment.

9. The ATDS site has evolved over the past 25 years. It has come about via MILCON (for buildings) and assignment of military assets via NAVSEA, NAVAIR and SPAWAR, and the acquisition of equipment funded by both OPN and RDT&E lines of funds. Equipment has arrived via truck transportation.

10. Functional Support Areas: 3.2, 7.2.

11. Historical utilization average for fiscal years 1989-1993:

FY 89: 5,000 hrs
FY 90: 5,000 hrs
FY 91: 5,000 hrs
FY 92: 5,000 hrs
FY 93: 5,000 hrs.

12. Projected utilization to FY 1997:

FY 94: 5,000 hrs
FY 95: 5,000 hrs
FY 96: 5,000 hrs
FY 97: 5,000 hrs.

These facilities will be utilized well into and beyond the year 2000. The E-2C aircraft projects funded are life-cycle and development projects that have no planned end date.

13. The approximate number of personnel used to operate the E-2C ATDS Integration Laboratory facility/equipment is 18.

14. The approximate number of personnel needed to maintain the equipment is 8.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | High Speed Water Tunnel |

1. The NCCOSC RDTE DIV SAN DIEGO CA High Speed Water Tunnel, located in the Hydromechanics Laboratory, is used by NCCOSC RDTE DIV SAN DIEGO CA and other Navy laboratories in support of ONR, IR, ONT, SPAWAR, NAVSEA and other sponsors to perform basic fluid mechanics, environmental, weapons and surveillance projects.

2. The High Speed Water Tunnel is a fixed facility.

3. The High Speed Water Tunnel is unique and represents a $ 1.5 million asset. The instrumentation and associated facilities are worth $ 1.0 million.

4. Gross weight is approximately 40,000 lbs., and the water tunnel occupies about 10,000 cubic feet.

5. No special utility support is required by this facility.

6. The tunnel must be mounted on vibration isolation foundations.

7. There are no environmental control requirements for this facility.

8. The water tunnel is a high speed ( 15 m/sec) -low turbulence (0.1%) facility. The tunnel is fully automated and can be operated by one scientist. It is equipped with a 2-D laser Doppler anemometer which is mounted on a 3-D computer controlled traverse.

In the U.S. there are less than 10 operating water tunnels and there are only about 3 that have more overall capability than the NCCOSC RDTE DIV SAN DIEGO CA tunnel. This tunnel is the newest for its size. NCCOSC RDTE DIV SAN DIEGO CA and Cal Tech operate the only tunnels west of the Mississippi.

The NCCOSC RDTE DIV SAN DIEGO CA water tunnel, including the support instrumentation and equipment, is state-of-the-art. The NCCOSC RDTE DIV SAN DIEGO CA tunnel is unique in that it is designed for 1 man operation. This reduces operational cost to about $1K/day versus big tunnel operations of $100K/day.

The estimated replacement cost of the NCCOSC RDTE DIV SAN DIEGO CA tunnel ( about $1.5 M) does not include labor to set up and revalidate the new facility. ***If the NCCOSC RDTE DIV SAN DIEGO CA tunnel and its capabilities are lost, it is unlikely that another tunnel of similar capabilities will ever be built.***

9. The tunnel was moved here from NOTS-Pasadena in 1974 and was modified and installed in the Hydromechanics Laboratory in 1975.

10. Functional Support Areas: 1.1, 2.4, 2.5, 2.12 ,5.3 ,5.5 ,11.7.

11. Over the past five fiscal years the tunnel has been supported with an approximately 4 man year effort per year.

12. It is anticipated that the tunnel will maintain support at the level of 3-5 man years over the next three years.

13. The approximate number of personnel used to operate the High Speed Water Tunnel is 1.

14. The approximate number of personnel needed to maintain the equipment is 1.

15. Drawing enclosed in lieu of a photo due to the nature of this unique facility.

| Technical Center Site | **NCCOSC RDTE DIV SAN DIEGO CA** |
|---|---|
| Facility/Equipment Nomenclature or Title | Distributed Command and Control (C2) Laboratory |

1. The Distributed Command/Control (C2) Laboratory is responsible for the development, demonstration, and transition of distributed technologies for combat systems and command and control systems for the Navy so that they may meet the application requirements of today and tomorrow. The evolution of these systems is being done through the use of software engineering and use of base technologies such as networks and standard computer communication protocols. These are enhanced through the incorporation of distributed realtime system, distributed operating system, distributed database management system, and distributed security technologies as they are developed. Most importantly, they are being integrated into a distributed computing environment that will support current and future Navy, joint, dual-use and non-Department of Defense applications.

2. This facility is moveable with the special requirements specified in #5 below.

3. The estimated replacement value of the DC2 Lab is approximately $1 million.

4. The DC2 Lab occupies approximately 5000 square feet.

5. This facility requires outside connectivity to numerous networks: Defense Research Internet (DRI), National Science Foundation Network (NSFnet), Internet, Joint Director's of Laboratories Network (JDLnet), NCCOSC RDTE DIV SAN DIEGO CA Seaside Internet (NCCOSC RDTE DIV SAN DIEGO CA buildings 600/605/606), etc., for research and experimentation with various research partners in industry and government.

6. This facility requires Open Storage facility for classified material up to the Secret level.

7. This facility requires normal laboratory requirements for air conditioning and balanced humidity/dehumidify controls.

8. This facility would not be extremely difficult or impossible to replicate or relocate at another site. Major consideration would involve network connectivity to all current research partners to continue experimentation. The impact for the Department of the Navy if this facility were lost would be high. The successful development of these technologies will provide the Navy with improved survivability of command when impacted by loss of hardware, data, or a command control node; evolutionary, affordable improvement to existing as well as future command control systems; security in both local area and wide area networks; and interoperability with other services through open system architectures.

9. This facility was originally housed in NCCOSC RDTE DIV SAN DIEGO CA building 600 and moved into NCCOSC RDTE DIV SAN DIEGO CA building 606 in 1990, upon completion of construction.

10. Functional Support Areas: 1.1, 1.2, 1.3, 1.4, 1.5, 3.1, 3.2, 3.3, 3.4, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 1.1, 11.2, 11.3.

11. Historical utilization average for fiscal years 1989-1993:

1989 - Manyears (Govt/Contractor): 23
Demonstrations: 156 Yearly
Required Access to Lab: 100

1990 - Manyears (Govt/Contractor): 25
Demonstrations: 175 Yearly
Required Access to Lab: 100

1991 - Manyears (Govt/Contractor): 27
Demonstrations: 180 Yearly
Required Access to Lab: 100

1992 - Manyears (Govt/Contractor): 29
Demonstrations: 200 Yearly
Required Access to Lab: 125

1993 - Manyears (Govt/Contractor): 31
Demonstrations: 260 Yearly
Required Access to Lab: 150

12. Projected utilization to FY 1997:

1994 - Manyears (Govt/Contractor): 31
Demonstrations: 280 Yearly
Required Access to Lab: 160

1995 - Manyears (Govt/Contractor): 35
Demonstrations: 280 Yearly
Required Access to Lab: 160

1996 - Manyears (Govt/Contractor): 37
Demonstrations: 300 Yearly
Required Access to Lab: 200

1997 - Manyears (Govt/Contractor): 37
Demonstrations: 300 Yearly
Required Access to Lab: 200

13. The approximate number of personnel used to operate the facility is 3.

14. The approximate number of personnel needed to maintain the equipment is 6.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Display Systems Development Laboratory |

1. The purpose of the Display Systems Development Laboratory is to facilitate Advanced Combat Direction System (ACDS) Hardware Engineering Support tasks involving documentation and Engineering Change Proposal (ECP) testing and verification. Equipment is also used to support advanced system design and testing for new systems such as the NCCOSC RDTE DIV SAN DIEGO CA Map Server and the NCCOSC RDTE DIV SAN DIEGO CA Digital Radar Video Data Distribution System (DRVDDS) programs. Principal equipment item include the following.

a. OJ-535/OL-318, UYQ-21 Display Console w/ Tactical Display Module
b. OJ-451(V)9 UYQ-21 Display Console
c. OL-191(V)1 Radar Azimuth Converter/Radar Data Switchboard/Radar Video Switchboard/Central Data Buffer/Power Supply
d. AN/UYK-7 3-Bay NTDS Computer

2. The various equipment in the Display Systems Development laboratory is moveable.

3. Approximate replacement costs for equipment in 1 above are:

a. $0.5M
b. $0.5M
c. $1.0M
d. $2.0M

4. Gross weight and volume for equipment listed in 1 above:

a. 1040 lb and 24 cu ft
b. 600 lb and 30 cu ft
c. 800 lb and 25 cu ft
d. 3000 lb and 144 cu ft

5. All equipment requires chilled water cooling and 400Hz power.

6. There are no special budget requirements for the Display Systems Development Laboratory.

7. The Display Systems Development Laboratory equipment requires air conditioning with humidity control.

8. The Display Systems Development Laboratory facility/equipment would be difficult to relocate.

9. The equipment was transported by truck to its current location in 1992-93.

10. Functional Support Areas: 11.1, 11.2.

11. Historical utilization average for fiscal years 1989-1993: 5 days per week (use of individual equipment in the laboratory varies from 2 to 5 days per week).

12. Projected utilization to FY 1997: 5 days per week.

13. The approximate number of personnel used to operate the Display Systems Development Laboratory is 1.

14. The approximate number of personnel needed to maintain the Display Systems Development Laboratory is 1 (on an as needed basis).

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Research Evaluation & Systems Analysis (RESA) Facility |

1. The purpose of the RESA facility is to provide Command Control and Communications (C3) simulation in support of RDT&E and Joint Training Requirements.

2. The RESA facility is moveable.

3. The estimated replacement cost of the RESA facility is $4M for equipment, $300K for facility prep/power, etc., $120K for T1 line relocations; the site must be secure for processing classified information..

4. The RESA facility requires 4,000 square feet (48,000 cubic feet), with the space having a 10 foot ceiling with a 12 inch space over the ceiling and a similar space under the computer flooring for a total of 12 feet; gross weight of RESA equipment is 10 tons.

5. In addition to normal electrical power, RESA requires that the power be conditioned and have a minimum 30 minute backup source available.

6. The RESA facility requires shielding for secure processing or a TEMPEST approved area.

7. The RESA facility requires a temperature and humidity controlled environment (computer room 62 degrees F, workspace 70 degrees F, humidity 60% maximum) with a 100 ton air conditioning capability.

8. The RESA facility could be replicated. If the facility were lost the DON would lose its primary expertise in constructive level simulation and would lose the capability to investigate C3I issues in a multi-warfare environment.

9. The facility was relocated from one building to another. Equipment was transported from the former location by local public works and by the computer manufacturers.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8; the RESA facility also supports Life Cycle-Work Area 18.

11. Historical utilization average for fiscal years 1989-1993: five to seven exercises/per year. An exercise is defined as a sponsor requested and funded effort which uses the RESA facility for a study or analysis effort. Exercises range from one to four weeks with additional weeks required for testing.

12. Projected utilization to FY 1997: five to seven sessions per year.

13. The approximate number of personnel used to operate the RESA facility is 20.

14. The approximate number of personnel needed to maintain the RESA facility equipment is 2.

15. One 8 1/2 x 11 photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Distributed Simulation Internet (DSI) Advanced Simulation Laboratory (DASL)/Secure DSI Integration Simulation Laboratory (SISL) |

1. The Distributed Simulation Internet (DSI) Advanced Simulation Laboratory (DASL), complemented by the Secure DSI Integration Simulation Laboratory (SISL), provides hardware, software, simulations, and gateways to other simulations.

2. The various hardware components in DASL/SISL are portable and moveable.

3. The replacement value of the DASL and SISL equipment is $3.0M and $2.5M, respectively.

4. The gross weight and volume of the equipment follows:

DASL: 4.0 tons; 13,440 cubic feet
SISL: 3.5 tons; 13,440 cubic feet.

5. The DASL/SISL equipment does not require any special utility support other than normal electrical power.

6. The DASL/SISL facility has the following special budget requirements:

DASL requires T.1 (1.544 Mbps) data rates.

SISL requires that it have all the proper TEMPEST requirements and necessary security to process SECRET/NOFORN data.

7. DASL/SISL computer equipment requires air conditioning.

8. The DASL/SISL facility is ARPA funded; it is relocatable and its loss would not impact directly on the Department of the Navy. The DASL/SISL equipment is used as an aid in the research and development of building a Seamless Simulation Warfighting Network/Information Highway infrastructure.

9. The DASL/SISL facility has been in operation since 1989.

10. Functional Support Areas: 11.1, 11.2, 11.3.

11. Historical utilization for fiscal years 1989-1993:

The DASL/SISL facility is used on average 6 days per week, 12-14 hours per day and have been so used for the past five years.

| | |
|---|---|
| FY 1989 | $0.1M |
| FY 1990 | 0.5M |
| FY 1991 | 1.0M |
| FY 1992 | 5.0M |
| FY 1993 | 7.0M |

12. Projected utilization to FY 1997:

| | |
|---|---|
| FY 1994 | $14.0M |
| FY 1995 | 10M |
| FY 1995 | 10M |
| FY 1996 | 10M |
| FY 1997 | 10M |

13. The approximate number of personnel used to operate the DASL/SISL facility is 79 (14 civil servants and 65 contractors).

14. The approximate number of personnel needed to maintain the DASL/SISL facility equipment is 5.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Marine Air Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) Laboratory |

1. The Marine Air Ground Task Force (MAGTF) Tactical Warfare Simulation (MTWS) Laboratory provides a simulated combat environment for commanders and their staffs to practice and sharpen decision-making skills and to assist in the command and control aspects of tactical field exercises.

2. The MTWS Laboratory is movable.

3. MTWS Laboratory replacement includes trailers valued at $200K and hardware/software valued at$2M.

4. The MTWS Laboratory occupies 2,200 square feet and 22,000 cubic feet; gross weight is five tons.

5. The MTWS Laboratory requires no special utility support in addition to normal electric power.

6. The MTWS Laboratory has no special budget requirements.

7. The MTWS Laboratory equipment requires air conditioning (70 degrees F).

8. This facility could be relocated. However, expertise for the development and system support would be lost. USMC would lose their future system enhancements and system support, especially in the joint exercise arena.

9. The MTWS Laboratory has evolved over the past two years. Equipment was transported to the MTWS Laboratory by truck/air freight.

10. Functional Support Areas: 7.2, 7.3, 7.4, 7.8, 10.1, 11.9

11. Historical utilization for fiscal years 1989-1993: the MTWS facility has been used for development/test/system support approximately 2,000 lab hours per year (8 hours per day, five days per week, 50 weeks per year).

12. Projected utilization to FY 1997: the facility will continue to be utilized for development/ test/system support approximately 2,000 lab hours per year (8 hours per day, five days per week, 50 weeks per year).

13. The approximate number of personnel used to operate the MTWS Laboratory is 20-30 (for development/test/system support).

14. The approximate number of personnel used to maintain the MTWS Laboratory is the same as 13 above.

15. 8 1/2 x 11 B&W photo

12. Projected utilization to FY 1997 (and beyond): 2500 lab hours/year.

13. The approximate number of personnel used to operate the MultiLink Laboratory is 15 - 20.

14. The approximate number of personnel needed to maintain the MultiLink Laboratory is 2.

15. One 8 1/2 X 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Convex Exemplar High Performance Computer and Supporting Workstations |

1. The primary purposes of the Convex Exemplar High Performance Computer and Supporting Workstations equipment are to permit research into and early application of new computer architectures including Scalable Parallel Processor computing, to support classified high performance computing capacity required as support during crisis, and to permit Department of Navy input into development of production of Exemplar architecture.

2. This computer and associated equipment is moveable.

3. The value of the equipment in the Exemplar suite is $600,000. Cost includes Exemplar, test station, and two Hewlett-Packard 715 workstations as well as required software.

4. The gross weight and cube of the equipment is as follows:

| | |
|---|---|
| a. Exemplar: | 475 pounds, 43 cubic feet |
| b. Test station: | 100 pounds |
| c. Work stations: | 100 pounds each |
| **Total gross weight:** | **775 pounds** |
| **Total volume:** | **approximately 50 cubic feet** |

5. The Exemplar requires a 60 Amperes circuit breaker for dedicated use. It also requires a Hubbel 360P6W receptacle/connector. The test station and workstations require standard 115V, 60Hz, 20 Amperes circuits.

6. This equipment requires network connection to the Internet and other unclassified computer networks. At the completion of the Alpha and Beta test periods the equipment will be designated for classified work and will require secret data handling and network connections to classified computer networks.

7. This equipment requires temperature and humidity controls standard for a computer laboratory facility.

8. Replicating this equipment would be extremely difficult since NCCOSC RDTE DIV SAN DIEGO CA is serving as an Alpha test site for the Exemplar. Only eight Exemplar systems are currently available outside of Convex Computer Corp. When Convex goes to production status, replicating the equipment will prove easier. Relocating the equipment to another site with adequate electrical support and open storage for classified material to the Secret level would not be extremely difficult or impossible. If this equipment were lost, the impact on Department of the Navy research

efforts would be high. Early application of novel new computer architectures would be delayed. Classified high performance computing capacity required as support during crisis would not be available. Research projects dependent on the Scalable Parallel Processor architecture would be delayed.

9. The two workstations were delivered by a commercial shipping company. The Exemplar and test station were shipped by Convex from their facility by a commercial moving company to building 606 at NCCOSC RDTE DIV SAN DIEGO CA.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 11.1, 11.2, 11.3.

11. Historical utilization average for fiscal years 1989-1993: since the Exemplar system was delivered in the first week of April 1994, no historical figures are available.

12. Projected utilization data to FY 1997:

Notes:

(1) The Exemplar system was delivered, installed, and tested during April 1994. It was not available for use until May 1994.

(2) Current plans call for increasing the processors in the Exemplar from 8 to 16 during the FY 1995-96 time frame.

(3) The Exemplar is a unique resource available at no other Navy site.

(4) On line access to the Exemplar will encourage its use by other sites across the network.

(5) Given the lack of historical data for this system, all projected data are the best estimates possible based on historical data for other similar system architectures.

FY 1994: system uptime: 80%; # of projects using system: 2-5; time system in use: 20%
FY 1995: system uptime: 95%; # of projects using system: 4-12; time system in use: 45%
FY 1996: system uptime: 95%; # of Projects using system: 8-20; time system in use: 70%
FY 1997: system uptime: 95%; # of Projects using system: 10-25; time system in use: 80%

13. The approximate number of personnel used to operate the equipment, because the system is currently an Alpha version of the Exemplar, includes one Government person half time and two other Government employees 10-25% of the time; additionally, 2 contractor personnel are on call full time. When the Exemplar reaches production quality, only 1 full time person will be required.

14. The approximate number of personnel needed to maintain the equipment is 1 plus a maintenance contract with Convex Computer Corp.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Ocean Sciences Laboratory |

1. The Ocean Sciences Laboratory provides more than 11,000 square feet of specialized spaces to support basic and applied research for Navy requirements. A flow-through seawater system delivers San Diego Bay water into about half of these labs for experimental uses. Unique and specialized instrumentation for environmental analyses include atomic absorption spectrophotometry, ICP atomic emission spectrophotometry, gas chromatography, high performance liquid chromatography (HPLC), gas chromatography/mass spectrometry (GC/MS), ultraviolet-visible spectrometry, scanning spectro-fluorometry, xray fluorescence, electrochemical instrumentation, electrophoresis instrumentation, scanning electron microscopy and cell culture instrumentation. All lab spaces are equipped with the most current analytical instrumentation. Nearby pier space is available for environmental survey and support craft. Several mobile assessment and monitoring capabilities are also located adjacent to this facility.

2. The Ocean Sciences Laboratory is a fixed facility.

3. The replacement value of the Ocean Sciences Laboratory facility/equipment is estimated to be between $10 and $15M.

4. The Ocean Sciences Laboratory building contains 52,000 square feet of space (including laboratories, offices, conference rooms, etc.).

5. The Ocean Sciences Laboratory requires a seawater delivery system, air, and gas in addition to electrical power.

6. The Ocean Sciences Laboratory requires special shielding in some spaces for radioactive materials handling and storage.

7. The Ocean Sciences Laboratory has various environmental control requirements including temperature, air scrubbing, and venting associated with chemistry analytical laboratories.

8. The Ocean Sciences Laboratory would be extremely difficult to replicate or relocate to another site due to its proximity to a seawater source, specialized laboratory requirements and interrelationship with other proximal facilities and assets.

9. The Ocean Sciences Laboratory was constructed in 1986.

10. Functional Support Areas: 10.5.

11. Historical utilization average for fiscal years 1989-1993: about $25M for 100 workyears/FY.

12. Projected utilization to FY 1997: $15M for 100 workyears/FY.

13. The approximate number of personnel used to operate the Ocean Sciences Laboratory facility is 60.

14. The approximate number of personnel needed to maintain the Ocean Sciences Laboratory equipment is 10.

15. One 8 1/2 x 11 B&W photo follows.

| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
|---|---|
| Facility/Equipment Nomenclature or Title | Marine Mammal Facility |

1. The Marine Mammal Facility is an integrated facility whose mission is the care, feeding and training of the Navy's marine mammals. It is the only authorized DoD marine mammal facility. The facility includes pier space, marine mammal enclosures, walkways, fish house, freezer and veterinary facility. Floating enclosures, walkways and brows house marine mammals in accordance with the Animal Welfare Act. The fish house and freezer store fish and provide a preparation facility for feeding the marine mammals. The veterinary lab includes a pathology lab, surgery room and drug storage area to care for the medical needs of the marine mammals.

2. The Marine Mammal Facility is a fixed facility that would require major demolition and construction to relocate. All fixtures are either non- or semi-portable.

3. The estimated replacement cost of the Marine Mammal Facility follows.

a. Facility/equipment

| | |
|---|---|
| marine mammal enclosures | $1.2M |
| walkways | 1.3M |
| piers | 7.0M |
| **Total** | **$9.5M** |

b. Building/utilities integral to facility

| | |
|---|---|
| veterinary lab | $0.5M |
| fish house/freezer | 0.75M |
| **Total** | **$1.25M** |

4. The Marine Mammal Facility includes the following:

a. Piers (fixed): 1,270 linear feet
b. Floating walkways: 1,840 linear feet, 745 tons (pre-cast concrete floats)
c. Marine mammal enclosures: 51,050 cubic feet (semi-portable)

5. Special utility support required for the Marine Mammal Facility includes fresh and salt water lines for the piers and hot and cold water lines for the fish house and veterinary lab in addition to normal electrical power.

6. Special budget requirements for the Marine Mammal Facility include the piers and special facilities for the proper care of the marine mammals.

7. The only special environmental control requirement for the Marine Mammal Facility is that the freezer must be maintained at the authorized DoD temperature for fish storage (0 to -10 degrees F).

8. The Marine Mammal Facility provides proper care and maintenance of the Navy's marine mammals in accordance with Federal laws and regulations. This facility would be extremely difficult to replicate at another site without great cost to the Navy. The impact of the loss of the Marine Mammal Facility would include inability to care for and maintain the Navy's marine mammals and the resulting expertise in the training and maintenance of the Navy's marine mammals for Fleet Systems. No equivalent commercial capabilities presently exist that could house the number of Navy marine mammals in open ocean enclosures which would meet Federal requirements. The Marine Mammal Facility is the only Government facility capable of housing marine mammals.

9. The Marine Mammal Facility was built as follows:

| | | |
|---|---|---|
| a. | initial marine mammal enclosures/walkways (about 10 per cent, replaced at various times) | 1983-1993 |
| b. | veterinary laboratory | 1989 |
| c. | fish house/freezer (1 of 2) | 1991 |
| d. | fish house/freezer (2 of 2) | 1993 |
| e. | marine mammal enclosures/walkways (remaining 90 per cent of total) | 1993 |

10. Functional Support Areas: 2.14, 8.2.

11. Historical utilization average for fiscal years 1989-1993: the marine mammal pens and enclosures are in use 24 hours/day every day to house marine mammals; the veterinary lab exceeds 40 hours/week usage due to the unpredictability of caring for live animals; the fish house and freezer facilities are in active use about 8 hours/day every day.

12. The projected utilization per year to FY 1997 is the same as the historical utilization in 11 above.

13. Approximately 65 personnel directly train and maintain the Navy's marine mammals.

14. A total of 4 man years of effort are required to maintain the Marine Mammal Facility.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Transducer Calibration Center |

1. The Transducer Calibration Center is a controlled environment, low ambient noise transducer calibration and underwater acoustic test facility. It provides R&D, production, and acceptance testing and preproduction evaluation of transducers for government and industry. The low ambient noise level in the TRANSDEC pool is ideal for investigating radiated noise of mechanical devices such as underwater motors and pumps. Water clarity of the pool is excellent for photographic and optical experiments.

2. The Transducer Calibration Center is a fixed facility.

3. The replacement value of the pool, bridge structure, circulation pumps and associated plumbing and structure to house support equipment is approximately $3.9M. Replacement cost of electronic equipment is approximately $300K. The cost to build-up a new data acquisition system including writing the necessary software is approx $100K - 150K.

4. The Transducer Calibration Center is a large anechoic pool, 92m by 61m by 12m depth containing 6 million gallons of continuously circulated fresh water. The pool is spanned by a stabilized bridge structure capable of supporting test loads up to 2 tons. A calibration house is located at the center of the bridge and has three wells with independent handling systems for concurrent transducer testing.

5. TRANSDEC does not require any special utility support other than normal electrical power and fresh water supply.

6. See number 4 above.

7. There are no special environmental control requirements.

8. Disregarding the $3.9M replacement cost -- this facility would not be difficult to replicate. If this facility were lost to the Navy, it's present workload could be distributed among other similar government test facilities.

9. TRANSDEC was constructed on site in 1964.

10. Functional support areas: 5.1, 5.3, 5.5, 7.1, 7.3, 8.2, 10.4.

11. Historical utilization average for fiscal years 1989-1993 (100% utilization means 1,990 hours/year of funded project work):

FY 1989 -- 109%
FY 1990 -- 108%
FY 1991 -- 92%
FY 1992 -- 85%
FY 1993 -- 48%

12. Projected utilization to FY 1997 is 50% to 60% per year. TRANSDEC expenses are offset at approximately 50% utilization.

13. The approximate number of personnel used to operate TRANSDEC is 3 (1 civil servant plus 2 contractors).

14. The approximate number of personnel needed to maintain TRANSDEC is 3 (the same individuals as in 13 above).

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Electronic Materials Science Facility |

1. The Electronic Materials Science Facility is used for semiconductor materials development, and electronic and optoelectronic device development.

2. The Electronic Materials Science Facility equipment is moveable; the facility itself, including the Electronic Materials Lab and Class 1000 Clean Room is fixed.

3. The replacement cost of the equipment in the Electronic Materials Science Facility is approximately $1.11M (including the III-V MOCVD System, $400K and the Mask Aligners, $150K) and for the facility, 1.27M (Lab, $1.2M; Clean Room, 70K).

4. The Electronic Materials Science Facility estimated gross equipment weight is 20 tons (includes special environmental control equipment such as air conditioners, de-humidifiers, and toxic gas exhaust systems); equipment volume is 10,000 cubic feet; the facility occupies 11,500 square feet.

5. This facility requires emergency electrical power.

6. No special budget requirements are required for the facility.

7. Environmental control requirements for the Electronic Materials Science Facility include the following:
   a. temperature and humidity control for the clean room facility;
   b. toxic gas monitoring;
   c. 12,000 cfm vent system with 100% makeup.

8. Special hazardous materials equipment and other safety features are built into the facility, making it difficult and very expensive to relocate.

9. The Electronic Material Lab and Class 1000 Clean Room were constructed in 1980 and 1993, respectively.

10. Functional Support Areas: 11.4 and 11.5.

11. Historical utilization average for fiscal years 1989-1993 is 70%.

12. Projected utilization average per year to FY 1997 is 60-80%.

13. The approximate number of personnel used to operate the Electronic Materials Science Facility is 8.

14. The approximate number of personnel used to maintain the Electronic Materials Science Facility is 2.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Materials Research Laboratory |

1. The purpose of the Materials Research Laboratory is to conduct research and development in the electronic and magnetic properties of synthetic materials such as ceramics, polymers, and organic solids, as well as in electrochemistry and high-energy-density batteries. Materials are prepared and tested in the laboratory, characterized electrically, magnetically and structurally, and evaluated as suitable devices and components for future Navy systems.

2. The Materials Research Laboratory is moveable.

3. The replacement cost of the equipment in the Materials Research Laboratory is approximately $900K.

4. There are eight large, heavy pieces of equipment in the Materials Research Laboratory. They could be crated in sizes of approximately 140 cubic feet and they would weigh approximately two tons total.

5. There is no special utility support required for this facility other than normal electric power.

6. There are no special budget requirements for the Materials Research Laboratory.

7. The only environmental control requirement for the Materials Research Laboratory is sufficient ventilation to keep the air clear of chemical vapors. This requirement is currently met by a fume hood and a roof-mounted scrubber to treat small amounts of effluent.

8. This facility could be replicated elsewhere for the approximate cost of $900K exclusive of building, utilities, and other space-availability issues. This facility could be relocated elsewhere for the cost of crating and shipping the equipment which probably would cost less than $100K exclusive of personnel costs and buildings, utilities, and other space-availability issues at the receiving site.

9. This facility was established at the current site during FY 1984. The equipment used at that time, consisting of approximately three of the eight large pieces of equipment above along with several smaller items, was moved from another local building approximately 200 meters distant. Since then, one of the large instruments was replaced and the remaining large instruments have been acquired. Most of the new instruments were acquired since FY 1988.

10. Functional Support Areas: 11.4, 11.5, 11.6, 11.7.

11. Historical utilization average for fiscal years 1989-1993: approximately seven professional man-years, plus one part-time summer faculty, one full-time postdoctoral fellow and one student/ contractor. The utilization in terms of funding categories is approximately equally divided between Basic Research (6.1) and Exploratory Development (6.2).

12. Projected utilization per year to FY 1997 is approximately five professional man-years, plus two part-time summer faculty, two full-time postdoctoral fellows and two student/contractors. The projected utilization in terms of funding categories is 25% Basic Research (6.1) and 75% Exploratory Development (6.2).

13. There are no personnel specifically assigned to operate the facility. The scientific and engineering staff cited above operate the instruments themselves with no operator/technician assistance.

14. No personnel are specifically assigned to maintain the equipment. The scientific and engineering staff cited above maintain the instruments themselves. There are no technicians available.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Propagation Test Facility (PTF) |

1. The primary purpose of the Propagation Test Facility is to simulate typical radio, radar, and electrooptic shipboard environments from which both propagation measurements and system performance assessment studies can be made. The most important aspects of this facility are an unobstructed view of the ocean's horizon at typical shipboard heights (50 to 100 feet above sea level); the rise of Point Loma peninsula to an altitude of approximately 400 feet behind the facility, providing reduction of nearby electromagnetic transmissions from the greater San Diego metropolitan area; the concave coastline and offshore islands of Southern California that provide many options for propagation paths; the Mediterranean climate that produces frequent ducting that is typical of other militarily important areas like the eastern Mediterranean, the Arabian Gulf, and the northern Arabian Sea; the prevailing westerly wind which produces propagation conditions that are predominately representative of the open-ocean and coastal regions. The nearby Naval Station San Diego makes the fleet and the offshore exercise areas readily accessible for shipboard tests and evaluations.

2. The PTF is a fixed facility.

3. The replacement value of the PTF is approximately $500,000 not including the land which is crucial to the operation of the facility (per paragraph 1 above). Including the cost of the land, the replacement value of this facility is in excess of $1,500,000.

4. Gross weight and cubic feet are not applicable measurements to describe the PTF. It consists of a modern field laboratory (special computer flooring and special roofing to support mounting antennas and pedestals) with approximately 800 square feet of usable space and a pier structure (approximately 400 square feet of usable space) extending horizontally out over the sea and providing access to the surface of the sea.

5. The PTF does not require any special utility support other than normal electrical power.

6. Special budget requirements for the PTF consist of modern computer type flooring (removable paneled floor), computer type electrical service (proper grounding minimizing "ground loops"), and special roofing that is amenable to the placement of antennas and antenna pedestals.

7. The PTF requires temperature control. Equipment are cycled from approximately 50 to 90 degrees F for evaluation of temperature effects.

8. The PTF cannot be replicated anywhere in the world. The combination of physical siting, geographic configuration, and climatic regimes in proximity to the fleet and offshore fleet operating areas is unique. Loss of this facility would make field experiments in anomalous propagation (radio, radar, optical) more time consuming, expensive, and logistically difficult. Relocation to another site, with a reduction in functionality, is possible, but the legal aspects, considering California Coastal Commission requirements as well as other environmental considerations (Environmental Protection Agency, Sierra Club, etc.), may substantially add to the cost of relocating the PTF to another site.

9. The original foundations of the PTF were constructed in 1969. PTF laboratory spaces and test areas were completely reconditioned in 1989 at a cost of $185,000.

10. Functional Support Areas: 3.2, 3.3, 3.4, 4.1, 4.2, 5.2, 5.3, 7.3, 7.4, 7.5, 8.3, 10.5.

11. The PTF has been heavily used in the past five fiscal years (more so than in the five years preceding FY 1989). The following highlights usage by fiscal year.

1989: This fiscal year marked the start of the Low-Altitude Propagation (LAP) project. The intent of LAP was to establish a shore-based radar site to monitor detection capabilities of a "typical" X-band radar against low-flying (sea-skimmer) type targets. In addition, requests to improve the laboratory spaces in the facility were made and approved.

1990: The LAP radar, associated computer control equipment, and surface meteorological sensors were installed at the PTF site. Construction began on improving the laboratory spaces at the site.

1991: The first LAP measurements were made on 11 October 1990 after more than one year of equipment construction, installation, and testing. LAP measurements continued throughout this year. About 1/2 of the entire LAP data set was taken in FY 1991. In addition to the LAP work, a new effort began in early FY 1991; the Evaporation Ducting Communications (EDCOM) project was implemented to assess the effects of the evaporation duct on long range (twice horizon) digital communication (at T1 data rates) in support of the SHF Backbone concept. An all digital communication link between the northwest end of Camp Pendleton and the PTF was created (about an 80 km path length).

1992: LAP measurements were completed (the measurement phase extended through February 1992). This effort was a "roaring" success in that, for the first time, it was conclusively shown that the oceanic evaporation duct could significantly degrade the detection of low-altitude, sea-skimming missiles at ranges well within the normal radar horizon. EDCOM measurements and analysis continued throughout FY 1992. Late in the year, planning began for the Variability of Coastal Atmospheric Refractivity (VOCAR) project.

1993: EDCOM measurements were completed. The analysis of the data clearly indicated that the evaporation duct could support high-speed digital communications (at least at T1 rates) to ranges in excess of twice the radio horizon. The VOCAR equipment was successfully installed and began operation. In August 1993, there was an intensive VOCAR measurement campaign including participants from the Naval Air Warfare Center Weapons Division, Naval Research Laboratory, the Pennsylvania State University, the Naval Postgraduate School, San Diego State University, the Mobile Environmental Team from North Island, and several other groups. This unique data set is currently being analyzed and a number of new practical and scientific discoveries are being made.

12. Projected utilization to FY 1997 follows:

1994: The PTF is heavily utilized this FY. In addition to continuing VOCAR measurements, equipment to support the Global Positioning System (GPS) Sounder is being installed and tested. This project will develop new techniques to infer a high spatial resolution (15 m) vertical profile of atmospheric refractivity from measurements of GPS satellite signals as the satellites are rising or setting on the horizon. Also, it is likely that the Infrared Analysis Measurement and Modeling Program (IRAMMP) equipment suite will be evaluated at the PTF.

1995: High usage is expected as this should be the first year of GPS Sounder measurements. VOCAR measurements will be completed.

1996: The GPS Sounder measurement phase will be completed. It has been proposed that a moderate power X-band radar be installed at the site to evaluate its performance in the presence of both sea and land clutter.

1997: Measurements and assessment of X-band radar system performance in land and sea clutter will be made. Usage of the PTF should continue into the following FY.

13. The approximate number of personnel used to operate the PTF is 4 to 6 engineers and scientists. The number varies according to which projects are currently active.

14. The approximate number of personnel needed to maintain the PTF equipment is 2 to 4 engineers and technicians.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Lightweight Array Development Laboratory |

1. The Lightweight Array Development Laboratory is used for the design, development, construction, and testing of lightweight, low-power, easily deployable ocean surveillance sensors and arrays. Such arrays are ideal for deployment under adverse circumstances, such as a forward (including Arctic, where a current deployment is taking place) or for covert deployment. The techniques used can also lower the cost of an ocean surveillance array substantially. The lightweight low-power arrays consist of a combination of hydrophone sensors for acoustic detection, array element localization (AEL) subsystems, engineering sensors (current meters, etc.), processing and supporting electronics, and onboard battery power. A 600 meter 30 element vertical acoustic array produced using this technology weighs approximately 90 pounds. This laboratory is the world leader in its technology.

2. The Lightweight Array Development Laboratory contains some small portable items; larger items are movable with specialized equipment. The laboratory facilities consist of a 240 sq ft electronics laboratory, 480 sq ft clean room with airlock, 288 sq ft acoustic/electronics test area, 2,100 sq ft array construction area, 3 chemical hoods, 3 processing ovens (24 cu ft each), 1 plastic injection molder, 2 environmental test chambers (36 cu ft each), a water-current simulation test tank (250 cu ft), 1 industrial sewing machine, extensive mechanical and metalworking shop equipment and supplies (such as drill presses, saws, riveters, etc.), extensive electronic design and test equipment and supplies (spectrum analyzers, digital oscilloscopes, logic analyzers, etc.), extensive workbenches, counter and storage space, sinks, water test tanks, and many other miscellaneous items used in surveillance array development.

3. The replacement cost of the equipment in the Lightweight Array Development Laboratory is approximately $500K. Building or installing equivalent laboratory fixtures in a different locale would cost at least another $200-400K.

4. The equipment in the Lightweight Array Development Laboratory weighs approximately 10-20 tons. The laboratory occupies approximately 3,100 square feet.

5. The Lightweight Array Development Laboratory requires a compressed air hookup, 220 V electrical power, and water hookups in addition to normal electric power.

6. There are no special budget requirements for the Lightweight Array Development Laboratory.

7. The Lightweight Array Development Laboratory requires a temperature-controlled environment.

8. The Lightweight Array Development Laboratory could be moved to another site. The impact to the Navy if this facility ceased to exist would be that the world-leading laboratory for developing lightweight low-power ocean surveillance array technology would no longer be available, resulting in a significant loss of expertise, corporate knowledge, and proven techniques in this area of Navy interest. We are not aware of any other facility, Government or private, developing these types of arrays.

9. The Lightweight Array Development Laboratory has been built up and added to incrementally over the last five years. Heavy equipment was transferred by jacks and forklift from the adjoining shipping dock.

10. Functional Support Area: 5.5.

11. Historical utilization average for fiscal years 1989-1993: the laboratory has been used continuously for the past five years; it has had no idle periods.

12. The Lightweight Array Development Laboratory is projected to be used continuously through FY 1997 and beyond.

13. The approximate number of personnel used to operate the Lightweight Array Development Laboratory is nine (2 senior engineers, 1 technician, 2 contractors, and 4 engineering college work/study program students).

14. The approximate number of personnel required to maintain the Lightweight Array Development Laboratory equipment is 2.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | SUN-Network Acoustic Data Processing (SNAC-DP) Facility |

1. The SUN-Network Acoustic Data Processing (SNAC-DP) Facility is used for processing data from ocean acoustic experiments; ocean surveillance signal processing algorithm development, test and application; acoustic surveillance model development, test, and application; and data and model visualization. The facility is a state-of-the-art ocean acoustic surveillance computational tool consisting of a computer network of SUN servers and workstations with broadband network access to several types of supercomputers (CRAY, PARAGON, NCube, etc.) which are not part of the facility itself. Specific SNAC-DP components include 2 SUN multiprocessor servers, 20 SUN workstations, an integrated array processing facility, an uninterruptable power supply (UPS) with multiferric technology, 4 network connected Exabyte tape units and several off-line Exabyte tape units, 25 disks, 10 printers including a Kodak continuous-tone color printer and 2 thermal wax transfer color printers, a color scanner, six 80486-based PCs, 2 MacIntosh computers, a wideband Ethernet bridge to the Internet, connecting ethernet cabling, and supporting supplies, software, and contracts.

2. Some computers of the SNAC-DP Facility are portable, others are movable.

3. The estimated replacement cost of the SNAC-DP Facility equipment is $500K.

4. The total weight of the SNAC-DP Facility equipment is about 3,000 pounds and occupies about 1,000 square feet of space.

5. Special utility support required for this facility includes 208 V single-phase 60 amp power service.

6. There are no special budget requirements for the SNAC-DP Facility .

7. The only environmental control requirement for the SNAC-DP Facility is air conditioning for the computer equipment.

8. The SNAC-DP Facility equipment could be relocated to another site. If the facility were lost, the impact to the Navy would be the loss of substantial capability for analyzing ocean acoustic data and for signal processing development and application. Data from experiments currently analyzed using this system could not be processed and signal processing applications being developed on the facility would require an equivalent or better facility.

9. The SNAC-DP Facility has been built up incrementally as increasingly advanced computer

technology made possible new model development, signal processing techniques, and extensive data analysis that would be impossible without such a facility. The first elements of the network and processors were purchased in 1986. Individual computers and system components are continually updated to the most current technology on an ongoing basis. Transportation of equipment has been by commercial freight.

10. Functional Support Area: 5.5.

11. Historical utilization average for fiscal years 1989-1993: 15 man-years/FY (scientists, engineers and contractors).

12. The projected utilization per year to FY 1997 is the same as the historical utilization in 11 above.

13. Approximately 20 scientists and engineers use the SNAC-DP Facility during any given week.

14. One system administrator is responsible for all maintenance, system upgrade, system-level software, etc.; various maintenance contracts with hardware and software suppliers are also in effect to provide maintenance.

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Ocean Sediments Laboratory (OSL) |

1. The Ocean Sediments Laboratory (OSL) measures physical and acoustic properties of ocean sediments retrieved via coring or other techniques. It accurately determines the parameters for use in ocean propagation and surveillance prediction models to enable the successful detection of targets of interest. Such detection requires knowledge of the acoustic properties of the ocean bottom, particularly in shallow water surveillance, because these properties strongly influence the propagation of bottom-interacting sound. The OSL measures sediment sound speed, density, porosity and grain size distribution; lack of knowledge of these properties frequently results in incorrect predictions and missed detections. The OSL includes a custom-designed work area (325 sq ft) and a measurement and recording apparatus which measures the sediment properties listed above.

2. The Ocean Sediments Laboratory is movable; disassembly and reassembly would be required.

3. The replacement cost of the OSL measuring and recording equipment is approximately $20K; the cost for building supporting structures and equipment enclosures, connecting utilities, etc., is estimated to be about $65K.

4. The OSL equipment is estimated to weigh about 1,000 pounds and has a volume of about 2,000 cubic feet.

5. The OSL requires natural gas, compressed air, vacuum and de-ionized water hookups in addition to normal electric power.

6. There are no special budget requirements for the OSL.

7. There are no special environmental control requirements for the OSL.

8. This facility could be relocated. Closing this facility would probably result in the loss of the Navy's only sediment research laboratory. Commercial activities exist which measure grain size density and porosity, but none are known to measure acoustic properties. NRL-Stennis used to have a similar facility, but knowledgeable NCCOSC RDTE DIV SAN DIEGO CA personnel have not seen reports from there recently on the type of work done in the OSL. NAVOCEACNO has a sediment lab, but it is geared toward production rather than research. With the shift in Navy emphasis to littoral and shallow water operations, areas where acoustic bottom interaction and knowledge of ocean sediment acoustic properties can be critical to successful ocean surveillance, loss of the OSL facility could seriously degrade the Navy's capability to research, analyze and develop accurate detection models for these areas.

9. The OSL facility was constructed in 1974 by removing partition walls separating four offices. Cabinets, counters, a sink and vacuum, natural gas and compressed air plumbing were custom designed, constructed and installed. The equipment was transported by moving van from a nearby building. Other equipment has been purchased and installed since then.

10. Functional Support Area: 5.5.

11. Historical utilization average for fiscal years 1989-1993: one-third time for 1 person/FY.

12. Projected utilization per year to FY 1997: one-quarter time for 1 person/FY.

13. The approximate number of personnel used to operate the OSL is 1.

14. The approximate number of personnel used to maintain the OSL is 1.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Microelectronics Computer Aided Design (CAD) Facility |

1. The Microelectronics Computer Aided Design (CAD) Facility is used for integrated circuit design to support research, design, test and evaluation for Space and naval Warfare Systems Command (SPAWAR) and Trident program activities. Tasks include full custom, semi-custom and digital system and sub-system development.

2. The Microelectronics CAD Facility equipment is moveable; the facility itself has TEMPEST shielding and is fixed.

3. The replacement cost of the equipment in the Microelectronics Computer Aided Design (CAD) Facility is approximately $1.333M (CAD software, $1.06M; computer hardware, $273K). The replacement cost of the TEMPEST shielded room with environmental control and conditioned power supply is $1.9M.

4. The Microelectronics CAD Facility equipment gross weight is 4,000 pounds and has about 600 cubic feet; the facility occupies 4,580 square feet

5. There is no special utility support required for this facility other than normal electric power.

6. The Microelectronics CAD Facility requires a TEMPEST shielded enclosure with conditioned and uninterruptable power.

7. The only environmental control requirement for the Microelectronics CAD Facility is sufficient ventilation (i.e., fume hoods) to keep the air clear of chemical vapors.

8. This facility could be replicated elsewhere and the equipment could be relocated. The cost for replication would exceed the initial cost of $1.9M. The facility is a secure, fully TEMPEST shielded integrated circuit design and simulation laboratory with an ensemble of equipments; the shielding is integrated into the building and is not relocatable.

9. The TEMPEST shielding for the Microelectronics CAD Facility was integrated on site at the time of original construction in 1986. The equipment was purchased and installed beginning in 1987.

10. Functional Support Areas: 7.2, 9.1, 11.4, 11.8.

11. Historical utilization average for fiscal years 1989-1993 (based on 40 hour/week average per workstation equals 100% utilization):

| | |
|---|---|
| 1989 | 50% |
| 1990 | 50% |
| 1991 | 60% |
| 1992 | 65% |
| 1993 | 70%. |

12. Projected utilization per year to FY 1997:

| | |
|---|---|
| 1994 | 80% |
| 1995 | 80% |
| 1996 | 80% |
| 1997 | 80%. |

13. The approximate number of personnel used to operate the Microelectronics CAD Lab equipment is 7.

14. The approximate number of personnel used to maintain the Microelectronics CAD Lab equipment is 2.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Radiometric Measurements Facility |

1. The purpose of the Radiometric Measurements Facility is the characterization of high-sensitivity photon detectors.

2. The Radiometric Measurements Facility equipment is moveable.

3. The replacement cost of the equipment in the Materials Research Laboratory is approximately $1.0M.

4. The gross weight of the Radiometric Measurements Facility equipment is 1,500 pounds and the volume is 1,000 cubic feet; the area of the facility is 750 square feet.

5. There is no special utility support required for this facility other than normal electric power.

6. There are no special budget requirements for the Materials Research Laboratory.

7. The environmental control requirements for the Radiometric Measurements Facility are controlled temperature and humidity and a special room with no light leaks, low reflectivity surfaces, non-fluorescent lighting, high-voltage and signal bulkhead feedthroughs.

8. Replication of this facility would be difficult, especially to duplicate the existing conditions noted in 7 above.

9. This facility was constructed on site.

10. Functional Support Areas: 5.5, 7.3, 11.3, 11.4, 11.5.

11. Historical utilization average for fiscal years 1989-1993: approximately 25% of available work hours for each FY.

12. The projected utilization in terms of manpower per year to FY 1997 is approximately 10% of available work hours per FY.

13. The approximate number of personnel used to operate the Radiometric Measurements Facility is 1.

14. The approximate number of personnel used to maintain the Radiometric Measurements Facility is 1.

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Optoelectronic Device Characterization Facility |

1. The purpose of the Optoelectronic Device Characterization Facility is to characterize photonic components to frequencies of 50 GHz.

2. The Optoelectronic Device Characterization Facility is moveable.

3. The replacement cost of the equipment in the Optoelectronic Device Characterization Facility is approximately $750K.

4. The Optoelectronic Device Characterization Facility equipment has a gross weight of 5 tons and volume of 5,000 cubic feet; it occupies an area of 3,750 square feet.

5. There is no special utility support required for this facility other than normal electric power.

6. There are no special budget requirements for the Materials Research Laboratory.

7. The only environmental control requirement for the Materials Research Laboratory is a stable temperature.

8. This facility could be replicated elsewhere and would not be difficult to relocate. The impact on the Navy if the facility were lost would be moderate.

9. The Optoelectronic Device Characterization Facility subsystems and equipment have been acquired over a twenty year period.

10. Functional Support Areas: 5.2, 5.5, 7.3, 11.3, 11.4, 11.5.

11. Historical utilization average for fiscal years 1989-1993: 100% (defined in terms of percentage of work days for which all or part of the facility is in use during a substantial portion of the work day).

12. The projected utilization per year out to FY 1997 is 100% (as defined in 11 above).

13. The approximate number of personnel used to operate this facility is 3.

14. The approximate number of personnel used to maintain this facility is less than 1.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Infrared Focal Plane Array Test Facility |

1. The purpose of the Infrared Focal Plane Array Test Facility is to test and evaluate infrared focal plane components in clear and simulated radiation environments.

2. The Infrared Focal Plane Array Test Facility is moveable.

3. The replacement cost of the equipment in the Infrared Focal Plane Array Test Facility is approximately $2.4M.

4. The Infrared Focal Plane Array Test Facility equipment has a gross weight of 7.5 tons and volume of 11,000 cubic feet; the facility occupies 3,000 square feet.

5. There is no special utility support required for this facility other than normal electric power.

6. The Infrared Focal Plane Array Test Facility requires EMI shielding and shielding for radiation sources.

7. The Infrared Focal Plane Array Test Facility requires controlled temperature and humidity.

8. This facility could be moved; however, delicate equipment may require extensive re-alignment and calibration. If this facility were lost to the Navy, unique capabilities would be lost that would affect strategic infrared sensor development.

9. Infrared Focal Plane Array Test Facility equipment has been acquired over a twenty year period.

10. Functional Support Areas: 5.4, 8.1, 9.2, 11.4, 11.5.

11. Historical utilization average for fiscal years 1989-1993: 30 hours per week by one or more persons.

12. Projected utilization to FY 1997: 30 hours per week by one or more persons.

13. The average number of personnel used to operate the Infrared Focal Plane Array Test Facility is 6.

14. The average number of personnel used to operate the Infrared Focal Plane Array Test Facility is 2.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Long Wavelength Infrared (LWIR) Filters and Materials Evaluation Laboratory |

1. The purpose of the Long Wavelength Infrared Filters and Materials Evaluation Lab is to test and evaluate LWIR filters and materials.

2. The LWIR Filters and Materials Evaluation Lab equipment is moveable.

3. The replacement cost of the lab test equipment (spectrometers and DeWars) is approximately $800K.

4. The gross weight and volume of the lab test equipment are 1.5 tons and 2,000 cubic feet; the lab occupies 1,250 square feet.

5. Special utility support required for this facility other than normal electric power includes electrical isolation, fume exhaust, and water/drainage.

6. There are no special budget requirements for the Materials Research Laboratory.

7. The only environmental control requirements for the LWIR Filters and Materials Evaluation Lab are temperature and humidity control (both are essential).

8. LWIR Filters and Materials Evaluation Lab equipment is unique in the nation. Replication or relocation of the facility would require suspension of current work for approximately three years. Being a tri-service facility, the impact of loss would be felt across the board, including Army, Air Force and NASA programs.

9. Equipment for the LWIR Filters and Materials Evaluation Lab was last transported in 1974. Additional construction has occurred sporadically over the last twenty years under a wide variety of Navy, Army and Air Force programs.

10. Functional Support Areas: 5.4, 8.1, 9.2, 11.4, 11.5.

11. Historical utilization average for fiscal years 1989-1993: equipment has been utilized at a 100% facility time use rate from 1989 through 1993, where facility time use reflects time throughout the fiscal year equipment is not dismantled for normal maintenance; test personnel have been fully project funded during this period.

12. Projected utilization per year to FY 1997: test personnel are expected to be fully project funded through FY 1997; equipment is expected to be utilized at a 100% facility time use rate over this period.

13. The average number of personnel used to operate the LWIR Filters and Materials Evaluation Lab is 1 to 2 scientists.

14. The average number of personnel used to maintain the LWIR Filters and Materials Evaluation Lab is 1 (in addition to personnel in 13 above).

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Electronic Packaging Facility |

1. The purpose of the Electronic Packaging Facility is the packaging of electronic devices and testing these devices to military specifications. Packaging includes die separation, die bonding, wire bonding, and sealing devices in a hermetic enclosure. Testing includes device burn-in, leak testing, temperature cycling, and particle impact noise detection.

2. The Electronic Packaging Facility is moveable; however, moving this equipment would require the new site to have 18 Mega ohm deionized water, appropriate plumbing for gasses, house vacuum for backing pumps, fume hoods for chemical work, etc..

3. The replacement cost of the Electronic Packaging Facility follows:

| | |
|---|---|
| a. packaging equipment | $0.57M |
| b. thin film processing equipment | $1.40M |
| c. special facilities | 0.24M |
| Total | $2.21M |

4. The Electronic Packaging Facility equipment has a gross weight of 20 tons, volume of 6,400 cubic feet; it occupies 2,400 square feet.

5. Special utility support required for this facility other than normal electric power includes air conditioning, fume hood facilities, deionized water, gas delivery system, and house vacuum..

6. The Electronic Packaging Facility requires fume hood facilities (mechanical) and chase areas for deionized water, gas delivery, waste recovery, etc.

7. The only environmental control requirement for the Materials Research Laboratory is temperature control.

8. This facility would not be difficult or impossible to replicate or relocate; however, the cost of replicating this packaging facility in existing floor space occupied by the Government would be in excess of $2.3M.

9. This facility was accepted as complete in 1987. Packaging equipment was purchased and transported to the facility by various means over the last 20 years. Thin film processing equipment

was purchased in 1988 by the Strategic Systems Program Office and currently resides at Hughes Electronics, Carlsbad, CA. It is due to be shipped to the Electronic Packaging Facility by Air Cushioned Van from June to September 1994.

10. Functional Support Areas: 9.1, 11.4, 11.5.

11. Historical utilization average for fiscal years 1989-1993 (based on historical billable time average, down time and maintenance from machine log books):

| | |
|---|---|
| billable time | 40% |
| down time | 10% |
| maintenance | 25% |
| Total | 75% |

12. Projected utilization per year to FY 1997: 85% (based on historical basis, increased capability, new business development planned).

13. The average number of personnel used to operate the Electronic Packaging Facility is three (1 engineer and 2 technicians full time).

14. The average number of personnel used to maintain the Electronic Packaging Facility is 1 technician full time.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Microelectronics Lab |

1. The purpose of the Microelectronics Lab is to provide expertise in the research and exploratory development of microelectronics in support of the C3I, Navy fleet systems, and Ocean Surveillance missions.

2. The Microelectronics Lab is a fixed facility.

3. The replacement cost of the equipment in the Microelectronics Lab is $17.3M and for the facility, $26.5M. Microelectronics Lab equipment with an individual estimated replacement value of over $500,000 follows:

| | |
|---|---|
| a. Gemini II Epitaxial Reactor | $1,024,000 |
| b. Eaton Ion Implanter | 754,000 |
| c. GCA XLS I-Line Stepper | 2,592,000 |
| d. Perkin Elmer Aligner | 720,000 |
| e. Bruce Furnaces, Four Banks | 3,840,000 |
| f. Varian Metalization System | 720,000 |
| g. Drytek Metal Etcher | 684,000 |
| h. Poly Etcher 5000 | 800,000 |
| i. 1513 Oxide Etcher | 654,000 |
| j. Electron Microscope | 585,000 |
| k. Credence VLSI Tester | 2,250,000 |
| l. Sentry VII Tester | 800,000 |

4. The Microelectronics Lab equipment gross weight is 34 tons and has about 22,505 cubic feet; the facility occupies 9,411 square feet.

5. The Microelectronics Lab requires Class 10 and Class 100 Clean Room conditions with monitoring capabilities, vibration free building foundation, cryogenic storage and handling equipment, temperature and humidity control in addition to normal electric power.

6. The Microelectronics Lab requires a vibration free building to support the photolithographic, quality control, diagnostic and test equipment. Laminar flow ceilings and work stations with HEPA filters are required for particulate control.

7. Environmental control requirement for the Microelectronics Lab include the following:

a. temperature must be controlled at 20 degrees C +/- 2 degrees;
b. humidity must be controlled at 45% +/- 5%;
c. five air scrubbers are required for the gas handling, wet chemical etching, dry plasma etching and deposition systems.

8. This facility and equipment would be extremely difficult or impossible to replicate or relocate to another site. Loss of this facility would result in loss to the Department of the Navy of fabrication and testing capabilities of special microelectronics devices now supplied in support of C3I, Navy Fleet Systems, and Ocean Surveillance. In addition, four CRADA contracts now in effect with private industry would be lost. Vendor funding totals $65K. Sponsorship for the CRADA with Conductus totals $270K for NCCOSC RDTE DIV SAN DIEGO CA, $200K for Conductus (from the same sponsor).

9. The present facility/equipment was transported by land vehicle and installed by PWC and laboratory personnel during the period FY 1981 to present.

10. Functional Support Areas: 1.2, 2.2, 6.2, 6.4, 11.4, 11.5.

11. Historical utilization average for fiscal years 1989-1993:

a. wafer fabrication and quality control: 67%
b. diagnostics: 63%
c. electrical test: 23%

12. Projected utilization per year to FY 1997 is the same as 11 above.

13. The average number of personnel used to operate the Microelectronics Lab is 24.

14. The average number of personnel used to maintain the Microelectronics Lab is 9.

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Waterside Security System (WSS) San Diego Installation |

1. The purpose of the Waterside Security System (WSS) San Diego Installation is to serve as an In-Service Engineering Activity (ISEA) and Software Support Activity (SSA).

2. The WSS equipment is moveable.

3. The replacement cost for the WSS equipment is $2.7M.

4. The WSS consists of two 8'x8'x40' containers with enclosed electronic equipment and system sensors and their electronic enclosures mounted in the near vicinity.

Gross weight: 34,432 lbs
Gross size: 11,730 cu ft

5. There is no special utility support required for this facility other than normal electric power.

6. The system is mounted at the facility being secured. Foundations (pads) for the two vans at the site are required.

7. The WSS equipment requires temperature control, heating, and air conditioning, which are a part of the system.

8. The WSS equipment is not duplicated in any other Government or commercial facility. NCCOSC RDTE DIV SAN DIEGO CA Code 532 would be unable to perform its ISEA and SSA functions if the equipment were lost. If relocated to another site, the ISEA and SSA would be unable to perform their duties during the relocation process.

9. This facility was delivered by flatbed truck in August 1993.

10. Functional Support Areas: 5.1, 5.2, 5.3.

11. Historical utilization average for fiscal years 1989-1993: 45% (defined as the percentage of the fiscal year in which all or parts of the WSS Installation were in use; this utilization figure is based on experience at NAVSUBASE Bangor, WA where the equipment was installed until being moved to San Diego in FY 1993).

12. Projected utilization per year to FY 1997: 50%.

13. The approximate number of personnel required to maintain the WSS equipment is 1.

14. The approximate number of personnel required to maintain the WSS equipment is 1 (1 man-year of effort required with much of that time spent "on call" so it can be performed as a collateral duty).

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Indoor Robotics Development/Test Facility |

1. The purpose of the Indoor Robotics Development/Test Facility is to conduct on-going development, test, and evaluation of indoor automated systems, including C4 software/hardware architectures.

2. The Indoor Robotics Development/Test Facility is fixed.

3. The replacement cost of the equipment in the Indoor Robotics Development/Test Facility is approximately $250K.

4. The size of the facility is approximately 27,000 cubic feet.

5. Special utility support required for this facility other than normal electric power includes General Communications Backbone (GCB) and Ethernet Local Area Network (LAN) hook-ups.

6. There are no special budget requirements for the Indoor Robotics Development/Test Facility.

7. The Indoor Robotics Development/Test Facility requires air conditioning and heating to maintain temperature and humidity standards for operational computer equipment.

8. This facility would be extremely difficult to relocate and/or replicate due to considerable internal modifications made in support of robotics navigation and control research and development efforts. Software models, requiring several man-years to perfect, have been made of this particular facility; relocation would require either an exact duplicate facility which is potentially prohibitive in cost, or duplication of the modeling effort which is again not fiscally feasible. Loss of the facility to the Navy would cause termination of Navy R&D programs (i.e., Mobile Detection Assessment Response System) associated with the facility's use.

9. The Indoor Robotics Development/Test Facility was erected before 1983 using Center (major) construction funds.

10. Functional Support Areas: 1.5, 5.1, 5.3, 5.4, 6.5, 7.4, 7.6, 10.9, 11.1, 11.2, 11.3, 11.4, 11.9.

11. Historical utilization average for fiscal years 1989-1993: 100% occupied/utilized (occupancy used as unit of measure, i.e., personnel per available lab space).

12. Projected utilization per year to FY 1997: 100% occupied/utilized.

13. The approximate number of personnel required to operate this facility is 0.

14. The approximate number of personnel required to maintain this facility is 0.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | San Clemente Island Sea Test Facility |

1. The San Clemente Island Sea Test Facility provides a secure test facility for long term under sea environmental testing.

2. The San Clemente Island Sea Test Facility is fixed and includes a pier and underwater installations.

3. The replacement value of the San Clemente Island Sea Test Facility including equipment, buildings, pier, etc., is approximately $4-5M.

4. The gross weight and volume of the San Clemente Island Sea Test Facility are not appropriate measures.

5. The San Clemente Island Sea Test Facility does not require any special utility support other than normal electrical power.

6. The San Clemente Island Sea Test Facility requires the pier and underwater installations to be functional.

7. The San Clemente Island Sea Test Facility requires temperature control.

8. The San Clemente Island Sea Test Facility is located on a Navy-controlled island and is in a geographic position that allows large scale underwater installations and access to a channel where deeper water is available. Due to the long term test installations, the work cannot be moved.

9. The San Clemente Island Sea Test Facility has been operational since the early 1970's.

10. Functional Support Area: 10.4

11. Historical utilization for fiscal years 1989-1993: the underwater sensors are continuously operational; a site manager (one person) is on site 40 hrs/week for one week; the facility is used one week per month for project support, system checkout and maintenance with 5-6 people on site; during a test operation up to 20 people are on site for 40 hours/week fro one week; there have been an average of 10 test operations per year for the past 5 years.

12. Projected utilization to FY 1997: same as 11 above with an increase in the number of test operations to 16 to 20 per year.

13. The approximate number of personnel used to operate the San Clemente Island Sea Test Facility is one site manager full time, 5 to 6 project personnel 1/4 time and up to 20 personnel when testing is in progress.

14. The approximate number of personnel needed to maintain the San Clemente Island Sea Test Facility is 2.

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Marine Environmental Survey Capability (MESC) |

1. The Marine Environmental Survey Capability (MESC) provides the Navy with a capability to measure multiple environmental parameters in real-time incorporating a data processing/ management system which allows near-real time mapping of significant environmental parameters; currently housed on the 40 foot custom built research vessel R/V ECOS in San Diego Bay.

2. The MESC components are portable and moveable.

3. The replacement value of the MESC equipment is $1.5M.

4. The gross weight and volume of the MESC equipment is 5,000 pounds and 2,500 cubic feet.

5. The MESC equipment does not require any special utility support other than normal electrical power when tied up pierside. The system provides its own power when underway.

6. Special budget requirements for this capability include maintenance of an all aluminum hull, silicone-based IPC's "INTERSLEEK" antifouling paint, and special equipment maintenance ($15K/year).

7. There are no special environmental control requirements..

8. The MESC equipment would be difficult but possible to replicate.

9. The MESC was initially available in 1975, has been refined and optimized during the last 15 years, and was incorporated in R/V ECOS in 1987.

10. Functional Support Area: 10.5 (and more specifically it is used in the Navy's Environmental Quality Program).

11. Historical utilization average for fiscal years 1989-1993: $2.5M for 3 work-years/FY.

12. Projected utilization to FY 1997: $1.5M for 3 work-years/FY.

13. The approximate number of personnel used to operate the MESC is 5.

14. The approximate number of personnel needed to maintain the MESC equipment is 3.

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Site Characterization and Analysis Penetrometer System (SCAPS) |

1. The Site Characterization and Analysis Penetrometer System (SCAPS) provides the Navy with a capability to detect and measure petroleum, oil and lubricant (POL) contaminants in the soil at hazardous waste sites with a mobile, real-time, in-situ laser/fiber optic/computer-based system. Plume definition and mapping before remediation and verification of cleanup after remediation are accomplished. State-of-the-art optical, data processing and computer equipment is installed on board a 20-ton all wheel drive cone penetrometer vehicle.

2. The various hardware components in SCAPS are portable and moveable.

3. The replacement value of SCAPS is approximately $1M.

4. The gross weight and volume of the SCAPS equipment are 56,000 pounds and 4,000 cubic feet.

5. The SCAPS equipment does not require any special utility support other than normal electrical power when parked at the loading dock. The SCAPS system provides its own power at operational sites.

6. The SCAPS has the following special budget requirements:

a. one utility cargo vehicle (20,000 pounds gross/3,000 cubic feet),
b. one 4X4, 1-ton crew cab truck with lift gate,
c. one maintenance facility (currently NCCOSC RDTE DIV SAN DIEGO CA Bldg 67, approximately 4,000 square feet),
d. one probe fabrication facility (currently NCCOSC RDTE DIV SAN DIEGO CA Bldg 147, approximately 4,000 square feet).

7. SCAPS has no special environmental control requirements.

8. SCAPS can be replicated with modest effort; however, the impact if lost to the Navy is enormous in terms of additional costs and scheduling for environmental cleanup.

9. SCAPS was researched, developed and constructed at NCCOSC RDTE DIV SAN DIEGO CA starting in 1990 and completed in 1993.

10. Functional Support Area: 10.5 (more specifically SCAPS is used in Navy and Tri-Service (Army, Air force, Navy) Environmental Security program).

11. Historical utilization for fiscal years 1989-1993: only one year's experience since development of the system is available; SCAPS was used at 10 hazardous waste sites in its first year of operation at a total cost of $3.0M.

12. Projected utilization to FY 1997: 12 hazardous waste sites/FY, $1.5M/FY (the reduced cost reflects efficiency with experience).

13. The approximate number of personnel used to operate the SCAPS is 5.

14. The approximate number of personnel needed to maintain the SCAPS equipment is 4.

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Signals Warfare Integrated Facilities Testbed (SWIFT) |

1. The Signals Warfare Integrated Facilities Testbed (SWIFT) supports the full spectrum of development and simulation efforts associated with Signals Intelligence (SIGINT) systems research, development, test and evaluation, and integration in a multi-system, Sensitive Compartmented Information (SCI) environment. This facility supports a number of advanced ashore and afloat based SIGINT systems for electromagnetic signal search, acquisition and exploitation as well as emitter identification, multiple source correlation and reporting of processed collected data for missions requiring intelligence support. Connectivity to major operational sites and DoD activities is maintained through DECNET, PLATFORM, TACINTEL, STREAMLINER, Special Project Office ATM (in process), and STU-III (SCI level) communications. Sensor systems located on the building provide HF, UHF, VHF and HFDF (in process) capability to support ashore and afloat SIGINT system developments.

2. The SWIFT is a fixed facility which hosts a number of development systems that are moveable.

3. Replacement value for the SCIF is unknown. Costs would be associated with 10,000 square feet of TEMPEST shielded space with the special utility requirements listed in 5, 6, 7 below. The systems hosted within SWIFT would be approximately $28M (excluding SEWSIM, submitted separately in this Tab):

| | |
|---|---|
| a. OUTBOARD: | $6.0M |
| b. Combat DF: | 15.0M (in process) |
| c. SIM/STIM: | 0.5M (in process) |
| d. CERCIS: | 1.0M |
| e. FATB: | 0.5M |
| f. SSEE Phase 2: | 1.0M |
| g. SPO: | 1.0M |
| h. SCORE/SURF: | 0.5M |
| i. BGPHES-ST: | 1.0M (in process) |
| j. LAN's: | 0.5M |
| k. Various W/S: | 1.0M. |

4. The SWIFT occupies 10,000 square feet of laboratory space at the SCI level, with three adjacent laboratories occupying 1160, 1160 and 600 square feet at the GENSER SECRET level.

5. Special utility support includes:

a. Secure fiber-optic links to other NCCOSC RDTE DIV SAN DIEGO CA facilities up to and including the SCI level.

b. External connectivity to HF, UHF, VHF and HFDF (in process) sensors on NCCOSC RDTE DIV SAN DIEGO CA building 605.

c. Communications connectivity to operational sites, and other DoD activities (PLATFORM, STREAMLINER, DECNET, Special Project Office ATM, TACINTEL, STU-III) at the SCI level.

d. Communication line filters on selected connectivity into the SWIFT.

e. Separate compartmented and accessed spaces within the SWIFT controlled by RUSCO access and ciphers.

f. Administrative support to control all magnetic media, ADP, and documentation that enters or exits the facility.

g. RF shielding on all air filtration systems in support of the SWIFT.

h. Vibration and other physical security sensors located throughout the laboratory space.

6. Special budget requirements include the SWIFT being totally RF shielded to meet TEMPEST requirements. In addition, extensive direct communications connectivity to operational sites and other DoD activities at the SCI level (see 1 and 5 above) and other applicable physical security measures are required.

7. The SWIFT requires maintaining temperature control between 65 and 80 degrees F and humidity between 40 and 60 percent.

8. This facility would be very difficult to replicate or relocate at another site for the following reasons:

a. Extensive communications connectivity worldwide at the SCI level in direct support of on-going programs require up to four years of up front planning and implementation time to be successful.

b. Natural RFI shielding of the facility from RF emanations from the San Diego metropolitan area results from the placement of the facility on the western slope of Point Loma facing the ocean. This shielding is separate from the SWIFT laboratory TEMPEST shielding built

into the facility. Placement on Point Loma allows sensors on the building (see 5 above) to operate without appreciable interference.

c. Extensive direct connectivity to C3I systems for use by afloat and ashore commands in the adjacent building (600) provides the critical interface with Navy Tactical Commander support systems (JMCIS, etc.) and those capabilities under development within SWIFT. Daily interaction among SWIFT personnel and those engaged in related work, both electronically and in person, are critical to the success of on-going SWIFT hosted development efforts.

d. Direct access to Fleet personnel on a daily basis (when needed) from NSGD-Imperial Beach and local type commands (SURFPAC, AIRPAC) not only provide augmentation of efforts but the necessary operational insights on a quick reaction basis to ensure success of time critical functions performed within SWIFT. Other commands interfaced with on an ad hoc basis include Fleet Intelligence Training Center, Pacific (FITCPAC) and the Marine Corps Base, Camp Pendleton - both in close proximity to NCCOSC RDTE DIV SAN DIEGO CA.

Impact on the Navy would be significant if this facility were relocated due to the affect on SIGINT programs soon to enter Fleet usage. The unique combination of facilities, connectivity, and associated C3I programs as well as operational commands make this facility unique to fulfilling the Navy's SIGINT mission. Other facilities are not available to accommodate this capability for the reasons cited above. Contractor facilities are out of the question due to the sensitive nature of the work, and the number of no contractor access programs that are accommodated.

9. The facility was constructed as a result of MILCON action and completed in 1982. Separate systems have been moved in and out of the facility in support of ongoing program efforts since that time.

10. Functional Support Areas: 5.3, 5.5, and 8.2.

11. Historical utilization average for fiscal years 1989-1993: approximately $7M to $11M in project funding has been accomplished within this facility with minimal contractor involvement. Approximately 45 government personnel have daily access to the facility to accomplish work associated with ongoing programs.

12. Projected utilization to FY 1997: the amount of program effort to be supported is expected to increase to about $10M to $15M in funding level with a commensurate increase in government personnel to about 55 and augmented by 10 to 15 contractor personnel.

13. The approximate number of personnel used to operate the SWIFT is 20 to 35 (personnel who access systems within the SWIFT directly on a day to day basis. Other personnel accomplish analysis and related efforts associated with the specifics of each program.

14. The approximate number of personnel used to maintain the SWIFT is 2 to 4 (once full installation and checkouts have been accomplished for newly installed equipment.

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Surveillance Test and Integration Center (STIC) |

1. STIC is a secure, environmentally controlled computer laboratory comprised within three interconnected working spaces, totaling approximately 24,000 square feet. STIC provides the facilities and resources to support research, development, integration, test, and life-cycle support of undersea surveillance subsystems. STIC is also used to support evaluation of Undersea Warfare concepts, Over the Horizon Radar, display technology, algorithms, systems analysis and technology insertion demonstrations for the Navy, Contractors, and other agencies.

2. STIC is a fixed facility although equipment contained with in STIC could be disassembled and rebuilt. STIC has a minimum of one each surveillance system hardware and simulators which are interconnected so as to provide full integration for any user. There are over 300 instrument racks, 4 VAX systems, 10 large display consoles, 200 computer monitors or terminals interconnected by FDDI, ethernet, hard wire, or high speed data switches.

3. The equipment within STIC is estimated to cost over $32 million. The physical plant and connections would cost over $8 million; therefore, the dollar value of replacing STIC is estimated to be $40,000,00.

4. The equipment within the 24,00 square foot STIC facility is estimated at 30 tons.

5. In addition to normal electrical power, STIC utilizes 3 Electric Motor Generators totaling 1500 KVA, to supply stable electric power to the equipment. Fleet Surveillance Equipment also requires that STIC has 400 cycle power.

6. The STIC facility is an open storage facility for classified material which requires additional security measures and modification of the spaces. Two of the labs are housed within an EMF shielded vault with special entrance doors. The STIC also has a Sensitive Compartmented Information Facility (SCIF). The communications through the vault spaces must be filtered or enclosed within an accredited protected distribution system.

7. The STIC lab spaces have 22 adjustable air handlers which control both temperature and humidity within the labs. Sound dampening panels, tiles, coverings, etc. are utilized to lower the equipment noise thus providing acceptable working spaces for the users.

8. STIC is unique within the Navy. Although there are fleet facilities and contractor facilities that possess similar equipment, there are no other lab facilities which have all the equipment and simulators assembled and integrated for testing and development work. Engineering analysis of

fleet problems would require personnel and equipment be sent to a site. This method of support would be inconvenient, costly, untimely, and would impact fleet operations. Commercial contractor sites could be enlarged to improve capability; however, this would cause contracting problems (sole source) for the Navy. The cost of dismantling the facility is estimated to be $500,000 and then a new site would have to be found, prepared and the equipment installed, at additional cost.

9. Effective 1987, Naval Command, Control and Ocean Surveillance Center RDTE Division (NCCOSC RDTE DIV SAN DIEGO CA), formerly Naval Ocean Systems Center (NOSC), signed a Memorandum of Agreement (MOA) with the Space and Naval Warfare Systems Command (SPAWAR) Undersea Surveillance Program Office (formally PMW-180) to establish a stable, controlled computer laboratory environment for the development and life-cycle support of the Integrated Undersea Surveillance System (IUSS) subsystems in support of fleet introduction. STIC evolved at NCCOSC RDTE DIV SAN DIEGO CA from the Acoustic Research Center (ARC) and the IUSS Laboratory at the Center. The end result was to provide the Navy with the latest technology for world-wide ocean surveillance to counter the changing characteristics of threat submarines and the ocean environment.

10. Functional Support Area: 5.5.

11. Historical utilization average for fiscal years 1989-1993: the IUSS Test Bed, established at NOSC in 1972, provided 9,000 sq. ft. of secure laboratory space in Building 1 and was used for IUSS subsystem development, integration, and testing. Specific IUSS Test Bed functions included SOSUS Phase II development; software testing and evaluation; software configuration management; and staging, burn-in, and checkout of new IUSS subsystems. The ARC evolved from the Acoustic Research Center established by DARPA at NAS Moffett Field, CA, in the mid-70's. The facility was transferred from DARPA to the Navy in FY 1983 and was located in 9,000 sq. ft. on the third floor of Building 605. Per the MOA the IUSS and ARC lab merged to form STIC. In June 1991, the STIC expanded in size, from 18,000 square feet in Building 605, to almost 24,000 square feet with the inclusion of the third-floor laboratory space in the newly completed Building 606. All STIC laboratory spaces in both buildings are electronically inter-connected for full integration and networking capability of the processor and display systems. The number of government personnel and contractors also grew as new programs were added. Prior to the forming of STIC there were about 100 to 200 persons supporting each function. In FY 1989 through 1993 there averaged 500 people on the access list so that they could support the different projects. Presently, in FY 1994, less than 350 persons require access to the secret STIC labs due to the de-emphasis of ASW and early initiation of other surveillance support.

12. Projected utilization to FY 1997: utilization will be similar to FY 1994 but with a slightly reduced staff. Alternate use of STIC equipment may result in increased utilization of the equipment and increase the required staff.

13. The approximate number of personnel used to operate STIC equipment is 75. During Naval exercises and formal Navy testing an additional 25 people would be present for daily operations.

Currently, a daily staff of about 40-50 people utilize the laboratory facilities, as the transition is accomplished from ASW to Surveillance/Command & Control support. Additional staff is required during testing periods. The reduction in daily staff in FY 1994 is due to the de-emphasis of ASW. However, it will be necessary to staff back up as the transition to support other areas is complete, since most of the STIC assets
are still in place.

14. The approximate number of personnel used to maintain STIC equipment is 12 (in FY 1993 there was a daily maintenance staff of 35 people; transition to newer technology systems has resulted in reduction or elimination of maintenance of many systems).

15. One 8 1/2 x 11 B&W photo follows.

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| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Space and Electronic Warfare Simulator (SEWSIM) |

1. The Space and Electronic Warfare Simulator (SEWSIM) is an operations analysis tool designed for use in assessing the projected effectiveness of current and future command and control warfare (C2W) systems under realistically simulated operating conditions in a variety of threat scenario environments. Fleet operations and scheduled exercises are not practical for recurring C2W analysis since it is too costly, is difficult to control, lacks repeatability and does not allow a large number of participants. SEWSIM provides a tool to replicate, by simulation, these operations and exercises.

2. SEWSIM is a fixed facility located in a Sensitive Compartmented Information Facility (SCIF) operating on a Digital Electronics Corporation (DEC) VAX mini-mainframe computer, VAX 6000-450, and supported by three VAX 4000 and six VAX 3500 computers.

3. Facility replacement: $500K; facility equipment replacement: $4M (includes over 500 plant property items in support of SEWSIM).

4. SEWSIM occupies a space of 2000 square-feet and 12 feet in height; it includes individual work areas separated by modular furniture dividers. In addition, a viewing and demonstration area is partitioned off to provide a noise free environment for viewing and demonstrations.

5. The SEWSIM facility requires the following special utility support:

a. Separately compartmented and accessed spaces controlled by RUSCO access and ciphers.
b. Administrative support to control all magnetic media, ADP and documentation that enters or exits the facility.
c. Motion and other physical security systems throughout the facility.
d. RF shielding on all air filtration systems in support of SEWSIM.

6. The SEWSIM facility requires both hardware ($51K/year) and software maintenance ($29K/year) contracts in support of computer systems and NDI software.

7. The SEWSIM facility requires temperature, humidity and cleanliness controlled environment for computer hardware.

8. The SEWSIM facility would be extremely difficult to relocate due to the following:

a. Vulnerability of computer hardware to internal damage during relocation.
b. Logistics of moving significant amount of Sensitive Compartmented Information (SCI)

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Tactical Systems Laboratory (TSL) |

1. The Tactical Systems Laboratory (TSL) is a multi-service, multi-user laboratory at the GENSER-Secret level. The TSL supports multiple Tactical Receive Equipment (TRE) and Tactical Related Applications (TRAP) processors, and an extensive array of fielded and developmental Tactical Data Processors (TDPs). These systems, together with reception, broadcast, and relay capabilities, give the TSL the flexibility to provide a wide variety of services and functions to the Tactical and Intelligence communities.

2. The TSL is a fixed facility.

3. The replacement value of the TSL is approximately $1.5M.

4. The TSL occupies 13,034 cubic feet.

5. The TSL uses the Secure Wide-Area Network in addition to normal electrical power.

6. The TSL operates at the Secret (GENSER) classification level and does not require special shielding, etc.; however, raised flooring is needed for running cables to and between hardware.

7. The TSL is a computer facility which requires temperature, humidity, and clean air control.

8. The TSL would be extremely difficult to replicate or relocate due to its location and assets. The TSL is the only Secret (GENSER) environment on the West Coast with such a network of computers, radios, cryptographic equipment, data lines, satellite feeds, etc., which permits it to provide the types of services it does to the Tactical and Intelligence communities.

9. The original TSL was constructed in 1992. Due to increased growth, the TSL is moving into a new area by mid-1994.

10. Functional Support Area: 5.4.

11. Historical utilization average for fiscal years 1989-1993: Estimate is 6 Full Time Equivalent (FTE) for the period 1992-1994 (TSL not completed until 1992).

12. Projected utilization to FY 1997: utilization is growing steadily; estimate growth to 10 FTE by 1997.

13. The approximate number of personnel used to operate the facility is 2.

14. The approximate number of personnel used to maintain the facility is 2.

15. Since the TSL is in the process of moving, a photograph of the new facility is not yet available.

# TAB B

## SPECIAL FACILITIES AND EQUIPMENT

## FACILITIES/EQUIPMENT CAPABILITY FORM

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| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Secure Facilities, Vaults, and Underground Bunkers |

1. NCCOSC RDTE DIV SAN DIEGO CA has the largest set of Navy Sensitive Compartmented Information (SCI) facilities (SCIFs) outside Washington, D.C., used for developing, testing, and operating communication systems that use highly classified data and for major programs combining the surveillance, command and control, and communications efforts into major military systems. Two Special Intelligence Communications (SPINTCOMM) facilities exist in the Center's intelligence structure. The SPINTCOMMs operate and maintain a variety of crypto, modem, router, facsimile and computer equipment for secure communications and related support for extremely highly classified work throughout the Center.

2. These spaces/facilities for the most part cannot be moved--more than half of these spaces are embedded. Relocation of NCCOSC RDTE DIV SAN DIEGO CA functions would have to provide comparable facilities meeting applicable security standards (DCID 1/21, DIAM 50-3, etc.)

3. Replication costs would easily exceed $20 million.

4. NCCOSC RDTE DIV SAN DIEGO CA SCI and other compartmented facilities consist of over 55,000 square feet of operating space in 26 separate facilities within the center. An additional 1500 square foot space is presently (April 1994) proposed for becoming a SCIF, and at least 12 additional spaces (12,000 square feet) meet DIAM 50-3 requirements and could be accredited as SCIFs. The Center also oversees three contractor SCIFs with 1,181 square feet of space; four other contractor SCIFs with 8,093 square feet can rapidly be re-accredited.

5. No special utility support is required for these facilities to be accredited.

6. Approximately 39% (over 21,000 square feet) of these facilities are TEMPEST (RF/EMC) shielded and certified for RDT&E/operational use.

7. All SCIF spaces require air conditioning systems due to security and cooling of ADP equipment.

8. The size of the SCI and other compartmented facilities would be extremely difficult to replicate at another site. SCIF standards must be met to provide laboratory and other working space for the wide variety of intelligence and intelligence-related command and control and surveillance programs at the Center. Lack of adequate accredited SCIF spaces and SCI communications support (SPINTCOMM facilities <u>must</u> be in SCIFs) would cause severe and in most cases complete degradation in the ability to perform major claimant assigned tasking. No known comparable support facility(s) on the West Coast currently exists which could duplicate this Center's SCI and

other compartmented support assets. Major on-going SCI communications/computer programs support U&S and Fleet Commanders including JCS, USCINCPAC, CINCPACFLT, CINCUSACOM, CINCLANTFLT, CINCENT, COMNAVCENTCOM, CINCSPACECOM, CINCNORAD, CINCSOCOM, and COMNAVSPECWARCOM plus agencies including CIA, NSA, and DIA. Additionally, the NCCOSC RDTE DIV SAN DIEGO CA SPINTCOMM facilities have served in the role of an alternate intelligence command center for communications purposes for major fleet commanders and as direct SCI communications support for high level officials visiting from Washington, D.C., and other areas; NCCOSC RDTE DIV SAN DIEGO CA is fully capable of performing similar SPINTCOMM support in the event of mobilization tasking from an appropriate higher authority.

9. The 26 NCCOSC RDTE DIV SAN DIEGO CA SCI and other compartmented facilities have been developed since World War II by adapting existing buildings and hardened underground bunkers in addition to new construction building projects.

10. Functional Support Areas: 5.1, 5.2, 5.3, 5.4, 5.5, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8, 8.1, 9.2, 11.2, 11.3, 11.4, 11.7.

11. Historical utilization average for FY 1989-93: the SCIFs are used on a daily basis.

12. Projected utilization to FY 1997: SCIF use is projected to exceed 100% (necessitating additional accreditation of spaces).

13. A total of 1219 billets (most with multiple compartment access) for government and contractor personnel are authorized and filled by appropriately cleared personnel.

14. Approximately 25 personnel perform the majority of the maintenance and security duties for the SCIF and other compartmented areas. Public Works Center or other personnel perform repair/maintenance work on a case basis as required.

15. 8 1/2 x 11 B&W photo of one of the unique NCCOSC RDTE DIV SAN DIEGO CA secure facilities, a large high bay storage area, follows. Additional SCIF areas are shown in photos of various labs elsewhere in this tab.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Corporate Information System at NCCOSC RDTE DIV SAN DIEGO CA |

1. The purpose of the Corporate Information System at NCCOSC RDTE DIV SAN DIEGO CA is to provide support for non-tactical unclassified corporate data systems and business applications (such as accounting) within NCCOSC RDTE DIV SAN DIEGO CA. This system also interfaces with payroll and personnel systems external to NCCOSC RDTE DIV SAN DIEGO CA developed by Central Design Agents (CDAs) and systems external to NCCOSC RDTE DIV SAN DIEGO CA identified by the DoD Corporate Information Management (CIM) initiative. It includes four Digital Equipment Corporation (DEC) VAX minicomputers in a VAX-cluster and support computers, plus the off-the-shelf applications software that runs on the computers. The system communicates with other computers over the unclassified networking infrastructure described in Section 9.a (COMPUTATIONAL FACILITIES) of this Data Call to provide a distributed processing environment.

2. The system is moveable.

3. The aggregate replacement value of the system is $2,217,068 for the four DEC VAX minicomputers. Included in this aggregate system are two pieces of equipment with a replacement value of more than $500,000 each. A DEC VAX8650, S/N 86069502K, value $513,508; and a DEC VAX8830, S/N 88A57130K, value $1,203,579. Another 8650 and an 8820 complete the VAX-cluster, with 42GB of data storage. Supporting this system is a VAX8650 as a maintenance computer and a micro-VAX III as an input/output computer.

4. Gross weight is about 6,000 pounds; volume is about 825 cubic feet.

5. No "special" utility support is required. The computers do require 110 single phase and 220 three phase electrical power, filtered.

6. The Corporate Information System at NCCOSC RDTE DIV SAN DIEGO CA has no special budget requirements.

7. The computers do require temperature and humidity controlled air typical of computers, but nothing special beyond that.

8. It would not be difficult to relocate or replicate the system at another site. It would be necessary to provide connections over a network similar to the unclassified networking infrastructure described in section 9.a (COMPUTATIONAL FACILITIES) of this Data Call for the 4400 devices at NCCOSC RDTE DIV SAN DIEGO CA, including all types of terminals, PCs, and workstations,

which currently access the system at NCCOSC RDTE DIV SAN DIEGO CA in a distributed processing environment. If this system were lost, another like it would need to be provided to fulfill its purpose.

9. The system was acquired from 1987 through 1993 from the manufacturers and was transported to NCCOSC RDTE DIV SAN DIEGO CA via normal commercial carriers.

10. Functional Support Area: 10.9.

11. Historical utilization average for fiscal years 1989-1993 has been 85% of available CPU cycles, with system expansion occurring as needed to support an increasing workload at that level.

12. Projected utilization average to FY 1997 is 85% of available CPU cycles.

13. The approximate number of personnel used to operate the Corporate Information System at NCCOSC RDTE DIV SAN DIEGO CA is 8.

14. The approximate number of personnel used to maintain the Corporate Information System at NCCOSC RDTE DIV SAN DIEGO CA is 15.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Navy Tactical Command System Afloat (NTCS-A) Testbed and Integration Facility |

1. The primary purpose of the Navy Tactical Command System Afloat (NTCS-A) Testbed and Integration Facility is to provide a landbased test site of an aircraft carrier command and control system to support development, integration and interoperability testing, new software duplication and release to all afloat platforms. On-line communications to ships and shore activities worldwide to provide a means to help diagnose and fix problems remotely. NTCS-A Testbed and Integration Facility work is done in two laboratories, one at the Secret level and one at the Sensitive Compartmented Information (SCI) level.

2. A significant amount of the facility consists of workstations which are moveable.

3. The replacement value of the facility equipment in Lab 160 is $979,000 and in Lab 350 is $1,000,000.

4. The volume of Lab 160 is 16,760 cubic feet and the area is 1,676 square feet. The volume of Lab 350 is 31,870 cubic feet and the area is 3,187 square feet.

5. Both labs of the NTCS-A Testbed and Integration Facility require the following special utility support in addition to normal electrical power:

Security control system
Halon (or equivalent) fire suppression system
Uninterruptable power system (UPS)
Raised deck computer flooring
Ethernet coax, twisted pair, fiber optic network wiring.

6. Both labs of the NTCS-A Testbed and Integration Facility require RF enclosure and TEMPEST approved building spaces.

7. Both labs of the NTCS-A Testbed and Integration Facility require air conditioning (for air cooled equipment) and humidity control.

8. The NTCS-A Testbed and Integration Facility would not be terribly difficult to replicate if all of the networks, communications connectivity and support facilities were provided. The biggest concern would relate to the down time and subsequent programmatic impact.

9. Both labs of the NTCS-A Testbed and Integration Facility were part of a MILCON facility constructed in 1978. Lab equipment has been installed since that time primarily through project funding from CNO sponsored programs.

10. Functional Support Areas: 7.3, 7.5, 7.6, 7.8.

11. Historical utilization average for fiscal years 1989-1993: facility utilization has been growing by 20% per year to the current utilization of 20 man-years per year per lab.

12. Projected utilization to FY 1997:

| | |
|---|---|
| 1994 | 20 man-years/lab |
| 1995 | 22 man-years/lab |
| 1996 | 25 man-years/lab |
| 1997 | 30 man-years/lab. |

13. The approximate number of personnel used to operate the facility/equipment is 40.

14. The approximate number of personnel used to maintain the facility/equipment is 4.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Navy Command and Control System Ashore (NCCS-A) Integration Test Facility |

1. The primary purpose of the Navy Command and Control System Ashore (NCCS-A) Integration Test Facility is to provide a landbased test site of a theater command center command and control system installation. It supports development, integration and interoperability testing plus on-line communications to ships and shore activities worldwide to support the gathering of requirements and to define user system needs. NCCS-A Integration Test Facility work is done in two laboratories, one at the Secret level and one at the Sensitive Compartmented Information (SCI) level.

2. A significant amount of the facility is class 3 equipment consisting of workstations which are moveable.

3. Replacement value of the NCCS-A Integration Test Facility equipment in Lab 250 is $1,087,000 and in Lab 360 is $2,170,000.

4. The volume of Lab 250 is 24,190 cubic feet and the area is 2,419 square feet. The volume and area of Lab 360 are 24,960 cubic feet and 2,496 square feet.

5. Both labs of the NCCS-A Integration Test Facility require the following special utility support in addition to normal electrical power:

Security control system
Halon (or equivalent) fire suppression system
Uninterruptable power system (UPS)
Raised deck computer flooring
Ethernet coax, twisted pair, fiber optic network wiring.

6. Both labs of the NCCS-A Integration Test Facility require RF enclosure and TEMPEST approved building spaces.

7. Both labs of the NCCS-A Integration Test Facility require air conditioning (for air cooled equipment) and humidity control.

8. The NCCS-A Integration Test Facility would not be terribly difficult to replicate if all of the networks, communications connectivity and support facilities were provided. The biggest concern would relate to the down time and subsequent programmatic impact.

9. Both labs of the NCCS-A Integration Test Facility were part of a MILCON facility constructed in 1978. Lab equipment has been installed since that time primarily through project funding from CNO sponsored programs.

10. Functional Support Areas: 7.3, 7.5, 7.6, 7.8, 11.1, 11.2, 11.3.

11. Historical utilization average for fiscal years 1989-1993: facility utilization has been growing by 20% per year to the current utilization 35 man-years.

12. Projected utilization out to FY 1997 follows.

| | | |
|---|---|---|
| a. Lab 250: | 1994 | 15 man-years |
| | 1995 | 20 man-years |
| | 1996 | 22 man-years |
| | 1997 | 26 man-years. |
| b. Lab 360: | 1994 | 20 man-years |
| | 1995 | 22 man-years |
| | 1996 | 25 man-years |
| | 1997 | 30 man-years. |

13. The approximate number of personnel used to operate the NCCS-A Facility is 35.

14. The approximate number of personnel used to maintain the NCCS-A Facility is 3.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Ocean Surveillance Information System (OSIS) Evolutionary Development (OED) Laboratory |

1. The primary purpose of the Ocean Surveillance Information System (OSIS) Evolutionary Development (OED) Laboratory is to provide a landbased test site of an OSIS Evolutionary Development facility to support development, integration and interoperability testing. It also provides on-line communications to ships and selected intelligence shore activities worldwide to support the gathering of requirements and to define user system needs.

2. A significant amount of the facility equipment consists of workstations which are moveable.

3. Replacement value of the OSIS/OED Laboratory equipment is $886,000.

4. The volume of the OSIS/OED Laboratory is 12,680 cubic feet and the area is 1,268 square feet.

5. The OSIS/OED Laboratory requires the following special utility support in addition to normal electrical power:

Security control system
Halon (or equivalent) fire suppression system
Uninterruptable power system (UPS)
Raised deck computer flooring
Ethernet coax, twisted pair, fiber optic network wiring.

6. The OSIS/OED Laboratory requires RF enclosure and TEMPEST approved building spaces.

7. The OSIS/OED Laboratory requires air conditioning (for air cooled equipment) and humidity control.

8. The OSIS/OED Laboratory would not be terribly difficult to replicate if all of the networks, communications connectivity and support facilities were provided. The biggest concern would relate to the down time and subsequent programmatic impact.

9. The OSIS/OED Laboratory was part of a MILCON facility constructed in 1978. Lab equipment has been installed since that time primarily through project funding from CNO sponsored programs.

10. Functional Support Areas: 7.3, 7.6, 7.8, 11.1, 11.2, 11.3.

| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
|---|---|
| Facility/Equipment Nomenclature or Title | Tactical Engineering Analysis Lab (TEAL) |

1. The Tactical Engineering Analysis Lab (TEAL) facility is a Sensitive Compartmented Information Facility (SCIF) which provides computers and communications for the analysis and development of classified tasks.

2. TEAL is a fixed facility.

3. The replacement value of the TEAL facility and equipment follows:

| | | |
|---|---|---|
| a. | Communications equipment: | $100,000 |
| b. | Computers (w/ printers, software, etc): | 12,000 |
| c. | Safes (5): | 23,000 |
| | **Total** | **$135,000** |

4. TEAL currently occupies a space with 5,427 cubic feet (18 ft x 38 ft x 8 ft); planned expansion will enlarge TEAL to approximately 16,000 cubic feet (40 ft x 50 ft x 8 ft).
Gross weight of the equipment within the current TEAL facility:

| | | |
|---|---|---|
| a. | Communications equipment: | 400 lbs |
| b. | Computers (w/ printers, software, etc): | 150 lbs |
| c. | Safes (5): | 3,400 lbs |
| | **Total** | **3,950 lbs** |

5. TEAL needs air conditioning (as it has no windows) and telephone service in addition to normal electric power.

6. TEAL has RF shielding necessary for operating at the required classification level.

7. TEAL does not need any extraordinary environmental specifications; normal ranges of room temperature and humidity should be adequate.

8. This facility could be replicated at another Government facility, but it would be expensive due to the radio frequency shielding requirement and due to a requirement that a reliable guard force be near by to prevent or stop any accidental or intentional breach of security.

9. Equipment was transported to this site by commercial trucks.

10. Functional Support Area: 5.4.

11. Historical utilization average for fiscal years 1989-1993: not available since TEAL was started in March 1993; however, since becoming functional it has been used by seven to twelve persons each day (each user uses this facility from 30 minutes to four hours); estimated overall utilization is approximately 16 labor hours/day.

12. Projected utilization to FY 1997:
    FY 94: 18 labor hours/day
    FY 95: 20 labor hours/day
    FY 96: 22 labor hours/day
    FY 97: 24 labor hours/day.

13. The approximate number of personnel used to operate TEAL is 1.

14. The approximate number of personnel used to maintain TEAL is 1.

15. One 8 1/2 x 11 B&W photo follows.

| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
|---|---|
| Facility/Equipment Nomenclature or Title | High Performance Computer Support Facility |

1. The High Performance Computer Support Facility provides an environment for conducting classified computer programs which require security at classified (including Top Secret/Sensitive Compartmented Information) levels. The facility includes 25 GFLOP Paragon Computer.

2. All equipment located within the High Performance Computer Support Facility is moveable.

3. Approximate value of the High Performance Computer Support Facility equipment is $12M. Replacement value of the facility, is an integral part of NCCOSC RDTE DIV SAN DIEGO CA Building 1, is unknown.

4. The High Performance Computer Support Facility equipment weighs 15,000 lbs and has a volume of 1,000 cubic feet.

5. The High Performance Computer Support Facility requires network connections for data/file transfer and remote computer access (T-1 minimum network capacity), de-ionized chilled water for air conditioning of commercial electronic equipment, and direct water cooling of operational equipment which may be used in facility projects.

6. The High Performance Computer Support Facility has no special budget requirements.

7. The High Performance Computer Support Facility requires that noise and light be controlled within visualization area and an air floor to provide proper air-cooling for some equipment.

8. It would be difficult to replicate or relocate this facility due to the requirements for:

   a. security to the SCI level;
   b. planning and construction costs for a secure facility.

9. Equipment within the facility was purchased by various program sponsors, shipped to NCCOSC RDTE DIV SAN DIEGO CA, and staged in the facility at various times. The building itself was renovated in 1984 at a cost of approximately $500,000.

10. Functional support areas: 5.5.

11. Historical utilization average for fiscal years 1989-1993: the facility was 100% utilized by NCCOSC RDTE DIV SAN DIEGO CA ASW Control System (ASWCS)/Underwater Fire Control

System (UFCS) work during the period 1989-1992. As portions of this older work have moved to other sites during 1992-1993 in response to BRAC decisions, the areas freed have been occupied by new projects focused on military applications of signal processing, high performance computing, and visualization. Usage of the facility has remained at 100% throughout this period except for those areas affected by movement of equipment in or out of the facility. The unit of measure for utilization is percent of facility floor space occupied by on-going RDT&E programs.

12. Projected utilization to FY 1997: it is anticipated the facility will be 100% utilized through FY 1997.

13. The approximate number of personnel used to operate facility is 30.

14. The approximate number of personnel needed to maintain equipment is 6.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Radar Signal Processing Laboratory (RSPL) |

1. The Radar Signal Processing Laboratory (RSPL) is equipped to provide support in analyzing and processing radar cross section (RCS) data, imagery and radar signal data. In addition , there are many resources available to assist in developing general engineering software.

2. The equipment in the RSPL is moveable.

3. The equipment in the RSPL includes a network of Digital Equipment Corporation VAX and ALPHA computer servers and graphics workstations, a network of Tektronix Corporation 3-D Graphics workstations and high resolution color printers, peripheral computer devices for data storage and processing, uninterruptable power supplies, power conditioners and environmental support equipment, storage cabinets and furniture, and laboratory security devices. The total replacement value of the RSPL equipment is $650K.

4. The RSPL lab consists of a three bay area approximately 36ft long by 20ft wide by 10ft tall (720 sq feet or 7200 cubic feet).

5. The RSPL ADP computer systems require a power conditioned uninterruptable power supply.

6. The entire 720 sq feet area of the laboratory requires a minimum 4 inch raised structural floor for electrical and ADP cables.

7. The RSPL ADP computer equipment requires air conditioning to be kept within normal room temperature and humidity.

8. The RSPL is a unique Navy asset which when taken as a complete facility would be difficult to replace. The individual items of ADP equipment are not unique and are frequently replaced with new or more capable items. The laboratory's assets are the unique combination of general purpose ADP equipment; unique radar image, signature and RCS data on U.S. Navy combatant ships; and unique radar and signal processing software.

9. The RSPL equipment was purchased from commercial vendors and installed on site. Initial procurement began in approximately 1981 and has continued to the present time.

10. Functional Support Areas: 5.2, 5.5.

11. Historical utilization average for fiscal years 1989-1993: during the period of 1989-1993 the RSPL laboratory has been used to directly support several radar programs. The laboratory has provided data and signal processing support for the following major efforts:

a. Radar Cross Section Measurements of full scale naval ships and aircraft
b. Airborne Target Identification
c. X-Band, Ku-Band and millimeter wave band ISAR imaging development
d. Periscope detection and radar cross section measurements

During this period RSPL was utilized on a nearly 100% basis. Data processing efforts in support of the above projects can be summarized as follows:

a. RCS measurements for CNO Project 886-4: 22 ships were measured, each measurement required a 3 to 4 week utilization of the RSPL facility.
b. Airborne Target Identification measurements: 15 aircraft were measured, each measurement required a 3 week utilization of the RSPL facility.
c. Periscope detection and RCS measurements: 4 targets were measured, each measurement required a 3 week utilization of the RSPL facility.
d. ISAR imaging software development is a continuing effort which employs the efforts of about one person per workyear.

12. Projected utilization to FY 1997: the laboratory will continue to support several radar programs and the efforts of three to five employees per year. The programs listed in item 11 will continue to be supported.

13. The approximate number of personnel used to operate the RSPL equipment is three to 5.

14. The approximate number of personnel used to maintain the RSPL equipment is 1 (if commercial vendor maintenance contracts are utilized).

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Processing and Data Exploitation Center (PDEC) |

1. PDEC is an in-house laboratory facility used to conduct data fusion and information processing research for the exploitation of national systems products for National, Unified and Specified Command, joint service, and tactical applications.

2. PDEC is a fixed facility.

3. Replacement Value: $1.5 Million.

4. PDEC occupies 2134 square feet.

5. PDEC requires Defense Secure Communications Support System and DSNET III communications in addition to normal electric power.

6. PDEC is in a Sensitive Compartmented Information Facility (SCIF), having special shielding, hardening, and other physical security features.

7. PDEC is a computer facility, requiring temperature, humidity and clean air control.

8. PDEC would be extremely difficult to replicate or relocate. Impact if lost: PDEC is the only SCIF at NCCOSC RDTE DIV SAN DIEGO CA with a network of computers processing national systems data.

9. The PDEC facility was constructed using Center funds and was completed in 1993.

10. Functional Support Area: 5.4.

11. Historical Utilization for fiscal years 1989-1993: not available for the entire period due to the recent (1993) completion of the facility; however, experience to date indicates the average labor usage rate is 23 personnel.

12. Projected Utilization to FY 1997: growth to 55 personnel.

13. The approximate number of personnel used to operate PDEC is 3.

14. The approximate number of personnel used to maintain PDEC is 2.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Anti-Submarine Warfare System Support Facility (ASWSSF) |

1. The ASWSSF is used for development/testing of MK116 MOD 5, 6, 8, 9 ASWCS and UFCS MIC 116 MOD 1-4.

2. All ASWSSF equipment is portable.

3. Replacement value of the ASWSSF equipment is approximately $2.6M.

4. The weight and size of the ASWSSF equipment is approximately 2500 lbs and 160 cu ft.

5. ASWSSF consoles require 115V/30/400 Hz power and de-ionized, chilled water system; CPU requires 115V/30/400 Hz power.

6. The ASWSSF has no special budgetary requirements.

7. ASWSSF equipment requires suitable A/C units for cooling.

8. The only difficulty in replicating the ASWSSF would be meeting space and physical security requirements.

9. ASWSSF equipment was purchased by the program sponsor, shipped to NCCOSC RDTE DIV SAN DIEGO CA, and has remained in place since the early 1980s.

10. Functional Support Area: 2.9.

11. Historical utilization average for fiscal years 1989-1993: 100% used, 40 hours/week/year.

12. Projected utilization to FY 1997: none at NCCOSC RDTE DIV SAN DIEGO CA (equipment and project being transitioned to NSWC/WO and Dahlgren as of 30 June 1994).

13. The approximate number of personnel used to operate the ASWSSF equipment is three to five government and 3 to 5 contractors.

14. The approximate number of personnel used to maintain the ASWSSF equipment is 10-15 contractors.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Vertical Launch Anti-Submarine Rocket (VLA) Hardware-In-The-Loop (HWIL) Simulation Laboratory |

1. The Vertical Launch Anti-Submarine Rocket (VLA) Hardware-In-The-Loop (HWIL) Simulation Laboratory was designed to be a general purpose simulation facility capable of real-time simulation of dynamic systems such as air or underwater vehicles. The Laboratory consists of a Digital Equipment Corporation (DEC) MicroVAX II host computer system, an Applied Dynamics International (ADI) AD-100 dynamic simulation computer, and a 3-axis Carco Electronics Model S-450 Rotation Table. There are also a number of PCs, external disks, and printers. The primary simulation in support of VLA is the VLASIM, a detailed 6 degree of freedom missile simulation. This simulation has several versions for different applications. The VAX version was used for missile design and post-flight analysis. The ADSIM version takes advantage of the AD-100 high speed computing capability for extensive missile studies. The PC version is portable enough to be utilized during actual VLA flight tests. Another version of VLASIM was generalized for use by NATO for a low-cost missile similar to a simplified VLA.

2. The PCs are Class 3 property. MicroVAX, AD-100, and Carco Table controller are Class 2, movable with more extensive effort. The Carco Table itself is not movable without major demolition of the building it resides in (the building was rebuilt around the table after it was installed).

3. Replacement value of the VLA HWIL equipment is $800 and for special features in 6 and 7 below is $22K..

4. The VLA HWIL equipment weighs 11,000 pounds and has a volume of 400 cubic feet.

5. The VLA HWIL equipment requires 220 and 440 VAC.

6. The facility requires a room with wire mesh window glass and interlock system of doors for noise and projectile protection, a hydraulic pump must be located outside in a weather-proof enclosure, and the equipment requires raised computer flooring.

7. The VLA HWIL equipment requires air conditioning and heating for a controlled environment.

8. This facility would be difficult to replicate. The original costs for the Carco table, AD-100, and MicroVAX were over $771,000 in 1986. There was significant reconstruction of the building the lab resides in. The AD-100 is a highly specialized computer which has yet to be replicated despite the advent of more powerful and inexpensive PCs. The laboratory itself was reconstructed to provide a secure environment for classified processing.

9. The VLA HWIL Facility was constructed in 1987 in an existing space. The large Carco table (6 degree of freedom machine) was installed through a former garage door, then a room with safety features (noise and projectile protection) was constructed around it. Also, a room for the computers was constructed; it has environmental controls (temperature) and a raised floor. Finally, the hydraulic pumping system was installed outside the building due to noise considerations, special power was supplied to it, and a weather enclosure was built around it.

10. Functional Support Area: 2.2.

11. Historical utilization for fiscal years 1989-1993: two workyears per year (this has included development of simulation software, missile design using the simulation software, and analysis of test flights).

12. Projected utilization to FY 1997: one workyear per year.

13. The approximate number of personnel used to operate the VLA HWIL equipment is one. With a full HWIL simulation application operating, there would be a personnel requirement of between 2 and 5 people.

14. The approximate number of personnel used to maintain the VLA HWIL equipment is 1.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Deployable Surveillance Integration Facility |

1. Primary purpose of the Deployable Surveillance Integration Facility is to serve as the facility where deployable surveillance hardware is assembled, integrated, and tested in preparation for deployment throughout the world. It is also part of the terminus for cables connecting deployable surveillance experimental hardware deployed in the Southern California Shallow Water Test Bed. Many other sea tests that support technology development in undersea surveillance are also staged here.

2. This is a fixed facility.

3. Replacement value of the Deployable Surveillance Integration Facility is $2.54M for equipment and $300K for the building and crane.

4. This facility occupies a 7,000 square foot building.

5. In addition to normal electric power this facility requires 220 and 440 VAC.

6. The Deployable Surveillance Integration Facility requires an overhead 2-ton crane running the length of the building.

7. There are no special environmental requirements for this facility.

8. Certain functions of this facility would be extremely difficult to replicate or relocate at another site, namely, those associated with the Southern California Shallow Water Test Bed. Cables come ashore here from offshore locations where undersea surveillance experiments are conducted. This is the only site where over-the-shore cables will be permitted after implementation of the environmentally protected zone on Point Loma. Other functions of integration and preparation for deployments at other sites could be relocated elsewhere, but would require duplicate facilities.

9. This facility was constructed in 1985 by combining two existing buildings into one large area of approximately 7,000 square feet. Equipment was purchased and installed in the building at that time; however, as projects evolve the types and configurations of the equipment change. One unique and permanent item is a 2-ton overhead crane running the length of the building. Other types of equipment are for fiber optic studies and acoustic array handling.

10. Functional support area: 5.5.

11. Historical utilization average for fiscal years 1989-1993:

| | |
|---|---|
| a. Man-years of activity per year: | 5 |
| b. Number of projects served per year: | 4 |
| c. Value of projects served per year: | $10M |
| d. % of work days utilized per year: | 90% |

12. Projected utilization to FY 1997: same as 11 above.

13. The approximate number of personnel used to operate the facility varies between 1 and 10 depending on the nature of the activity in progress.

14. The approximate number of personnel used to maintain the facility is 1.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Bayside Acoustic Systems Computational Center (BASCC) |

1. The primary purpose of the Bayside Acoustic Systems Computational Center (BASCC) is the simulation of acoustic and non-acoustic system performance, data analysis and algorithm development for acoustic/non-acoustic system sea trials.

2. The BASCC equipment is moveable.

3. The replacement value of the BASCC equipment and software is $4M; physical security and operating environment expenses are valued at $22K.

4. The BASCC equipment weighs 10,400 pounds and has a volume of 2,200 cubic feet.

5. There are no special utility requirements for this center.

6. The BASCC requires physical security standards for operation at the Secret (GENSER) level.

7. BASCC equipment requires air conditioning and heating for a controlled environment.

8. The BASCC would be difficult to replicate or relocate; cost would be approximately $4.1M. Programs relying on BASCC for simulation and analysis would also lose access during relocation/replication process; this involves up to 53 people working on funded programs who need regular access to the unique hardware and software in BASCC. Programs affected would be:

a. SURTASS/LFA (SURveilance Towed Array Sensor System/Low Frequency Active Programs)
b. Multistatic Active Surveillance
c. ADS (Advanced Deployable Systems Program)
d. AdDA (Advanced Deployable Array Program)
e. NDST (Non-acoustic Distributed Systems Technology Program)
f. LLFA/JETI (Low-Low Frequency Active/Joint Environmental Test Initiative Programs)
g. NORAD CCM (NORth American Defense Counter Cruise Missile Program)
h. PAS (Port Area Surveillance Program)
i. Marine Mammals.

9. The BASCC was constructed in an existing room in 1990. The facility consists of computer equipment and peripherals. so environmental controls were also installed. Additionally, the data processed in this facility is classified, so the entire facility is secure to the Secret level. Since the

initial development of the BASCC lab, work has increased and another room has been added to accommodate the increase in equipment and data processing.

10. Functional Support Areas: 4.1, 5.1, 5.5, 8.1,10.5.

11. Historical utilization average for fiscal years 1989-1993: 32 work-years per FY. The facility has averaged 80% usage during regular working hours and 20% usage during off-hours.

12. Projected utilization to FY 1997: 24-27 workyears that funded users will average 80% usage of available machines during work hours (no off-hours projection is included in this estimate).

13. The approximate number of personnel used to operate the BASCC equipment is 53 (of these 28 personnel are full time users. The remainder are parttime users).

14. The approximate number of personnel used to maintain the BASCC equipment is 3.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Southern California Communications Networking Test Facility |

1. The Southern California Communications Networking Test Facility is composed of communications sites at Pt. Mugu, San Nicolas Island, San Clemente Island, Seal Beach and NCCOSC RDTE DIV SAN DIEGO CA. NCCOSC RDTE DIV SAN DIEGO CA maintains and controls these sites for use in multiforce communications testing and support of West Coast Fleet Exercises.

2. The equipment for this test facility is moveable.

3. Replacement value of the equipment (separate from buildings/utilities) is $500,000.

4. This network facility covers 10,400 square miles from Point Loma in San Diego north to Point Mugu and west 52 miles.

5. This test facility equipment requires no special utility support.

6. This facility provides line-of-sight microwave communications over a large, heavy operation tempo area for surface ships, submarines, aircraft and land-based testing. Any relocation site would require the same.

7. Facility equipment requires air conditioning.

8. Individual components of this facility would not be difficult to replicate; however, the geography and exceptional fleet access would be extremely difficult if not impossible to find elsewhere.

9. This facility was constructed at site between 1986 and 1988.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4.

11. Historical utilization average for fiscal years 1989-1993: used as projects require (diverse testing 2-3 hours per work day).

12. Projected utilization to FY 1997: same as 11 above.

13. The approximate number of personnel used to operate the facility/equipment is 1.

14. The approximate number personnel used to maintain the facility/equipment is 1.

15. One 8 1/2 x 11 B&W photo follows; however, the facility consists of various antennas and racks of equipment located throughout Southern California.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Information Transfer Management Structure (ITMS) |

1. The Information Transfer Management Structure (ITMS) provides integrated management of the automated, distributed, fiber optics connected information transfer system and provides management of the connectivity between all major command, control, communications, computers and intelligence (C4I) and ocean surveillance facilities at NCCOSC RDTE DIV SAN DIEGO CA, and the interconnect between ELF to EHF and lasers; it also provides a controlled environment in which to determine the applicability and utility of commercial off-the-shelf and nondevelopmental item equipment in providing joint C4I and ocean surveillance capabilities.

2. The Information Transfer Management Structure (ITMS) equipment is moveable.

3. Replacement value of the ITMS (separate from building/utilities) is $800,000.

4. Gross weight is 1,800 pounds and volume is 1,440 cubic feet.

5. Special utility support required by ITMS in addition to normal electric power includes an uninterrupted power source and air conditioning.

6. Special budget requirements include physical security (including controlled entry).

7. ITMS equipment requires air conditioning.

8. The ITMS equipment would not be difficult/impossible to replicate/relocate.

9. The ITMS equipment has been shipped commercially and assembled on site since 1993.

10. Functional Support Areas: 7.1, 7.2, 7.4, 7.5.

11. Historical utilization average for fiscal years 1989-1993: 2 workyears per year.

12. Projected utilization to FY1997: 6 workyears per year.

13. The approximate number of personnel used to operate this equipment is 2.

14. The approximate number personnel used to maintain this equipment is 1.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Ship Antenna Model Range and Simulation Facility |

1. This facility has a capability to model and simulate ship communications systems that is unsurpassed in the world. The model range consists of a flat ground plane for rotating modeled ships, tracks and towers for equipment movement, control systems for the test equipment, data collection systems, data reduction computers, plotters, and analysis software and components. The facility modelling shop has built a scale model of every ship in the fleet for evaluation. The Ship Antenna Model Range and Simulation Facility provides a basis for analysis and measurement of LF/HF/VHF/UHF/SHF/EHF shipboard antennas and their effect on other systems when installed on ships; evaluates electromagnetic propagation effects, electromagnetic engineering systems and structural resonant responses; provides software modeling and simulation of systems, confirmation of models, and extensions beyond the test capability of the model range alone; and evaluates electromagnetic propagation effects, electromagnetic engineering systems and structural resonant responses.

2. The Ship Antenna Model Range and Simulation Facility is fixed.

3. Replacement value of the Ship Antenna Model Range and Simulation Facility equipment (separate from buildings and utilities) is $30M.

4. This facility covers about 25-30 acres that is well shielded from interfering frequencies from land based emitters on the San Diego side of the Point Loma peninsula.

5. This facility requires no special utility support in addition to normal electric power.

6. This facility requires material non-conductive to radio frequency and it requires shielding from interfering-reflected frequencies.

7. The Ship Antenna Model Range and Simulation Facility has no special environmental requirements.

8. The Ship Antenna Model Range and Simulation Facility would be extremely difficult or impossible to replicate/relocate; to re-locate would cost $25 - 30 million and need 3 years time to set-up.

9. The Ship Antenna Model Range and Simulation Facility has been built-up over the last 40 years.

10. Functional Support Area: 5.2.

11. Historical utilization average for fiscal years 1989-1993: $3 million/year.

12. Projected utilization to FY 1997: $3 million/year.

13. The approximate number of persons used to operate this facility is 20.

14. The approximate number of persons used to maintain this facility is 4.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Survivable Adaptable Fiber- Optic Embedded Network (SAFENET) Development Site |

1. The Survivable Adaptable Fiber-Optic Embedded Network Development Site is used to develop hardware, software and firmware for ship interior communication, addressing interface to combat systems and combat damage survivability issues. It also provides a base to address hull, machinery and electrical systems effects.

2. The SAFENET Development Site equipment is moveable.

3. Replacement value of the SAFENET Development Site equipment (separate from building/utilities) is $3M.

4. The volume of this site is 6,000 cubic feet.

5. The only special utility support required by this site is 60 AMPS.

6. This site does not have any special budget requirements.

7. This site does not have any environmental control requirements.

8. The SAFENET Development Site would be extremely difficult to relocate, requiring a long lead time (3-4 years, labor intensive).

9. This facility was constructed at site 1986 thru the present.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.5.

11. Historical utilization average for fiscal years 1989-1993: 7 workyears per year.

12. Projected utilization to FY 1997: 7 workyears per year.

13. The approximate number of personnel used to operate this site is 4.

14. The approximate number of personnel used to operate this site is 4.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Communications Support System Simulation Facility |

1. The Communications Support System Simulation Facility provides an environment for evaluating software and hardware components being developed for communication systems and their controls. Analysis includes fleet protocol definition, operator interfaces, system engineering, and integration within the navy and DOD following standards based on open architecture to meet joint interoperability requirements.

2. The Communications Support System Simulation Facility is moveable.

3. Replacement value of the facility (separate from building/utilities) is $500,000.

4. Gross weight of the equipment is 2,000 pounds and the volume is 50 cubic feet.

5. The Communications Support System Simulation Facility requires connection to RF resources on Center and to the information highway.

6. There are no special budget requirements for this facility.

7. There are no environmental control requirements for this facility.

8. This facility would not be extremely difficult/impossible to replicate/relocate.

9. This facility is composed of computer workstations that were installed in 1993.

10. Functional Support Areas: 7.1, 7.3, 7.4, 7.5.

11. Historical utilization average for fiscal years 1989-1993: not available since this is a new facility.

12. Projected utilization to FY 1997: $5M per year.

13. The approximate number of personnel used to operate this facility is 1.

14. The approximate number of personnel used to maintain this facility is 1.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | VLF/LF Integrated Test Facility |

1. The VLF/LF Integrated Test Facility includes simulated terminals, submarine radio room, RF equipment, control devices, software evaluation, test equipment, analysis tools used for the development, test and certification of Navy, Joint and international VLF/LF communication systems and message processing systems

2. The VLF/LF Integrated Test Facility is moveable.

3. Replacement value of the VLF/LF Integrated Test Facility equipment (separate from the building and utilities) is $97 million.

4. The size of this facility is 80,000 square feet and 800,000 cubic feet for buildings and approximately 5-7 acres of land.

5. This facility requires shielding, 400 Hz power, and air conditioning.

6. Special budget requirements for the VLF/LF Integrated Test Facility include shielding and TEMPEST certification. Additionally, the satellite antenna is mounted on a tiltable tower, and can be aimed at satellites in orbit over the equator. This requires the tower to be lowered to within 40 degrees from the ground plane. Because of the facility's geographical location on Point Loma, the ground plane reflection and other interfering signals are minimal. This location also provides a greater than 180 degree arc to transmit without radiation hazard concern to the general population.

7. The VLF/LF Integrated Test Facility requires temperature and humidity control. Additionally, the satellite antenna is mounted on a tiltable tower, and can be aimed at satellites in orbit over the equator. This requires the tower to be lowered to within 40 degrees of the ground plane. Because of the facility's geographical location, the ground plane reflection and other interfering signals are minimal. This location also provides a greater than 180 degree arc to transmit without radiation hazard concern to the general population.

8. This facility would be extremely difficult/impossible to replicate/relocate due to the extreme expense to relocate requiring unacceptable downtime.

9. The VLF/LF Integrated Test Facility has been built-up on site over the last 28 years.

10. Functional Support Areas: 7.1, 7.2, 7.4, 7.5.

11. Historical utilization average for fiscal years 1989-1993: $15 million per year.

12. Projected Utilization to FY 1997: $17 million per year.

13. The approximate number of personnel used to operate this facility is 25.

14. The approximate number personnel used to maintain this facility/equipment is 10.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | SHF Satellite Communication (SATCOM) Test Facility |

1. The SHF Satellite Communication (SATCOM) Test Facility contains a complete SHF SATCOM terminal and test equipment to support follow-on SHF equipment development.

2. The SHF SATCOM Test Facility is moveable.

3. The replacement value of the SHF SATCOM Test Facility (separate from building/utilities) is $2M.

4. The size of the SHF SATCOM Test Facility is 7,850 cubic feet and 3,700 square feet.

5. Special utility support for this facility includes 3 phased power and air conditioning.

6. There are no special budget requirements for this facility.

7. Environmental control requirements for this facility include air conditioning for communications and test support equipment.

8. The SHF SATCOM Test Facility would be difficult to re-locate, expensive to replicate.

9. The SHF SATCOM Test Facility was developed on site in 1971 and has been continuously revolving to present.

10. Functional Support Areas: 7.3, 7.4, 7.5.

11. Historical utilization average for fiscal years 1989-1993: 80% work load of each workday.

12. Projected utilization to FY 1997: 80% work load of each workday.

13. The approximate number of personnel used to operate the facility/equipment is 1.

14. The approximate number personnel used to maintain the facility/equipment is 1.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | EHF Satellite Communications Terminal Test Facility |

1. The EHF Satellite Communications Terminal Test Facility provides a basis for ship, submarine, and shore site terminal development and follow-on support in MILSTAR EHF systems.

2. This facility is moveable.

3. Replacement value of this facility (separate from building/utilities)is $3M.

4. The EHF Satellite Communications Terminal Test Facility includes antennas, ground plane and buildings which cover about 5-7 acres.

5. Special utility support required for this facility includes 3 phased power and air conditioning.

6. Special Budget requirements for this facility include perimeter security.

7. The EHF Satellite Communications Terminal Test Facility equipment requires air conditioning.

8. The EHF Satellite Communications Terminal Test Facility would be difficult to replicate.

9. This facility has been constructed at site since 1985 with continuous growth to present.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.5.

11. Historical utilization average for fiscal years 1989-1993: 100% of every workday plus some after hours.

12. Projected Utilization to FY 1997: 100% of every workday plus some after hours.

13. The approximate number of personnel used to operate this facility/equipment is 5.

14. The approximate number personnel used to maintain this facility/equipment is 2.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Optical and Radiometric Calibration Facility |

1. The NCCOSC RDTE DIV SAN DIEGO CA Optical and Radiometric Calibration Facility consists of a building sealed optically for calibration of absolute sensitivity, spectral characteristics, linearity, dynamic range, and field-of-view of optical and emission systems. Although primarily used for laser research, it supports other optical oriented systems, both in communication and surveillance.

2. The Optical and Radiometric Calibration Facility is moveable.

3. Replacement value of this facility (separate from building/utilities) is $750,000.

4. The volume of the facility is 8,000 cubic feet.

5. This facility has no special utility required other than normal electric power.

6. The Optical and Radiometric Calibration Facility requires an optically sealed building.

7. Environmental control requirements for this facility are air conditioning and light-sealing.

8. This facility would be impossible to relocate, but it could be re-built elsewhere.

9. The Optical and Radiometric Calibration Facility was constructed at site in 1988.

10. Functional Support Area: 5.3.

11. Historical utilization average for fiscal years 1989-1993: 75% of each workday.

12. Projected utilization to FY 1997: 60% of each workday.

13. The approximate number of personnel used to operate this facility/equipment is 1.

14. The approximate number of personnel used to maintain this facility/equipment is less than 1.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Navy UHF Satellite Communications Test Facility (NUSTF) |

1. The Navy UHF Satellite Communications Test Facility (NUSTF) supports information exchange subsystem development, and testing and certification, direct support to fleet exercises, determining new requirements, and developing system improvements. It includes an operating Fleet SATCOM radio and analysis capability.

2. The NUSTF equipment is moveable.

3. Replacement value for the NUSTF (separate from building/utilities) is $7M for equipment and $2M for installation.

4. Gross weight is 38,000 pounds and the volume is 20,000 cubic feet.

5. No special utility support is required for this facility.

6. The NUSTF requires EMI shielding, security alarms, cryptographic equipment, and a UHF satellite dish antenna

7. The NUSTF equipment requires air conditioning.

8. This facility would be extremely difficult/impossible to replicate/relocate.

9. NCCOSC RDTE DIV SAN DIEGO CA personnel installed sponsor provided equipment in 1993.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.5.

11. Historical utilization average for fiscal years 1989-1993 (unit is general communications circuit): 15 circuits per day per FY (includes continuous testing around the clock as needs require).

12. Projected utilization to FY 1997 (same units as 11): 12 circuits per day.

13. The approximate number of personnel used to operate the NUSTF facility/equipment is 8.

14. The approximate number personnel used to maintain the NUSTF facility/equipment is 6.

15. One 8 1/2 x 11 B&W photo follows.

| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
|---|---|
| Facility/Equipment Nomenclature or Title | Commercial SATCOM Facility |

1. The Commercial SATCOM Facility functions to buy, integrate and test commercial and non-development items, satcom terminals have been developed, operating at S and C bands (soon to be extended to KU and KA bands). Through the use of the Information Transfer Management Structure (ITMS) addressed separately in this tab, this facility is easily integrated into any of the other associated satcom facilities.

2. The Commercial SATCOM Facility is moveable.

3. Replacement value for this facility (separate from building/utilities) is $500,000.

4. Gross weight/cube are not available.

5. The Commercial SATCOM Facility has no special utility support required.

6. Special Budget requirements include a Commercial satcom lease.

7. There are no environmental control requirements for this facility.

8. This facility would not be extremely difficult/impossible to replicate/relocate.

9. The Commercial SATCOM Facility was built over last 8 years in support of various individual projects that are now integrated into a common facility.

10. Functional Support Areas: 7.3, 7.5.

11. Historical utilization average for fiscal years 1989-1993: Some satcom support is used 100% of time and other use is on an "as needed" basis.

12. Projected Utilization to FY 1997: Same as 11 above.

13. The approximate number of personnel used to operate this facility/equipment: is 2.

14. The approximate number personnel used to maintain this facility/equipment is less than 1.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Environmental Test Laboratory |

1. The Environmental Test Laboratory is a facility for testing equipment and hardware to insure that it will perform in extreme environments. The laboratory has facilities for creating the extremes of temperature and humidity, vibration and mechanical shock, pitch and roll, salt fog and deep sea pressure as defined in MIL-STD 810, MIL-STD 167 and MIL-S-901 and other specifications and standards. Electronic test facilities include automated spectrum analysis equipment and the capability of EMI/RFI testing to MIL-STD-461 and power input variation and magnetic field testing to MIL-STD-1399.

2. The Environmental Test Laboratory is a moveable facility.

3. Replacement value (separate from buildings/utilities) is $3.8 Million.

4. The Environmental Test Laboratory occupies a 12,600 square foot facility.

5. The Environmental Test Laboratory has no special utility support requirements.

6. The Environmental Test Laboratory has no special budget requirements.

7. The Environmental Test Laboratory has no environment control requirements.

8. Relocation of this facility is estimated to cost at least $600K.

9. The original building was constructed in the 1940s and the equipment has been acquired over time since then. Roughly half of the facility has been moved to a new building constructed in 1993.

10. Functional Support Areas: 7.1, 7.2, 7.3, 7.4, 7.5, 7.8, 10.9.

11. Historical utilization average for fiscal years 1989-1993: $1.3M/FY.

12. Projected utilization to FY 1997: $1.3M/FY.

13. The approximate number of personnel used to operate this facility/equipment is 12.

14. The approximate number of personnel used to maintain this facility/equipment is 2.

15. One 8 1/2 x 11 B&W photo follows.

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|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Structural Materials Science Laboratory |

1. The NCCOSC RDTE DIV SAN DIEGO CA Materials Laboratory supports Center projects and Navy needs in the area of structural materials science. Services include failure analysis, materials analysis and testing, materials and mechanical engineering, chemical analysis (optical emission spark, Inductively Coupled Plasma (ICP), and Direct Solids Nebulization (DSN), and carbon/sulfur analyzer), Energy Dispersive X-ray (EDX) florescence analysis, mechanical and structural testing and instrumentation (strain gaging and loading of structures, pressure vessels and hulls), image analysis, Scanning Electron Microscope (SEM) analysis, composite materials design and analysis, fatigue and fracture analysis and testing, corrosion (engineering, testing, and failure analysis), plastics and rubber materials (compounding, compatibility testing, and physical property testing), epoxy adhesive/encapsulant compounding and application, towed array hose materials and component design, syntactic foam compounding and casting, non-destructive testing (X-ray, dye penetrant, acoustic emission, ultrasonic (A, B & C scan)), off site inspections (welds, failures, corrosion, underwater), materials specification and drawing review, and process developments.

2. The equipment of the Structural Materials Science Laboratory is moveable.

3. Replacement value of the laboratory (separate from buildings/utilities) is $2.5 million.

4. The laboratory occupies 8,000 square feet.

5. Special utility support required by the laboratory in addition to 3 phase electrical power includes air conditioning, de-ionized water, fume hoods, gasses (Argon, LN2).

6. There are no special budget requirements for the Structural Materials Science Laboratory.

7. The Structural Materials Science Laboratory requires a hazardous materials storage area.

8. This laboratory would not be extremely difficult/impossible to replicate/relocate.

9. This facility has evolved on site over a number of years.

10. Functional Support Area: 11.5.

11. Historical utilization average for fiscal years 1989-1993 follows:

    a. FY 1989: 12 people full time
    b. FY 1990: 11 people full time
    c. FY 1991: 9 people full time
    d. FY 1992: 9 people full time
    e. FY 1993: 9 people full time.

12. Projected utilization to FY 1997: 9 people full time per FY.

13. The approximate number of personnel used to operate this facility/equipment is 9.

14. The approximate number of personnel used to maintain this facility/equipment is 1.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Facility for Hardware Design, Analysis, and Fabrication |

1. The NCCOSC RDTE DIV SAN DIEGO CA Facility for Hardware Design, Analysis, and Fabrication serves to assemble and interconnect procured and manufactured items into final assemblies.

2. This is a moveable facility.

3. Replacement value for this facility (separate from buildings/utilities) is $200K.

4. This facility occupies 4,150 square feet.

5. The Facility for Hardware Design, Analysis, and Fabrication has no special utility support requirements.

6. This facility has no special budget requirements.

7. This facility has no environment control requirements.

8. The Facility for Hardware Design, Analysis, and Fabrication would not be difficult to replicate/relocate.

9. The building for this facility was constructed in 1986.

10. Functional Support Area: 10.9.

11. Historical utilization average for fiscal years 1989-1993: $1M each year.

12. Projected utilization to FY 1997: $1M each year.

13. The approximate number of personnel used to operate this facility/equipment is 10.

14. The approximate number of personnel used to maintain this facility/equipment is 10 (same personnel identified in 13 above).

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Computer-Aided Design, Documentation and Engineering Drawing Management Facility |

1. The purpose of the Computer-Aided Design, Documentation and Engineering Drawing Management Facility is to provide electronic and mechanical CAD design and documentation services to technical engineering codes and to provide engineering drawing management functions for NCCOSC RDTE DIV SAN DIEGO CA or contractor produced engineering drawings.

2. This is a moveable facility.

3. Replacement value of the facility (separate from building/utilities) is $775K.

4. Gross weight of the equipment in this facility is 29,000 pounds; volume is 4,000 cubic feet.

5. The only special utility support required by this facility is 3 phase electrical power.

6. This facility has no special budget requirements.

7. Environment control requirements for this facility include controlling air temperature at 70 degrees F +/- 5 degrees and humidity at 50% +/- 10%.

8. This facility might be difficult to relocate since some equipment requires special packaging and handling.

9. All equipment has been installed on site since 1982 by the manufacture.

10. Functional Support Areas: 10.8, 10.9.

11. Historical utilization average for fiscal years 1989-1993:

| | | | |
|---|---|---|---|
| a. | FY 1989: | $1.95M | 31,500 labor hours |
| b. | FY 1990: | $2.05M | 33,000 labor hours |
| c. | FY 1991: | $1.75M | 30,000 labor hours |
| d. | FY 1992: | $1.50M | 25,000 labor hours |
| e. | FY 1993: | $0.887M | 16,800 labor hours |

12. Projected utilization to FY 1997:

| | | | |
|---|---|---|---|
| a. | FY 1994: | $762K | 12,500 labor hours |
| b. | FY 1995: | $828K | 11,775 labor hours |
| c. | FY 1996: | 910K | 11,990 labor hours |
| d. | FY 1997: | 910K | 11,900 labor hours |

13. The approximate number of personnel used to operate this facility/equipment is 11.

14. The approximate number of personnel used to maintain this facility/equipment is 0 Government (equipment and software are maintained under contract at a cost of $50K/year).

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Calibration Laboratory |

1. The purpose of the Calibration Laboratory is to conduct calibration and repair of all NCCOSC RDTE DIV SAN DIEGO CA electronic test equipment. The facility is a Type 3 calibration laboratory established by authority of NAVMAT ltr 0472/jts of 7 Mar 1979. The laboratory is operated per section 6 of Metrology Requirements List METRL (NAVSEA OD 45845, SPAWAR P4734-310-0001).

2. This facility is moveable.

3. Replacement value for this laboratory (separate from building/utilities) is $518K.

4. The Calibration Laboratory occupies 2,400 square feet.

5. The Calibration Laboratory has no special utility support requirements.

6. There are no special budget requirements for this facility.

7. There are no special environment control requirements for this facility.

8. This facility would not be difficult/impossible to replicate/relocate.

9. The Calibration Laboratory has been in its present location for the last 15 years, and the test equipment has been gradually acquired during that time.

10. Functional Support Area: 10.9.

11. Historical utilization average for fiscal years 1989-1993: $325K/FY.

12. Projected utilization to FY 1997: $325K/FY.

13. The approximate number of personnel used to operate the Calibration Laboratory is 6.

14. The approximate number of personnel used to maintain the Calibration Laboratory is 1.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Facility for Design, Engineering, and Prototype Hardware Fabrication/ Assembly/Checkout |

1. The purpose of the Facility for Design, Engineering, and Prototype Hardware Fabrication/ Assembly/Checkout is to manufacture, assemble and inspect prototype hardware in support of NCCOSC RDTE DIV SAN DIEGO CA projects. The facility includes a machine shop, a weld shop, and a sheet metal fabrication shop. Both manual and computerized machine operations are supported by an in-house computer aided manufacturing workstation. A full range of machine, welding, and sheet metal fabrication services are available to project engineers on a quick turn around basis at known rates.

2. This is a moveable facility.

3. Replacement value of this facility (separate from buildings/utilities) is $4.9 million.

4. This facility occupies 31,000 square feet.

5. This facility has no special utility support requirements.

6. There are no special budget requirements for this facility.

7. This facility requires hazardous material facilities certified by applicable permits and inspections.

8. Relocation of this facility is estimated to cost at least $300K.

9. The building housing this facility was constructed in 1974 and the equipment was transferred from the NUC Pasadena facility during that year.

10. Functional Support Area: 10.9.

11. Historical utilization average for fiscal years 1989-1993: $1.8 Million/FY.

12. Projected utilization to FY 1997: $1.8 Million/FY.

13. The approximate number of personnel used to operate this facility/equipment is 15.

14. The approximate number of personnel used to maintain this facility/equipment is 2.

15. One 8 1/2 x 11 B&W photo follows.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Facility/Equipment Nomenclature or Title | Command Center of the Furture |

1. The purpose of the Command Center of the Furture is to serve as a briefing center and advanced technology demonstration theater.

2. This facility is moveable; however, lighting, displays, and screens are built into the overall building structure.

3. Replacement value of this facility is $300K.

4. Gross weight and cube of facility/equipment: 5,000 pounds; 9600 cubic feet.

5. This facility has no special utility support requirements.

6. There are no special budget requirements for this facility.

7. The equipment in the Command Center of the Future requires air conditioning.

8. This facility could be constructed at another site for its replacement value.

9. This facility was constructed through the modification of extisting spaces in Bldg 33 of the NCCOSC RDTE&E Division.

10. Functional Support Areas: 10.9, 11.1, 11.2, 11.3.

11. Historical utilization for fiscal years 1989-1993: the Command Center of the Furture was only completed this year and a historical average is therefore not available; to date since completion the facility is used an average of 3 days per week to support presentations and demonstrations.

12. Future utilization to FY 1997: the Command Center of the Furture is expected to be used an average of 4 days per week through the next 5 years.

13. The approximate number of personnel used to operate this facility/equipment is 2.

14. The approximate number of personnel used to maintain this facility/equipment is 1.

15. One 8 1/2 x 11 B&W photo follows.

# TAB C

# RANGE RESOURCES

# RANGE CAPABILITY FORM

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Range Nomenclature or Title | Waterside Security System (WSS) Test Range |

1. Range: Waterside Security System (WSS) Test Range.

a. The Waterside Security System Test Range supports the In-Service Engineering Activity (ISEA) and Software Support Activity (SSA) functions of the Waterside Security System San Diego Installation.

b. The WSS San Diego Installation is located at NCCOSC RDTE DIV SAN DIEGO CA pier 160 in San Diego Bay.

c. The range is collocated with the facility headquarters.

d. Range size: 1.3 square nautical miles.

e. Range scheduling authority: NCCOSC RDTE DIV SAN DIEGO CA Code 532.

f. Air space available/restrictions: none.

g. Maximum water depth available/restrictions: 42 feet/underwater acoustic levels are restricted in certain areas.

h. Instrumentation capability: not applicable.

i. Accuracy of tracking: radar element +/- 34 yards (range), +/- 1 degree (bearing); sonar element +/- 1.25 feet (range), +/- 3.5 degrees (bearing).

j. Data collection/replay capability: RS-170, RS-232, and RS-422.

k. Maximum hours per year that this range is available to support activities (not counting down time due to maintenance, reconfiguration, or administrative activities): 1300 (75% of a work year).

l. Actual hours this range was utilized per year for FY 1989-93: 800 (45% of a work year); note: the range was installed at NCCOSC RDTE DIV SAN DIEGO CA in FY 1993 using the equipment previously installed at NAVSUBASE Bangor, WA; the reported utilization is based on use at Bangor.

m. Actual hours utilized in FY 1993: 300 (17% of a work year); note: represents use at Bangor which was exceptionally low in FY 1993 due to funding constraints which limited the travel budget for NCCOSC RDTE DIV SAN DIEGO CA personnel; utilization is expected to increase significantly now that the range has been relocated to NCCOSC RDTE DIV SAN DIEGO CA and travel expenses will no longer be incurred when the range is in use.

n. Range customers: NCCOSC RDTE DIV SAN DIEGO CA Code 532, NESEA, NSWC, ARL:UT.

o. Percentage of utilization time by customer: NCCOSC RDTE DIV SAN DIEGO CA Code 532, 100%; NESEA, 15%; NSWC, 15%; ARL:UT, 25%; note: the sum of the percentages is greater than 100 because tests are often conducted simultaneously.

p. Drawings of the range follow.

2. This range is not part of the DoD Major Range and Test Facility Base (MRTFB).

3. There are no limiting (current/future) environmental and/or encroachment characteristics associated with this range.

| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
|---|---|
| Range Nomenclature or Title | Marine Mammal Training Range |

1. Range: Marine Mammal Training Range.

a. The Marine Mammal Training Range, consisting of seven training and maintenance sites, is used for open water training of Navy marine mammals. Training involves developing and enhancing marine mammal capabilities utilized in the detection and marking of underwater objects.

b. The Marine Mammal Training Range is located in San Diego Bay and the ocean area off Point Loma. The following table summarizes range parameters.

| Range Numbe r | Geographic Location | Distance to NRaD (nautical miles) | Area (square nautical miles) | Maximum Depth (feet) | Accuracy of tracking (meters) |
|---|---|---|---|---|---|
| R-1 | San Diego Bay | 2.17 nm | 0.17 $nm^2$ | 37 ft | +/- 5 m |
| R-2 | San Diego Bay | 2.19 nm | 0.41$nm^2$ | 40 ft | +/- 5 m |
| R-3 | San Diego Bay | 0.44 nm | 0.01$nm^2$ | 38 ft | +/- 5 m |
| R-4 | SE of Pt Loma | 4.48 nm | 4.51$nm^2$ | 51 ft | +/- 5 m |
| R-5 | S of Pt Loma | 4.71 nm | 1.94 $nm^2$ | 174 ft | +/- 5 m |
| R-6 | W of Pt Loma | 11.24 nm | 1.85 $nm^2$ | 300 ft | +/- 5 m |
| R-7 | W of Pt Loma | 13.80 nm | 2.10 $nm^2$ | 650 ft | +/- 5 m |

c. Distance from the various range areas to the facility headquarters are per the above table.

d. The Marine Mammal Range occupies approximately 10 square nautical miles as noted in the above table.

e. Range scheduling authority: none.

f. Air space available/restrictions: none.

g. Maximum water depth available varies by area per the table above; there are no depth restrictions associated with this range.

h. Instrumentation capability: Differential Global Positioning System (GPS).

i. Accuracy of tracking: +/- 5 meters.

j. Data collection/replay capability: Differential GPS.

k. Maximum hours per year that this range is available to support activities (not counting down time due to maintenance, reconfiguration, or administrative activities): 24 hours/day, 365 days/year (the range areas do not require any special services; they are passive geographic areas used to develop and test animal performance and are not controlled or restricted access spaces).

l. Actual hours this range was utilized per year for FY 1989-93: the training ranges were in use a minimum of 5 days/week, 8 hours/day for FY 1989-93; depending on the training phase, use may have involved night or weekend operations.

m. Actual hours utilized in FY 1993: 10,400 (estimated).

n. Range customers: NCCOSC RDTE DIV SAN DIEGO CA Code 51 and Fleet Marine Mammal Systems (EODMU THREE).

o. Percentage of utilization time by customer: the range areas are shared use by NCCOSC RDTE DIV SAN DIEGO CA Code 51 and Fleet Marine Mammal Systems (EODMU THREE) and a percentage breakdown is not available.

p. A two-page drawing showing the seven range areas is attached.

2. This range is not part of the DoD Major Range and Test Facility Base (MRTFB).

3. There are no limiting (current/future) environmental and/or encroachment characteristics associated with this range.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Range Nomenclature or Title | NCCOSC RDTE DIV SAN DIEGO CA Antenna Range |

1. Range: NCCOSC RDTE DIV SAN DIEGO CA Antenna Range.

a. The NCCOSC RDTE DIV SAN DIEGO CA Antenna Range is used in the design, development, test and evaluation of antenna systems being developed at NCCOSC RDTE DIV SAN DIEGO CA. It is also used for the evaluation, calibration and servicing of antennas sent to NCCOSC RDTE DIV SAN DIEGO CA for that purpose. The location across the natural deep canyons on the Point Loma peninsula provide reflection-free operation, electromagnetic isolation, access to testing with ships at sea and an over water link to San Clemente Island.

b. The antenna range consists of 8 outdoor signal paths situated across canyons on the Point Loma Naval Reserve. It is bounded on the east by San Diego Bay and on the west by the Pacific Ocean. The approximate location is 32 degrees, 42 minutes north by 117 degrees, 15 minutes west. Three anechoic chambers are also located on the range.

c. The antenna range is located approximately one mile south of the main sites of NCCOSC and NCCOSC RDTE DIV SAN DIEGO CA.

d. The antenna range takes up an area of approximately 0.16 square miles. The transmitter buildings and receive towers consists of 7 structures totalling 4478 square feet. The three anechoic chambers total 1460 square feet. Estimated replacement costs are $103M for the land, $3.2M for the transmit/receive buildings and test equipment, and $1.1M for the anechoic chambers and their test equipment. This includes $200K for the full scale DDG 72 antenna mast mock-up.

e. Scheduling of range activity is done by NCCOSC RDTE DIV SAN DIEGO CA code 753.

f. Air restrictions exist over Naval Air Station North Island (NASNI) to the east, Lindberg Field to the north-east and residential areas to the north. Unrestricted air space exists to the west and south. Fly-overs can be arranged, as well as air operations with NASNI.

g. The "mean lower low water level" water depth is 6 feet at 2400 feet to the west and 60 feet at 7000 feet to the west; out in the Pacific Ocean depth drops rapidly to hundreds of feet, and is down to hundreds of fathoms within 4 miles. Eastward, across the

San Diego Bay, the level is 30 feet at 3000 feet away and 55 feet at 4000 feet away.

h. The antenna range is equipped with 3-channel receivers, 1-channel receivers, pattern recorders and pedestals. The pedestals have weight capacity from a few hundred pounds to 30,000 pounds. Signal generators and synthesizers, coupled with solid state and TWT amplifiers, provide for transmission over the frequency range from 0.045 GHz to 110 GHz, although the ranges are usually not used below 0.4 GHz. In-house developed software and hardware allows for digital recording of antenna pattern data on one of the signal paths and in one of the chambers.

i. Amplitude measurements have been made to tenths of a dB and angle data recorded to tenths of a degree. Boresight measurements on NESP (Navy MILSTAR) antennas are to 0.03 degrees (RSS).

j. Data is typically recorded on antenna pattern paper, either rectangular or circular. Amplitude ranges are typically 40, 60 or 80 dB. Data can be digitally recorded also. Digitally recorded data is displayed on a PC and can be plotted with graph routines in rectangular or circular formats.

k. Mild climate conditions allow for nearly year-round range operation, with typically 2,000 hours of range availability. This availability can be extended greatly, since many of the signal paths and all of the three chambers can be operated independently. At one time during FY 1994 three of the signal paths and all three chambers were in operation simultaneously.

l. Actual hours of range operation are not recorded. The estimated yearly utilized hours for the past five years is 2,800 hours.

m. Actual hours of range operation were not recorded. The estimated utilized hours for FY 1993 is 2,600 hours. Range utilization has increased in FY 1994. With the mast mockup using one signal path about 90% of the time, JTIDS using another path and a chamber about 50% of the time, classified projects using the other two chambers about 35% of the time and NESP using a third signal path about 15% of the time, we have probably already exceeded 2,300 hours.

n. The range is primarily used for in-house RDT&E, on such projects as JTIDS, NESP, NAVSTAR GPS, SMATCALS, UFDUF, ARGUS, ARIES and RUTLEY. Antennas are also serviced and calibrated for NAWC-WD, China Lake and Barstow Marine Corp Logistics Base.

o. Approximately 60% of the hours were spent on in-house efforts, 25% on work for Barstow and 15% on work for China Lake.

p. A photo of the range is attached.

2. The antenna range is not a part of the DoD Major Range and Test Facility Base (MRTFB).

3. There are no known environmental or encroachment characteristics associated with this range.

| | |
|---|---|
| Technical Center Site | NCCOSC RDTE DIV SAN DIEGO CA |
| Range Nomenclature or Title | NCCOSC RDTE DIV SAN DIEGO CA Radar Test Range |

1. Range: NCCOSC RDTE DIV SAN DIEGO CA Radar Test Range.

a. The NCCOSC RDTE DIV SAN DIEGO CA Radar Test Range is used to support several programs. Major efforts are:

(1) Radar Cross Section (RCS) of full scale naval ships and aircraft
(2) Airborne Target Identification
(3) X-Band, Ku-Band, and Millimeter Wave Band ISAR target imaging development
(4) Periscope and wake detection
(5) Impulse radar measurements
(6) HF surface wave radar development
(7) Ultra-Wideband, Adaptive, Coherent radar testing
(8) Low probability of intercept radar testing

b. The NCCOSC RDTE DIV SAN DIEGO CA Radar Test Range is located on the west side of Point Loma, adjacent to the Pacific Ocean (radar site: 32-42.19N/117-15.25W).

c. The range is at headquarters: Field House 33, seaside (0.5 miles north of Bldg. 605).

d. Range size is 275 Sq km (estimated).

e. Range scheduling authority: NCCOSC RDTE DIV SAN DIEGO CA range coordination office and the naval Fleet Area Control & Surveillance Facility (FACSFAC) at Naval Air Station North Island.

f. Air space is restricted by FAA, adjacent to San Diego International Airport, maximum flight ceiling: 850 meters (2,800 ft)

g. Water depth is between 18 meters and 1100 meters.

h. The instrumentation capability can be summarized by the following table:

| Radar | Frequency | Bandwidth | Range Resolution |
|---|---|---|---|
| Ultra Wideband (UWB) Impulse | 150-700MHz | 550MHz | 25cm |
| High Frequency (HF) Surface Wave | 10-30MHz | 100KHz | 1.5km |
| S-Band | 3GHz | 500MHz | 25cm |
| X-Band | 9GHz | 500MHz | 25cm |
| Ku-Band | 14GHz | 500MHz | 25cm |
| Millimeter Wave | 50GHz | 500MHz | 25cm |

i. The tracking accuracy is 18m x 0.1 degree in the automatic tracking modes.

j. Complete real time data collection is provided with replay capability.

k. The maximum hours per year that this range is available to support activities (not counting down time due to maintenance, reconfiguration, or administrative activities); 1,620.

l. Actual hours this range was utilized per year for FY 1989-1993:

FY 1989 432 hours
FY 1990 456 hours
FY 1991 528 hours
FY 1992 720 hours
FY 1993 840 hours

m. Actual hours utilized in FY 1993: 840 hours

n. The range customers are NAVSEA, ONR, ARPA, and SPAWAR

o. The percentage of utilization time by customer was:

| Customer | FY 1989 | FY 1990 | FY 1991 | FY 1992 | FY 1993 |
|---|---|---|---|---|---|
| NAVSEA | 83% | 83% | 77% | 50% | 43% |
| ONR | 17% | 17% | 23% | 23% | 23% |
| ARPA | 0% | 0% | 0% | 17% | 20% |
| SPAWAR | 0% | 0% | 0% | 10% | 14% |

p. A drawing of the range is attached.

2. This range is not part of DoD Major Range and Test Facility Base (MRTFB).

3. There are no known limiting environmental and/or encroachment characteristics associated with this range.

## BRAC-95 CERTIFICATION

**Certified Data: Naval Command, Control and Ocean Surveillance Center, RDT&E Division San Diego, CA - BRAC 95 Data Call Number Five**

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

MAJOR CLAIMANT LEVEL

W.H. Cantrell
NAME (Please type or print)

W.H. Cantrell
Signature

Commander
Title

17 May 1994
Date

Space and Naval Warfare 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)**

J.B. Greene, Jr
NAME (Please type or print)

J.B. Greene Jr.
Signature

Acting
Title

24 MAY 1994
Date

Activity

## BRAC-95 CERTIFICATION

**Certified Data: Naval Command, Control and Ocean Surveillance Center, ISE East Coast Division, Charleston SC - BRAC 95 Data Call Number Five**

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

NEXT ECHELON LEVEL

J. J. DONEGAN
NAME (Please type or print)

SIGNATURE

Commander
Title

17 May 1994
Date

Naval Command, Control and Ocean Surveillance Center
Activity

# BRAC-95 CERTIFICATION

Reference: SECNAVNOTE 11000 of 08 December 1993

In accordance with policy set forth by the Secretary of the Navy, personnel of the Department of the Navy, uniformed and civilian, who provide information for use in the BRAC-95 process are required to provide a signed certification that states "I certify that the information contained herein is accurate and complete to the best of my knowledge and belief."

The signing of this certification constitutes a representation that the certifying official has reviewed the information and either (1) personally vouches for its accuracy and completeness or (2) has possession of, and is relying upon, a certification executed by a competent subordinate.

Each individual in your activity generating information for the BRAC-95 process must certify that information. Enclosure (1) is provided for individual certifications and may be duplicated as necessary. You are directed to maintain those certifications at your activity for audit purposes. For purposes of this certification sheet, the commander of the activity will begin the certification process and each reporting senior in the Chain of Command reviewing the information will also sign this certification sheet. This sheet must remain attached to this package and be forwarded up the Chain of Command. Copies must be retained by each level in the Chain of Command for audit purposes.

I certify that the information contained herein is accurate and complete to the best of my knowledge and belief.

ACTIVITY COMMANDER

KIRK E. EVANS, CAPT., USN
NAME (Please type or print)

Signature

COMMANDING OFFICER
Title

10 MAY 94
Date

NCCOSC RDTE DIV
Activity

DATA CALL # 5 - MILITARY VALUE, NCCOSC RDTE DIV