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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES (CNWRA) COMPUTER AND INTERFACE REQUIREMENTS FOR FISCAL YEAR 1997

Prepared for

Nuclear Regulatory Commission
Contract NRC-02-93-005

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August 1996

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ACKNOWLEDGMENTS

This report was prepared to document work performed by the Center for Nuclear Waste Regulatory Analyses (CNWRA) for the Nuclear Regulatory Commission (NRC) under Contract No. NRC-02-93-005. The activities reported here were performed on behalf of the NRC Office of Nuclear Material Safety and Safeguards, Division of Waste Management. The report is an independent product of the CNWRA and does not necessarily reflect the views or regulatory position of the NRC.

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1 INTRODUCTION

This letter report, Intermediate Milestone (IM) 5702-158-660, identifies computer-related requirements for the successful operation of the Center for Nuclear Waste Regulatory Analyses (CNWRA) computer systems and applications. It includes the known computer systems interface requirements to maintain compatibility in fiscal year (FY) 1997 with the Nuclear Regulatory Commission (NRC) Division of Waste Management (DWM) hardware and software systems. Specific hardware and software items necessary for the DWM to maintain compatibility with the CNWRA systems are identified in the text and tables in Chapter 3.

The implementation of these requirements will ensure that the interfaces for the systems and networks described herein will be compatible with those at the DWM and support the schedules for deliverables based on computer applications in the various program areas. The timely availability of the necessary computer-related items will facilitate the utilization of the office automation, document and database management, and project management software, as well as technical computing capabilities by individual staff including team members from the DWM and the CNWRA.

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2 CURRENT SYSTEMS AND NETWORK CONFIGURATION

The CNWRA systems are configured in a wide area network (WAN) and local area network (LAN) to support communications by the staff with all of the major organizations in the high-level waste (HLW) program. The CNWRA San Antonio and Washington Technical Support Office (WTSO) network configuration is shown in Figure 2-1. The network includes a Firewall Computer Security System to protect the CNWRA and the DWM against unauthorized intruders. The Firewall Systems are shown in the Perimeter Net (DMZ) (lower left-hand corner) in Figure 2-1.

2.1 WIDE AREA NETWORK

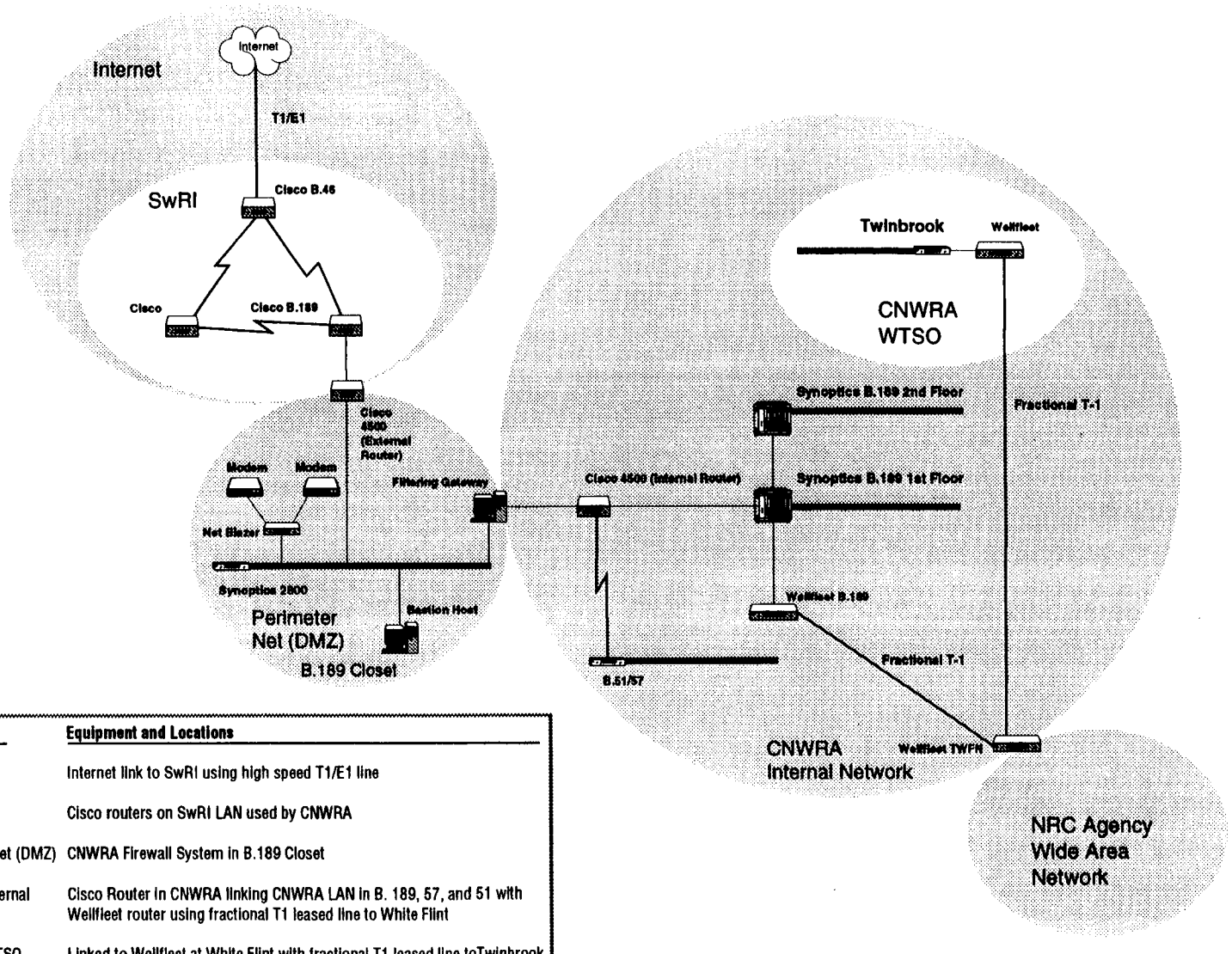
The major organizations in the CNWRA WAN are: (i) the NRC DWM in Rockville, Maryland; (ii) the CNWRA in San Antonio, Texas; and (iii) the CNWRA WTSO in Rockville, Maryland. The U.S. Department of Energy (DOE) offices in Washington, DC, and Las Vegas, Nevada, its sponsored organizations, and other worldwide organizations whose services may be required in the execution of the HLW program may be accessed using the Southwest Research Institute (SwRI) link on the Internet.

The CNWRA primary communication interface to its WTSO and the NRC DWM is a Fractional T1 leased line supported on the NRC WAN. The current configuration for the DWM computer systems is based on the NRC Agency Upgrade to Office Systems (AUTOS), a LAN implemented throughout the entire agency, and the DWM High Performance UNIX Technical Computing System, referred to as the Advanced Computer Review System (ACS). The CNWRA has assisted the DWM in the design and implementation of the ACS during the past four years.

2.2 LOCAL AREA NETWORK

The current CNWRA LAN configuration is based on an Ethernet LAN using the Transmission Control Protocol/Internet Protocol (TCP/IP). The major segments of the LAN support an open system architecture that consists of seven UNIX servers for major office automation, technical, and database applications. The CNWRA LAN office automation, technical, and database servers are shown in Figure 2-2.

The current user workstations, personal computers, and peripherals on the CNWRA LAN in San Antonio, Texas, and the WTSO in Rockville, Maryland, are listed in Table 2-1.



Networks	Equipment and Locations
Internet	Internet link to SwRI using high speed T1/E1 line
SwRI	Cisco routers on SwRI LAN used by CNWRA
Perimeter net (DMZ)	CNWRA Firewall System in B.189 Closet
CNWRA Internal Network	Cisco Router in CNWRA linking CNWRA LAN in B. 189, 57, and 51 with Wellfleet router using fractional T1 leased line to White Flint
CNWRA WTSO	Linked to Wellfleet at White Flint with fractional T1 leased line toTwinbrook
NRC Agency Wide Area Network	Linked to CNWRA SA and WTSO via fractional T1 leased line and Wellfleet Router

Figure 2-1. San Antonio and Washington Technical Support Office network configuration

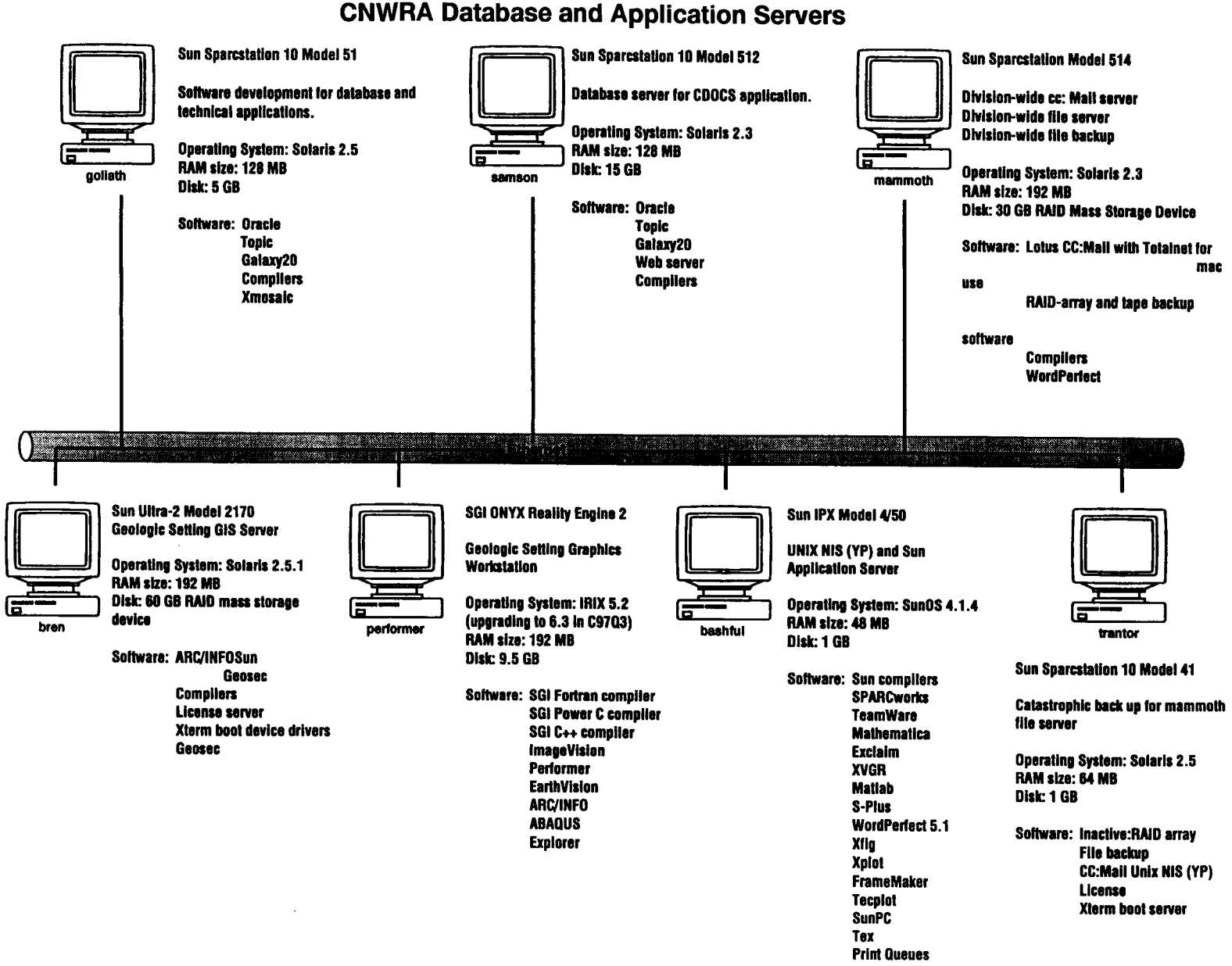


Figure 2-2. Local area network technical, database, and office automation servers

Table 2-1. List of major computers and peripherals

Categories	Description	Quantity
Servers		
Sun	NFS Sun Ultra II and Sparc20 with mass storage Redundant Array of Inexpensive Disks (RAID) System (60 and 30 GB)	2
	Sun Sparc10 Servers	4
SGI	Silicon Graphics ONYX Reality Engine 2 Server	1
Workstations		
Silicon Graphics, Inc.	Silicon Graphics Indigo 2 and Indy Workstations	3
Sun	Sun Sparc10 Model 41 Workstations (3 staff, and 1 other)	4
	Sun IPX 4/50 Workstations (7 staff, and 1 other)	8
	Sun Sparc20 Model 51 Workstations (6 staff)	6
	SUN Sparc5 (Security)	2
Apple	Apple Macintosh/Quadra Workstations (8 staff, and 2 others)	10
	Apple Power Macintosh (5 staff)	5
Personal Computers		
IBM	IBM PS/2 Model 95 and clones (52 staff and 25 others)	77
Printers		
	QMS Laser Printers	3
	HP LaserJet IV Printers	12
	HP LaserJet III Printers	3
	Tektronix Phaser III Color Printer	1

Table 2-1. List of major computers and peripherals (cont'd)

Categories	Description	Quantity
Plotter		
	HP Draftmaster Drum Plotter	1
Router		
	Wellfleet Router/Concentrator (NRC-provided)	2
	Cisco 4500M Router	2
	NetBlazer Modem Server	1
Scanner		
	Fujitsu Scanner	1

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3 REQUIREMENTS FOR COMPUTERS AND INTERFACES FOR FISCAL YEAR 1997

The computer acquisitions planned for FY97 at the CNWRA are described in the following five sections. Specific lists of hardware and software required to support applications at the CNWRA are identified. In addition, a cost estimate is provided for those hardware and software items. All hardware and software items described in the following tables will be leased on overhead or purchased using SwRI capital equipment funds.

3.1 OFFICE AUTOMATION

The standard word processing software used by the NRC DWM and the CNWRA is WordPerfect (WP) 5.1 for DOS. Both the NRC DWM and the CNWRA plan to upgrade to WP 6.1 sometime in FY97. All CNWRA Major and IM deliverables are expected to be submitted electronically in appropriate version of WP along with the hard copy documents.

The e-Mail system software currently used at the CNWRA is cc:Mail, and it will be upgraded to cc:Mail Release 6 in FY97. The CNWRA cc:Mail system is interfaced to the NRC Groupwise e-Mail system. The CNWRA uses an ORACLE-based system for scheduling meetings and conference rooms, travel, and vacations. The upgrade cost for WP 6.1 and cc:Mail Release 6 is shown in Table 3-1.

Table 3-1. Software for office automation in fiscal year 1997

Quantity	Item Description	Estimated Cost
80	Upgrade WordPerfect 5.1 to WordPerfect 6.1	$7,120
80	Upgrade cc:Mail Release 1 to cc:Mail Release 6	$1,100
	SUBTOTAL	$8,220

3.2 CONSOLIDATED DOCUMENT MANAGEMENT SYSTEM

The planned software and hardware upgrades and additions for the Consolidated Document Management System (CDOCS) during FY97 are shown in Table 3-2. To maintain compatibility, the ORACLE and TOPIC upgrades will be necessary for the NRC. These upgrades will only be implemented if major functionality improvements are judged by NRC and CNWRA staff to justify the cost. The color scanner allows the CNWRA to maintain compatibility with the existing NRC scanner.

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Table 3-2. Hardware and software for the Consolidated Document Management System in fiscal year 1997

Quantity	Item Description	Estimated Cost
3	TOPIC, ORACLE, GALAXY Maintenance	$10,000
1	Color Scanner	$14,500
	SUBTOTAL	$24,500

3.3 PROJECT MANAGEMENT AND REPORTING

The project management function consists of operations planning, periodic cost reporting, commitment control, and project scheduling at the CNWRA. During FY96, the CNWRA continued using Microsoft Excel to support periodic cost reporting and commitment control. The CNWRA will continue to use this product. Microsoft Project has been selected for planning and scheduling purposes since it will interface seamlessly with Excel.

Recommendations to provide DWM and CNWRA staff access to reports, such as the Commitment Control Log (CCL), are on hold at this time. If NRC funding permits application of various resources to offer access to these reports, then the database products that would be required are shown in Table 3-3.

Table 3-3. Project management software for fiscal year 1997

Quantity	Item Description	Estimated Cost
1	Oracle/Access products for database/network	$15,000
	SUBTOTAL	$15,000

3.4 SCIENTIFIC AND ENGINEERING MODELS AND CODES

The NRC and the CNWRA will be involved in the technical review of activities and development of guidance, procedures, and technical positions. Fulfilling these tasks involves: (i) ready access to technical databases, (ii) analysis and display of spatial and temporal data, (iii) code assessments, (iv) literature searches and reviews, and (v) checking DOE calculations and documents. These tasks require the utilization of Geographical Information Systems (GIS), two-dimensional (2D)/three-dimensional (3D) graphics, and other data management software. A D/E Format Ink Jet Plotter is required to upgrade the CNWRA existing HP Draftmaster Pen Plotter. A laptop will also be acquired for travel and work in the field. The operating system for Sun computers will be upgraded to Solaris 2.5 to take advantage of additional features as the application software becomes compatible.

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Computer activities in the CNWRA Total System Performance Assessment and Technical Integration task include reviewing the DOE total system performance assessments (TSPAs) and conducting independent iterative PAs for the DWM. The UNISON Load Balancing software package will be evaluated for all CNWRA UNIX systems to queue and process jobs more effectively for all technical users. Additionally, the following codes (primarily FORTRAN-based) must be maintained and developed further to meet ongoing TSPA requirements.

- 3DStress, Version 1.1
- 3DStress, Version 1.2
- ABAQUS, Version 5.5
- BREATH, Version 1.1
- CHAIN T
- CTOUGH, Version 1.0
- EBSPAC, Version 1.0
- EQ 3/6, Version 7.2b
- FITEQL, Version 2.0
- GENII-S, Version 1.485
- MAGNUM
- MINTEQA2, Version 3.10/3.11
- MODFLOW MF, Version 1.31
- MULTIFLO, Version 1.0
- PORFLOW, Version 2.50
- PVHVIEW, Version 1.0
- SEISM1, Version 1.1
- SUFLAT, Version 1.0
- TPA, Version 2.0
- UDEC, Version 2.01

The cost of development, modification, and maintenance of the codes is included in the budget for each key technical issue (KTI). All of the software upgrades and hardware additions for technical computing are shown in Table 3-4.

Table 3-4. Technical computing hardware and software for fiscal year 1996

Quantity	Item Description	Estimated Cost
26	UNISON Load Balancing software (if found suitable)	$16,000
26	Upgrade Sun to Solaris 2.5	$ 5,000
1	D/E Format Ink Jet Plotter	$10,000
1	Field/Travel Laptop (hardware case, 12V converter)	$7,500
	SUBTOTAL	$38,500

3.5 COMMUNICATIONS AND SECURITY SYSTEMS

A Fractional T1 line (576 kbps) is available on the NRC WAN to the CNWRA. The T1 line supports increased use of cc:Mail and CDOCS. External CRAY usage was transferred to the Minneapolis Supercomputer Center (MSC), using Internet access. Internet access of the DOE and other contractor databases has also increased.

A Firewall Computer Security System that provides security for the entire CNWRA network from Internet intruders was implemented in FY95. This system will be tested by an independent NRC contractor in FY97, and recommended changes agreed upon by the NRC will be made. Additional hardware and software may be identified for purchase at that time. New hardware and software to increase the capacity of the LAN include an 80-Slot Optical Drive Jukebox, additional 60 GB of disk storage, Exabyte 480 80-Tape 4-Drive Backup Unit, and additional Switch Modules for LAN Ethernet Switches. With NRC permission, an anonymous File Transfer Protocol (FTP) server may be installed outside the CNWRA Firewall Computer Security System to permit others to share data with CNWRA staff. The Firewall Proxie software will be upgraded. Each of these items are shown in Table 3-5.

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Table 3-5. Communications and Security Systems hardware and software for fiscal year 1997

Quantity	Item Description	Estimated Cost
1	80-Slot Optical Drive Jukebox	$34,000
1	Additional Disk Storage (60 GB)	$36,000
1	Exabyte 480 80-Tape 4-Drive Backup Unit	$6,800
2	Additional Switch Modules for LAN Ethernet Switches	$30,000
1	Anonymous FTP Server	$3,000
1	Improved Firewall Proxie Software	$5,000
	SUBTOTAL	$114,800

4 SUMMARY

The CNWRA requirements in the five application categories are summarized in Table 4-1.

Table 4-1. Summary of computer and interface requirements for fiscal year 1997

Category	Quantity	Item Description	Estimated Cost
Office Automation	80	Upgrade WordPerfect 5.1 to WordPerfect 6.1	$ 7,120
	80	Upgrade cc:Mail Release 1 to cc:Mail Release 6	$ 1,100
Consolidated Document Management System	1	Color Scanner	$ 14,500
	3	TOPIC, ORACLE, GALAXY Maintenance	$ 10,000
Project Management and Reporting	1	Oracle/Access products for database/network	$ 15,000
Scientific and Engineering Models and Codes	26	UNISON Load Balancing software	$ 14,635
	1	D/E Format Ink Jet Plotter	$ 10,000
	1	Field/Travel Laptop (hardware case, 12V converter)	$ 7,500
	26	Upgrade Sun to Solaris 2.5	$ 5,000
Communications and Security Systems	1	80-Slot Optical Drive Jukebox	$ 34,000
	1	Additional Disk Storage (60 GB)	$ 36,000
	1	Exabyte 480 80-Tape 4-Drive Backup Unit	$ 6,800
	2	Additional Switch Modules for LAN Ethernet Switch	$ 30,000
	1	Anonymous FTP Server	$ 3,000
	1	Improved Firewall Proxie Software	$ 5,000
		TOTAL	$199,655

This report defines the hardware and software only and does not include any labor for system design, development, implementation, testing, training, and documentation. The CNWRA has existing tasking to support FORTRAN codes and other technical computing applications in FY97.