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**CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
COMPUTER AND INTERFACE REQUIREMENTS
FOR FISCAL YEAR 1999**

Prepared for

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Prepared by

**Henry F. Garcia
Raymond B. Kotara
Rebecca A. Sanchez**

**Center for Nuclear Waste Regulatory Analyses
San Antonio, Texas**

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1 INTRODUCTION

This letter report 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 systems and applications that will be acquired in fiscal year (FY) 1999 to facilitate electronic communication with the Nuclear Regulatory Commission (NRC) Office of Nuclear Material Safety and Safeguards (NMSS) hardware and software systems. Specific hardware and software necessary to maintain an efficient operating environment are identified in the text and tables in chapter 3.

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

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 NRC offices, divisions and/or branches. 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 NRC against unauthorized intruders. The firewall system is identified as the Perimeter Network in figure 2-1.

2.1 WIDE AREA NETWORK

The three organizations in the CNWRA WAN are the NRC NMSS in Rockville, Maryland; the CNWRA in San Antonio, Texas; and 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 that may provide information required in the execution of the high-level waste (HLW) program use the Southwest Research Institute (SwRI) link on the Internet to access the WAN.

The CNWRA primary communication interface to its WTSO and the NRC is a fractional T1 leased line supported on the NRC WAN. The current configuration for the NMSS computer systems is based on a LAN implemented throughout the entire agency. In addition, NMSS currently uses a high performance UNIX technical computing system, referred to as the Computerized Risk Assessment and Data Analysis Lab. NMSS also plans to participate in the agency-wide Agency Documents Access and Management System (ADAMS) in FY99. Selected portions of this ADAMS system will be accessible to the CNWRA.

2.2 LOCAL AREA NETWORK

The current CNWRA LAN configuration is based on an Ethernet LAN using the Transmission Control Protocol/Internet Protocol. The major segments of the LAN support an open-system architecture that consists of six UNIX servers and one NT server for major office automation and 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 also listed in table 2-1.

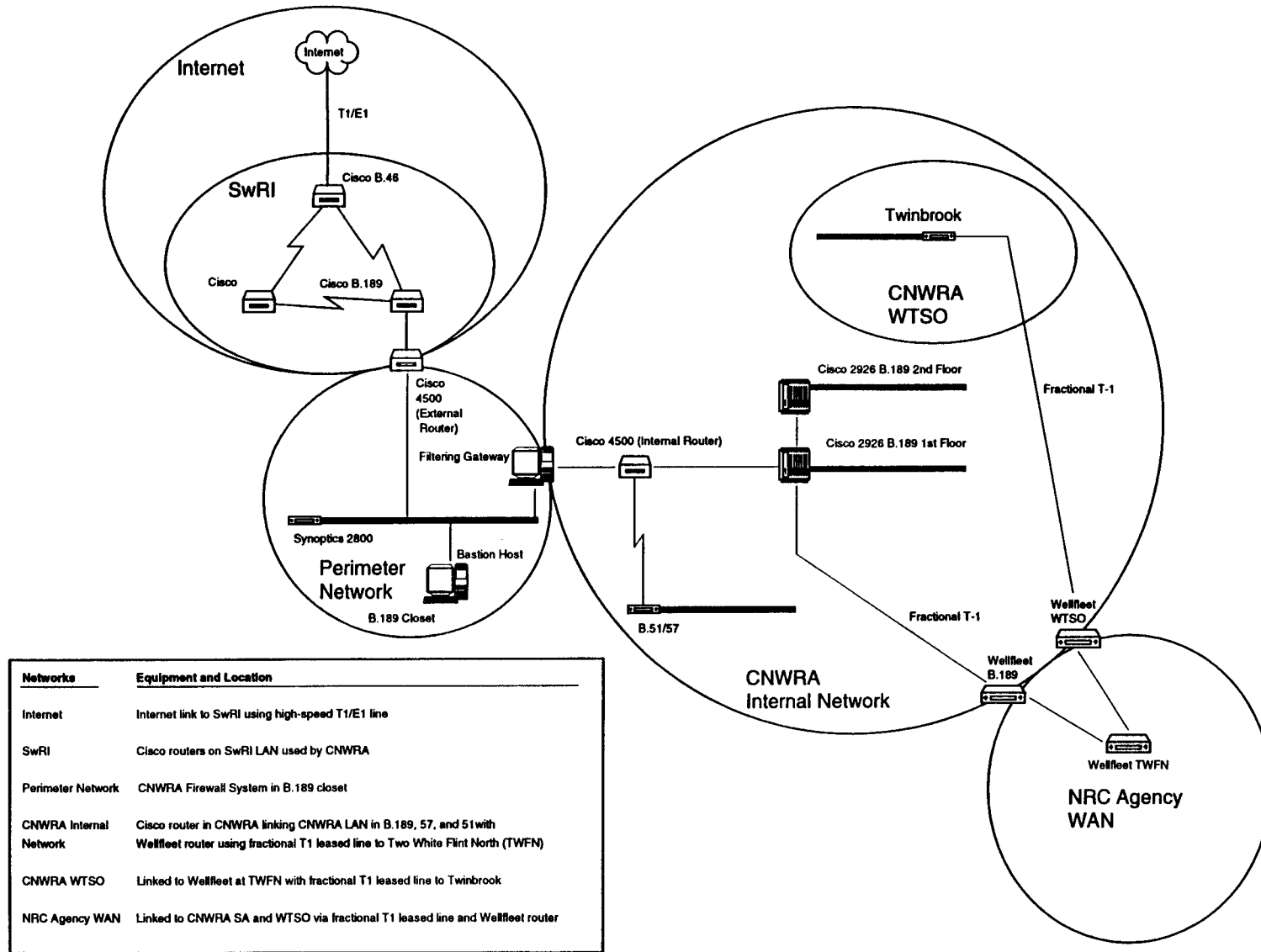


Figure 2-1. Center for Nuclear Waste Regulatory Analyses San Antonio and Washington Technical Support Office network configuration

Primary CNWRA Database and Application Servers

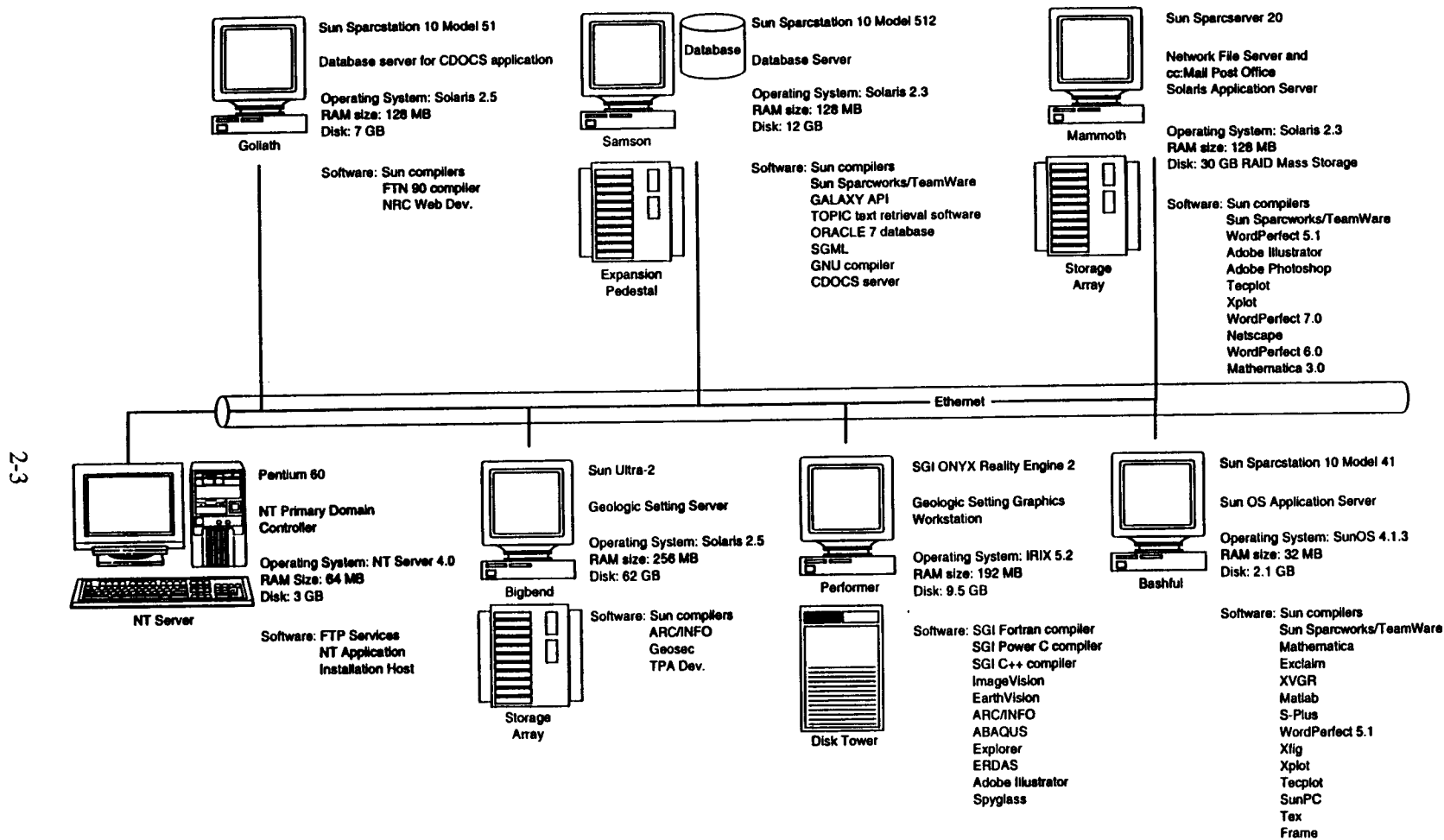


Figure 2-2. Center for Nuclear Waste Regulatory Analyses local area network technical, database, and office automation servers

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Table 2-1. List of major computers and peripherals

Categories	Description	Quantity
Servers		
Sun Microsystems, Inc.	Network File Server Sun Ultra II and Sparc20 with mass storage Redundant Array of Inexpensive Disks System (60 and 30 GB)	2
	Sun Sparc10 Servers	3
Silicon Graphics, Inc.	SGI ONYX Reality Engine 2 Server	1
International Business Machines, Inc.	NT Server IBM PS/2 95	1
Workstations		
Silicon Graphics, Inc.	SGI Indigo 2 and Indy Workstations	3
Sun Microsystems, Inc.	Sun Sparc10 Model 41 Workstations	5
	Sun IPX 4/50 Workstations	7
	Sun Sparc20 Model 51 Workstations	8
	Sun Ultra I Model 140 Workstations	2
	Sun Sparc5 (Security)	2
Tektronix, Inc.	X-Terminal	3
Apple Computer, Inc.	Apple Macintosh/Quadra Workstations	9
	Apple Power Macintosh	5
Online Storage		
Network Appliance	NetApp F210 Filer	1
Personal Computers		
Various	Pentiums/IBM PS2/Clones	82

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

Categories	Description	Quantity
Printers		
QMS, Inc.	QMS Laser Printers	3
Hewlett Packard Co.	HP DesignJet 755CM Printer	1
	HP LaserJet IV Printers	12
Apple Computer, Inc.	Apple LaserWriter II	1
Tektronix, Inc.	Tektronix Phaser III Color Printer	1
	Tektronix Phaser 550 Color Printer	1
Plotter		
Hewlett Packard Co.	HP Draftmaster Drum Plotter	1
Router		
Wellfleet Communications, Inc.	Wellfleet Router/Concentrator (NRC provided)	2
Cisco Systems, Inc.	Cisco 4500M Router	2
Telebit, Inc.	NetBlazer Modem Server	1
Scanner		
Fujitsu Products of America, Inc.	Fujitsu Scanner	1

3 REQUIREMENTS FOR COMPUTERS AND INTERFACES FOR FISCAL YEAR 1999

The CNWRA computer-related acquisitions planned for FY99 are described in the following sections. Specific hardware and software required to support CNWRA applications are identified, together with cost estimates. The items described in the following tables will be leased on CNWRA overhead or purchased using SwRI capital equipment funds.

3.1 OFFICE AUTOMATION

The standard word processing software authorized for use by the NRC and the CNWRA is WordPerfect® (WP) 8.0 for Windows. Currently, all CNWRA systems use the approved version of WP 8.0 under the Win/NT operating system, or its equivalent for Sun systems. It is understood the NRC NMSS will continue upgrading to WP 8.0 during FY98 and FY99. All CNWRA major and intermediate milestones are expected to be submitted electronically in the contractually required version of WP along with the hard copy documents.

The CNWRA recently increased its online storage capacity with the addition of new computing resources and online data storage units. The addition of the Win/NT platform coupled with the limitations of current backup hardware and software has prompted researching new data backup systems that would better accommodate present and future needs of the CNWRA in the area of storage management. Software/hardware candidates will permit the archiving of CNWRA-specific applications and data. Current estimates for expenditures in this area are listed in table 3-1.

The e-mail system software currently used at the CNWRA is Lotus cc:Mail Release 8. It is interfaced to the NRC Groupwise e-mail through Simple Mail Transfer Protocol servers. The CNWRA uses Microsoft Access 97 software for scheduling meetings and conference rooms as well as travel and vacations. Moreover, it is used for the creation and maintenance of the Commitment Control Log.

Table 3-1. Hardware and software for office automation, FY99

Quantity	Item Description	Estimated Cost
1	Backup Software for NT/UNIX	\$22,000
1	High Capacity Tape Storage Unit	5,000
SUBTOTAL		\$27,000

3.2 DOCUMENT MANAGEMENT SYSTEM

The CNWRA will migrate from the current Consolidated DOCument Management System (CDOCS) to a commercial package for general indexing of CNWRA correspondence and documentation. The CNWRA is searching for a commercial database software to replace CDOCS. The current cost estimate for an appropriate document management system is shown in table 3-2.

Table 3-2. Document management, FY99

Quantity	Item Description	Estimated Cost
1	Document Management System	\$10,000
SUBTOTAL		\$10,000

3.3 PROJECT MANAGEMENT AND REPORTING

The CNWRA project management function consists of operations planning, periodic cost reporting, commitment control, and project scheduling. During FY97, the CNWRA began using Microsoft® Excel to support periodic cost reporting and Microsoft Access for commitment control. Microsoft Project has been selected for planning and scheduling purposes, since it interfaces seamlessly with Microsoft Excel.

In FY99, the CNWRA will begin using a Windows NT-based software product to expedite proposal and operations planning, as well as pricing and cost estimating. The product selected for these purposes is shown in table 3-3. This software, Pro-Pricer, was selected to facilitate communication and data exchange with the SwRI Contracts department. Moreover, it can seamlessly interface with Microsoft Excel, the software currently used to create financial data for operations plans.

Table 3-3. Proposal and operations plan development, FY99

Quantity	Item Description	Estimated Cost
1	Executive Business Services Pro-Pricer	\$5,000
SUBTOTAL		\$5,000

3.4 TECHNICAL COMPUTING SOFTWARE

The CNWRA supports the NRC in the following areas: (i) Nuclear Waste Policy Act (NWPA) repository program providing technical assistance in support of ten key technical issues (KTIs) important to licensing the HLW repository and (ii) NWPA-related and non-NWPA programs offering technical assistance in support of the NMSS Division of Fuel Cycle Safety and Safeguards for the Tank Waste Remediation System (TWRS) project, the NMSS Division of Waste Management, West Valley Demonstration Project (WVDP), the Savannah River Site Aluminum-Based Spent Fuel, Uranium Recovery (UR) projects, and the Site Decommissioning Management Plan (SDMP) programs, as well as Spent Fuel Project Office projects. Not all the technical computing software listed below is used exclusively in the conduct of work on the NWPA repository program. For example, the TWRS project uses ESP/CSP, Version 6.0/6.1; the WVDP and/or SDMP project/programs run D and D, Int. Rel. 1.0, MEPAS, PATCHI, Version 1.1 and RESRAD, Version 5.62; and the UR project uses RADON, Version 1.2 and STABL, Version 5M.

The NRC and CNWRA will be involved in technical review of a broad range of DOE documents, including the viability assessment, and in development of guidance, procedures, issue resolution status reports, and other technical reports presenting results of its technical assistance to the NRC. Support to the NWPA repository program also includes technical review of DOE and other licensee documents. In addition,

independent assessments and evaluations, many of which are computationally intensive and draw upon large and complex databases, are conducted to support the NRC programs. Fulfilling these tasks requires (i) ready access to technical databases, (ii) analysis and display of spatial and temporal data, (iii) involvement in code assessments, (iv) conduct of literature searches and reviews, and (v) evaluation of the DOE calculations and documents. These tasks require the use of Geographical Information Systems, two-dimensional and three-dimensional graphics displays, and other data management software.

In addition, technical review and technical assistance activities require confirmatory and independent calculations to be performed by the CNWRA staff. Computer codes currently available at the CNWRA that are controlled in accordance with quality assurance program requirements are listed as follows. This list changes as the NRC support requirements vary.

- 3DStress, Version 1.1/1.2/1.3
- ABAQUS, Version 5.5/5.6
- ASHPLUME, Version 1.0
- BREATH, Version 1.1/1.2
- CEMCHEM, Version 1.0
- CHAINT, Version 2.3
- CTOUGH, Version 1.0
- D and D, Int. Rel. 1.0
- EBSPAC, Version 1.0/1.1
- EQ 3/6, Version 7.2b
- ESP/CSP, Version 6.0/6.1
- FAULTING, Version 1.0
- FITEQL, Version 2.0
- GENII-S, Version 1.485
- GFLOW, Version 1.1/Basic
- MAGNUM-2D, Version 3.2
- MCNP, Version 4A
- MEPAS
- MINTEQA2, Version 3.11/3.12
- MODFLOW MF, Version 1.31
- MULTIFLO, Version 1.0/1.2b
- NEFTRAN II, Version 1.0
- NETPATH, Version 2.0
- ORIGEN, Version 2.1
- PORFLOW, Version 2.5
- PVHVIEW, Version 1.0
- PATCHI, Version 1.1
- PEST for Unix
- RADON, Version 1.2
- RESRAD, Version 5.62
- RESRAD (For Windows), Version 5.82
- SEISM1, Version 1.1
- SIMUL, Version 1.0
- STABL, Version 5M
- STEPWISE
- SUFLAT, Version 1.0
- S-PLUS, Version 3.4
- STRIPI, Version 1.1
- TPA, Version 3.0 to 3.1.4/3.2
- UDEC, Version 3.0

The cost to develop, modify, and maintain these codes is, in most cases, included in the budgets for the appropriate KTIs, projects, and task orders. However, software that is generally applicable to NRC-funded and/or other work of the CNWRA is purchased or leased using SwRI capital monies or overhead funds, respectively. This ensures that costs are appropriately allocated to the projects and tasks that use the software.

3.5 UPGRADE TO EXISTING COMPUTING CAPABILITY

The CNWRA has undertaken an effort to centralize and enhance its computing capability. This project initiated the phasing out of the Macintosh platform, a centralization of UNIX resources, and establishment of a Win/NT presence on all desktops. The primary SGI (Performer) and Sun (Bigbend) machines will be replaced with improved high performance servers in early FY99. The estimated expenditures associated with this upgrade are listed in table 3-4.

Table 3-4. Hardware for computing capability upgrade, FY99

Quantity	Item Description	Estimated Cost
1	Sun Enterprise 3500 Server w/Raid Subsystem	\$111,000
1	SGI Onyx2 Base Reality DS	66,000
SUBTOTAL		\$177,000

3.6 COMMUNICATIONS AND SECURITY SYSTEMS

A fractional T1 line (576 kbps) is available on the NRC WAN to the CNWRA. This T1 line will support the current volume of e-mail traffic, greater use of the File Transfer Protocol services recently made available at the CNWRA and future access to the ADAMS system. Internet access to the DOE and other contractor databases is available via the Internet.

The CNWRA LAN Security System was implemented in FY95. The CNWRA LAN Certification Report and a follow-up letter, issued in FY97, documented the implementation and response to recommendations made by the NRC and the DOE Lawrence Livermore National Laboratory, Computer Technology Center, Computer Incident Advisory Capability in connection with approval of this system. New software necessary to increase the capacity of the CNWRA LAN is expected in FY99. This software will increase the speed of the proxy server and permit secure hypertext transmission protocol connections to the SwRI campus computers and the Internet in general. The CNWRA does not anticipate incurring any additional hardware or software costs for using this capability.

The CNWRA expects to further its ability to access SwRI computer resources currently residing on the Banyan network. Presently, the CNWRA does not use these services to their fullest extent because of limitations in server availability. Purchasing, licensing, and implementing a CNWRA server at the campus level will make these resources available to the CNWRA. The cost associated with this project is delineated in table 3-5.

Table 3-5. Communication hardware and software, FY99

Quantity	Item Description	Estimated Cost
1	Banyan Server and Software	\$10,000
SUBTOTAL		\$10,000

3.7 SUMMARY

The CNWRA computer hardware and software requirements in the application categories are summarized in table 3-6.

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Table 3-6. Summary of computer and interface requirements, FY99

Category	Quantity	Item Description	Estimated Cost
Hardware/Software for Office Automation	1	Backup Software for NT/UNIX	\$ 22,000
	1	High Capacity Tape Storage Unit	5,000
Document Management	1	Document Management System	10,000
Proposal and Operations Plan Development	1	Executive Business Services Pro-Pricer	5,000
Hardware for Computing Capability Upgrade	1	Sun Enterprise 3500 Server w/Raid Subsystem	111,000
	1	SGI Onyx2 Base Reality DS	66,000
Technical Computing Software*	0	None	0
Communications Hardware and Software	1	Banyan Server and Software	10,000
TOTAL			\$229,000
*Costs associated with development and/or use of technical computing software are presented in the operations plans and proposals for specific work assignments.			

This report defines the anticipated hardware and software requirements as well as associated cost estimates. These cost estimates do not include labor required for system design, development, implementation, testing, training, and documentation. The CNWRA has been tasked and funded to develop computer codes and other technical computing applications in FY99 in support of NRC programs and projects.