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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES COMPUTER AND INTERFACE REQUIREMENTS FOR FISCAL YEAR 1996

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1 INTRODUCTION

This letter report, Intermediate Milestone (IM) 5702-157-530, 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) 1996 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 Section 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, Office of Nuclear Regulatory Research (RES), and the CNWRA.

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2 CURRENT CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES 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. Recently, a Firewall Computer Security System was added to protect the CNWRA and the DWM against outside Internet users, and the Firewall Systems are shown in the Perimeter Net (DMZ) (lower left-hand corner) in that figure.

2.1 WIDE AREA NETWORK

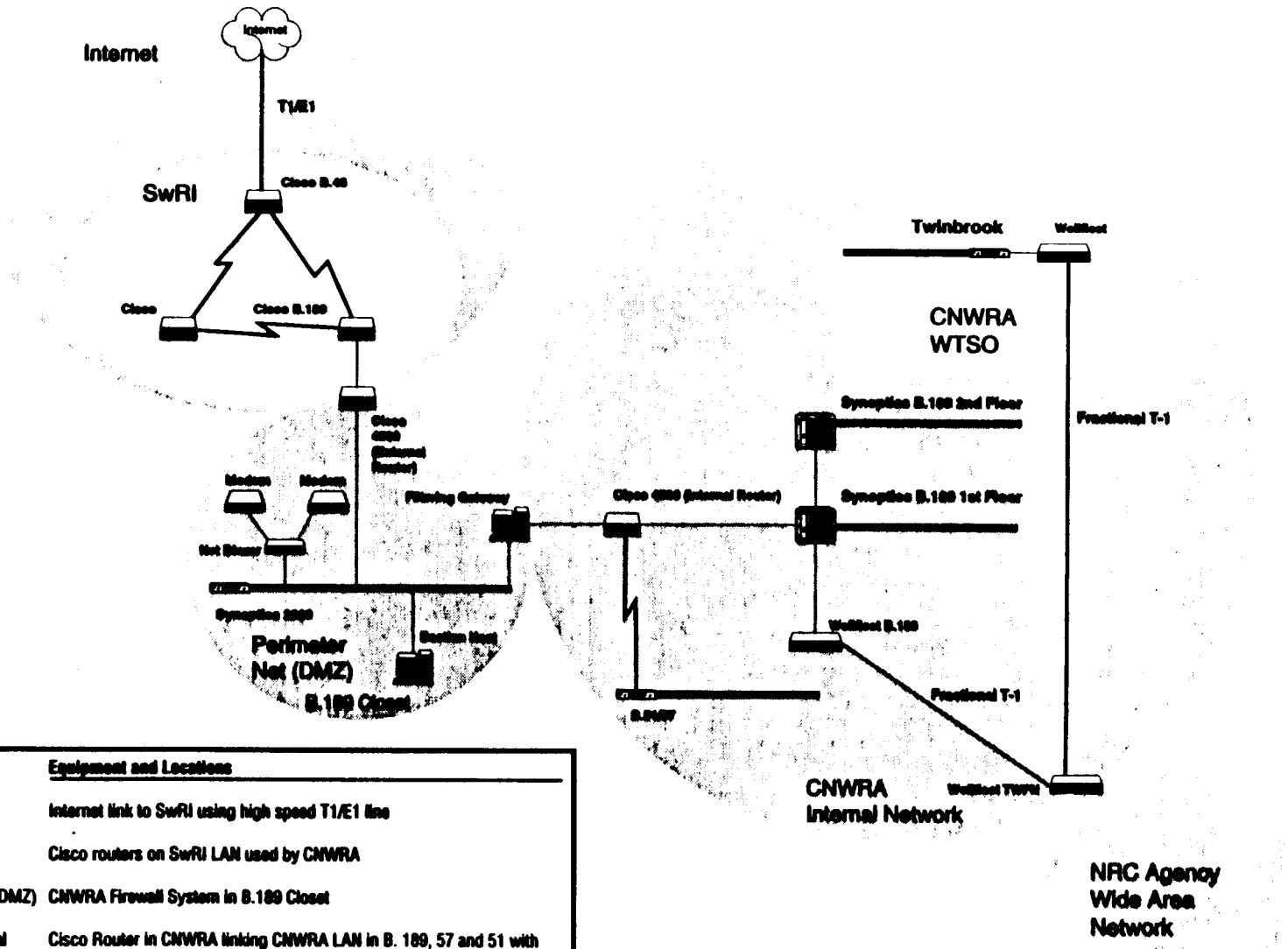
The major organizations in the CNWRA WAN are: (i) the NRC DWM and NRC RES in Rockville, Maryland; (ii) the CNWRA in San Antonio, Texas; and (iii) the CNWRA WTSO in Rockville, Maryland. The U.S. Department of Energy (DOE) offices in Washington, DC, and Las Vegas, Nevada, its sponsored organizations, and other worldwide organizations whose services are required in 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 and RES 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 three 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 six UNIX servers for major technical and database applications and two IBM LAN servers for office automation applications. The CNWRA LAN technical, database, and office automation 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. Center for Nuclear Waste Regulatory Analyses San Antonio and Washington Technical Support Office network configuration

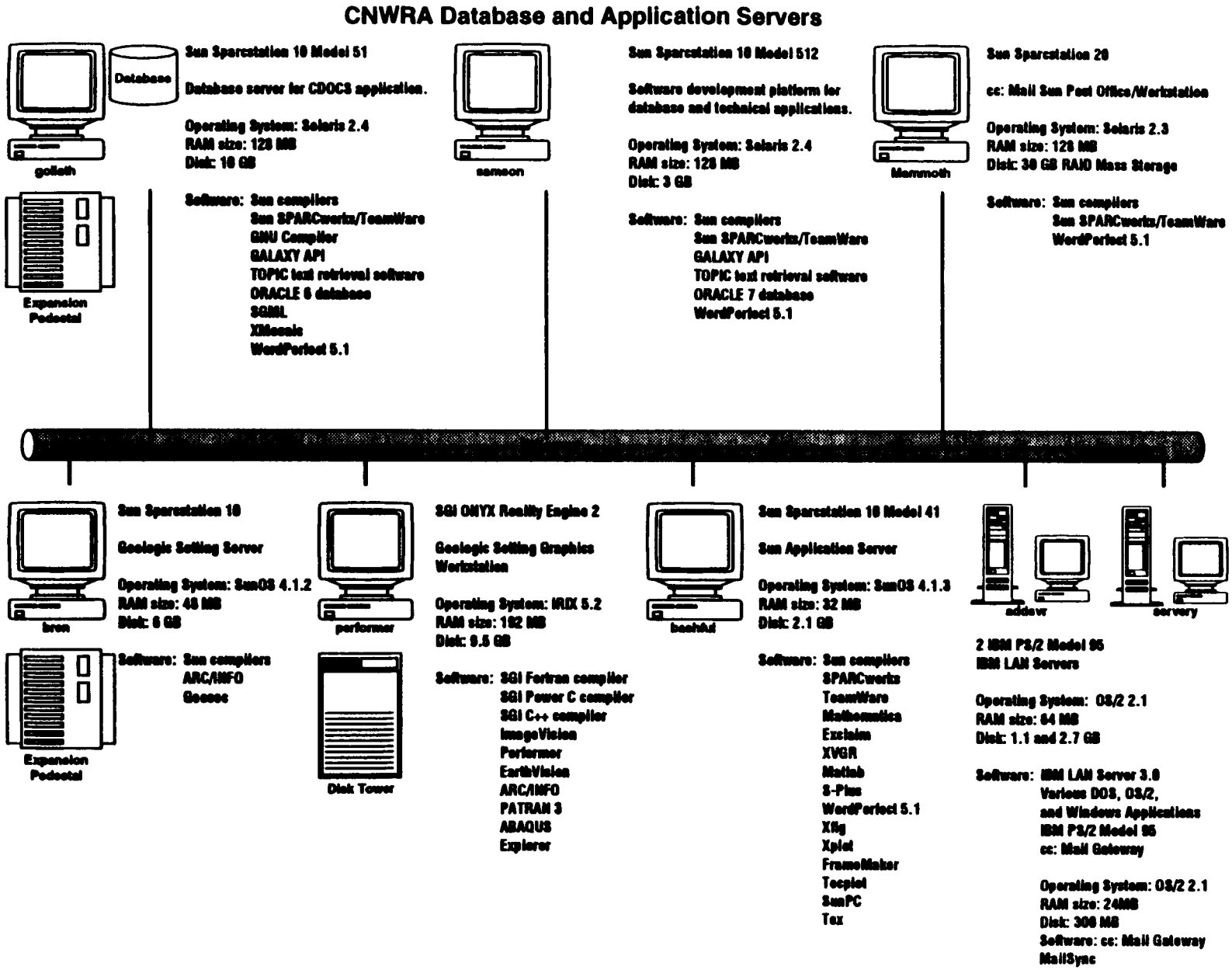


Figure 2-2. Center for Nuclear Waste Regulatory Analyses local area network technical, database, and office automation servers

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Table 2-1. List of major Center for Nuclear Waste Regulatory Analyses computers and peripherals

Categories	Description	Quantity
Servers		
	NFS Sun Sparc20 mass storage Redundant Array of Inexpensive Disks (RAID) System (30 GB)	1
	Sun Sparc10 Servers	4
	IBM PS/2 Model 95 LAN Server	2
	Silicon Graphics ONYX Reality Engine 2 Server	1
Workstations		
SGI	Silicon Graphics Indy Workstation	1
Sun	Sun Sparc10 Model 41 Workstations (3 core staff, and 1 other)	4
	Sun IPX 4/50 Workstations (7 core staff, and 1 other)	8
Apple	Sun Sparc20 Model 51 Workstations (2 core staff)	6
	Apple Macintosh/Quadra Workstations (8 core staff, and 3 others)	11
	Apple Power Macintosh (2 core staff)	2
PCs		
IBM	IBM PS/2 Model 95 with OS/2 (49 core staff, and 21 others)	70
Printers		
	QMS Laser Printers	3
	HP LaserJet III Printers	12
	HP LaserJet IV Printers	3
	Tektronix Phaser III Color Printer	1

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Table 2-1. List of major Center or Nuclear Waste Regulatory Analyses computers and peripherals (cont'd)

Categories	Description	Quantity
Plotter		
	HP Draftmaster Drum Plotter	1
Router		
	Wellfleet Router/Concentrator (NRC-provided)	2
Scanner		
	Fujitsu Scanner	1
Firewall Security System		
	Cisco 4500M Router	2
	Sun Sparc5 Workstation	2
	NetBlazer Modem Server	1

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3 REQUIREMENTS BY APPLICATION FOR CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES COMPUTER AND INTERFACES FOR FISCAL YEAR 1996

The computer acquisitions planned for FY96 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 (WP) software used by the NRC DWM and the CNWRA is WordPerfect 5.1 for DOS. Both the NRC DWM and the CNWRA plan to upgrade to WordPerfect 6.1 by July 1996. All CNWRA Major and IM deliverables are expected to be submitted electronically in WordPerfect 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 FY96. The CNWRA cc:Mail system is interfaced to the NRC WordPerfect Office (WPO) e-Mail system by a pair of gateways using the Novell Mail Handling System (MHS) standard. One gateway is located at the CNWRA and the other is at the NRC. The CNWRA uses an Oracle-based system for scheduling meetings and conference rooms, travel, and vacations. The DWM uses the calendaring capability in the WPO system. The upgrade cost for WordPerfect 6.1 and cc:Mail Release 6 is shown in Table 3-1.

The NRC provides compatibility between the two mail systems with a MHS gateway. This gateway has occasional problems mapping long user names and post office names between WPO and cc:Mail (both e:mail systems support >8 character user names and post office names, the limit of the MHS standard). The NRC is currently researching the WordPerfect cc:Mail gateway from WordPerfect.

Table 3-1. Center for Nuclear Waste Regulatory Analyses software for office automation in fiscal year 1996

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	$8,200

3.2 CONSOLIDATED DOCUMENT MANAGEMENT SYSTEM

Recently, the Consolidated Document Management System (CDOCS) Server [Technical Reference Document Database System (TDOCS) prototype] was installed at the NRC DWM. The same system was implemented at the CNWRA during the past year to replace the Correspondence Control (CC), Technical Document Indexing (TDI), and Quality Assurance (QA) Records systems. The NRC and CNWRA servers are synchronized so that documents loaded at either organization will be transmitted to the other organization's database. While TDOCS is a full-text management system, it has been loaded primarily with the headers for CC, TDI, and QA. The TDOCS currently supports physical filing and checkout of technical documents by the staff. A document loading plan will be developed jointly with the NRC in FY96 and full-text of selected documents will be loaded.

The CDOCS also incorporates the Regulatory Program Database (RPD) and is used to: (i) capture results of Systematic Regulatory Analysis (SRA); (ii) support the efficient retrieval, review, and confirmation of information; and (iii) support and maintain a corporate memory of decisions and considerations pertaining to the licensing process. During FY95, the RPD was operational at the CNWRA. The RPD 2.0 provides a Standard Generalized Markup Language (SGML) coding structure, relational database record control, and full-text search and retrieval for all SRA records. A generalized report writer was implemented to support standard reports such as the License Application Review Plan (LARP). UNIX and Windows clients for RPD/Open Item Tracking System (OITS) are being implemented at this time for the DWM to access the RPD Server at the CNWRA. An enhanced version of CDOCS that synchronizes RPD documents and reports between the CNWRA and DWM servers will be completed in FY96.

The RPD implementation incorporates an OITS for three types of open items: (i) regulatory, (ii) institutional, and (iii) technical uncertainties. Support is provided for tracking open items by "responsible" party and "action" party. Status reports are available on-line, along with a history of actions taken to resolve the open items.

The planned software and hardware upgrades and additions for CDOCS during FY96 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 support for the existing versions are withdrawn, or if major functionality improvements are judged by NRC and CNWRA staff to justify the cost. The Galaxy upgrades are necessary for development of TDOCS only; there are no "runtime" requirements that necessitate NRC to own Galaxy. The color scanner is for the CNWRA to maintain compatibility with the existing NRC scanner. Adobe Acrobat will be investigated to serve as a document "browser" to eliminate the requirement for multiple word processors.

3.3 SOFTWARE FOR PROJECT MANAGEMENT

The project management function supports operations planning, periodic cost reporting, commitment control, and project scheduling at the CNWRA. During FY95, 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. However, the CNWRA is exploring the adoption of Oracle products to enhance the capability for accomplishing planning, scheduling, and reporting in an integrated manner.

Table 3-2. Center for Nuclear Waste Regulatory Analyses hardware and software for the Consolidated Document Management System in fiscal year 1996

Quantity	Item Description	Estimated Cost
2	Adobe Acrobat Pro	$ 3,000
1	Oracle Version 8.0 Software Upgrade	$12,500
1 server 50 clients	TOPIC Agent Server and Clients	$25,000
5 platforms	GALAXY Version 3.0 Software Upgrade	$20,000
1	Color Scanner (12×18 in.)	$14,500
	SUBTOTAL	$75,000

Recommendations for additional capabilities in providing DWM and CNWRA staff access to reports,such as the Commitment Control Log (CCL), are on hold at this time. These database products are shown in Table 3-3.

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. One seat for the ERDAS software for map and image interpretation is under consideration and a final decision will be made later. The Sun Sparc Open Graphics Language (GL) product spreads the Silicon Graphics Inc. (SGI) 3D graphics displays to the desktop of Sun Sparc technical users. An evaluation is being performed to determine if the CNWRA will benefit by implementing Open GL. The DWM will be informed of the results of the CNWRA evaluation to support discussion of compatibility issues. An SGI Indigo 2 High-Impact graphics computer will be added to provide an additional SGI 3D graphics seat for developers. The operating system for Sun computers will be upgraded to Solaris 2.4 to take advantage of additional features, as the application software becomes compatible.

Table 3-3. Center for Nuclear Waste Regulatory Analyses project management software for fiscal year 1996

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

Computer activities in the CNWRA Iterative Performance Assessment (IPA) task include reviewing the DOE performance assessment (PA) program and conducting independent iterative PAs with the DWM and RES staffs. The UNISON Load Balancing software package will be implemented for all CNWRA UNIX systems to queue and process jobs more effectively for all technical users. Additionally, the codes (FORTRAN-based primarily) must be maintained and developed further to meet ongoing PA requirements. All of the software upgrades and hardware additions for technical computing are shown in Table 3-4.

3.5 COMMUNICATIONS AND SECURITY SYSTEMS

A Fractional T1 line (576 kbps) is fully operational at this time on the NRC WAN to the CNWRA. The faster transmission rates and improved reliability support increased use of RPD, OITS, and TDOCS applications as part of the CDOCS and office automation applications, as well. External CRAY usage was transferred from Idaho National Engineering Laboratory (INEL) to Lockheed Information Technology Company (LITC), using Internet primarily, by both the DWM and CNWRA staff. Internet access of the DOE and other contractor databases has also increased.

A Firewall System that provides security for the entire CNWRA network from Internet intruders was implemented in FY95. No additional hardware or software is required by the CNWRA for the communications or Firewall System in FY96.

Table 3-4. Center for Nuclear Waste Regulatory Analyses technical computing hardware and software for fiscal year 1996

Quantity	Item Description	Estimated Cost
26	UNISON Load Balancing software	$14,635
15	Open GL for Sun Sparc workstations	$15,000
1	ERDAS for image and map interpretation	$36,375
26	Upgrade Sun to Solaris 2.4 (3/95)	$ 5,000
1	SGI Indigo 2 high-impact graphics computer	$33,000
	SUBTOTAL	$104,010

4 SUMMARY OF THE CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES COMPUTER AND INTERFACE REQUIREMENTS FOR FISCAL YEAR 1996

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

Table 4-1. Summary of Center for Nuclear Waste Regulatory Analyses computer and interface requirements for fiscal year 1996

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
CDOCS	2	Adobe Acrobat Pro	$ 3,000
	1	Oracle Version 8.0 software upgrade	$ 12,500
	1 server 50 clients	TOPIC agent server and clients	$ 25,000
	5 platforms	GALAXY Version 3.0 software upgrade	$ 20,000
	1	Color scanner (12×18 in.)	$ 14,500
Project Management	1	Oracle products for database/network	$ 15,000
Technical Computing	26	UNISON Load Balancing software	$ 14,635
	15	Open GL for Sun Sparc workstations	$ 15,000
	1	ERDAS for image and map interpretation	$ 36,375
	26	Upgrade Sun to Solaris 2.4 (3/95)	$ 5,000
	1	SGI Indigo 2 high-impact graphics computer	$ 33,000
Communications and Security Systems	—	—	—
		TOTAL	$202,230

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 coordinate implementation (Waste Systems Engineering and Integration) and operation (Center Operations) of CDOCS, and to support FORTRAN codes and other technical computing applications in FY96.