

**CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES
COMPUTER AND INTERFACE REQUIREMENTS
FOR FISCAL YEAR 2003**

Prepared for

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1 INTRODUCTION

This report identifies computer-related requirements for the successful operation of the Center for Nuclear Waste Regulatory Analyses (CNWRA). It briefly describes the CNWRA wide area network and the local area network, and enumerates the existing hardware and software. Moreover, this report identifies hardware, systems, and related application software that will be acquired in fiscal year 2003 to facilitate electronic communication with the various offices, divisions, and branches of the U.S. Nuclear Regulatory Commission (NRC) that are supported by CNWRA, particularly those within the Office of Nuclear Material Safety and Safeguards. The report acknowledges that CNWRA will not have direct access to the NRC Agency Documents Access and Management System (ADAMS) for document management, workflow, and record keeping, but has full web-based access for public information dissemination and will have access to the electronic information exchange. Hardware and software necessary to maintain an efficient operating environment are specified in the text and tables in Chapter 2 (for existing systems) and Chapter 3 (for planned systems).

Implementation of these requirements will ensure that interfaces between the CNWRA and NRC systems and networks are compatible and will support delivery of the CNWRA reports, analyses, codes, and databases in the various program areas. The timely availability of computer-related equipment facilitates office automation, document management, and project management and reporting. This availability also allows technical computing software and communications and security systems to be used by individual staff, including team members from NRC and CNWRA.

2 CURRENT SYSTEMS AND NETWORK CONFIGURATION

The CNWRA systems are configured in a wide area network and local area network to support communications by the staff with the NRC. The CNWRA San Antonio and Washington Technical Support Office 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

Included in the CNWRA wide area network are the NRC in Rockville, Maryland; the CNWRA in San Antonio, Texas; and the CNWRA Washington Technical Support Office in Rockville, Maryland. The U.S. Department of Energy (DOE) offices in Washington, DC, and Las Vegas, Nevada, its contractor organizations, other NRC licensees, and other worldwide organizations that may provide information required in the execution of the high-level waste program and other projects conducted by CNWRA use the Southwest Research Institute™ link on the Internet to access the wide area network.

The CNWRA primary communication interface to its Washington Technical Support Office and NRC is an MCI Frame Relay leased line supported on the NRC wide area network. The wide area network is illustrated in Figure 2-1. The current configuration for the Office of Nuclear Material Safety and Safeguards computer systems is based on a local area network implemented throughout NRC. In addition, the Office of Nuclear Material Safety and Safeguards uses a high-performance UNIX technical computing system, referred to as the Computerized Risk Assessment and Data Analysis Laboratory, and the agency-wide ADAMS. CNWRA accesses the NRC "Agency Official Records" via a standard web browser. These records include official, public, and nonsensitive items. When developing jointly authored documents, drafts are transmitted between NRC and CNWRA staffs as email attachments. Voluminous documents can be exchanged via an external server that permits the exchange of files in native format.

2.2 Local Area Network

The current CNWRA local area network configuration is based on an Ethernet local area network using the Transmission Control Protocol/Internet Protocol. The MCI Frame Relay line (576 Kbps) on the NRC wide area network supports communications between NRC and all CNWRA offices, and forms the baseline for anticipated email traffic. Without this line, the Washington Technical Support Office cannot connect to the CNWRA local area network. Access to the DOE and other contractor information is available via the Internet, however. The major segments of the local area network support an open-system architecture that consists of 26 UNIX-based and 5 NT-based servers for major office automation and technical applications. The CNWRA local area network office automation and technical servers are shown in Figure 2-2.

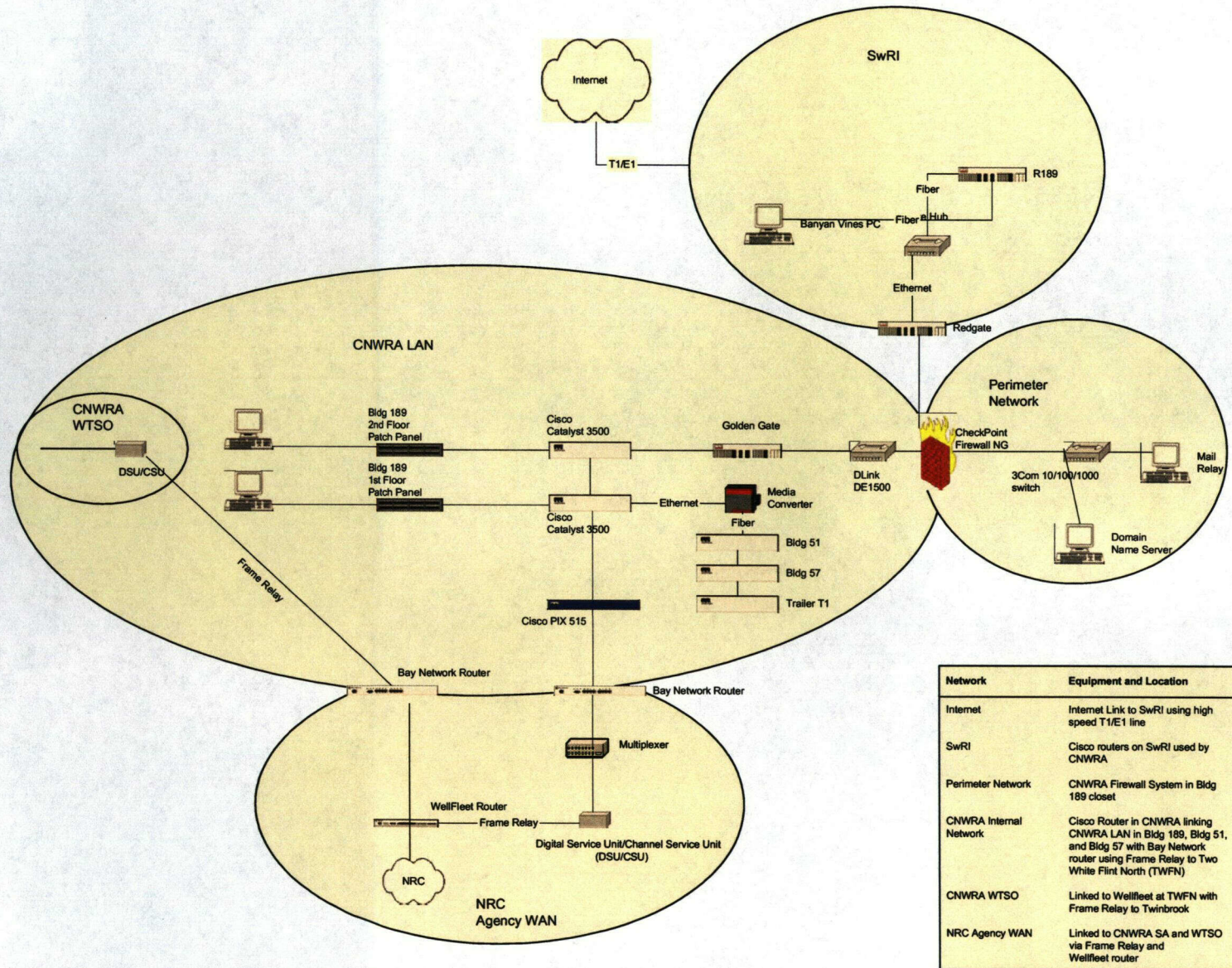


Figure 2-1. CNWRA San Antonio and Washington Technical Support Office Network Configuration

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The Center for Nuclear Waste Regulatory Analyses Local Area Network Certification Report¹ and the Center for Nuclear Waste Regulatory Analyses Local Area Network Security Plan² documented the implementation and response to recommendations made by the NRC and the Computer Incident Advisory Capability at the Computer Security Technology Center, Lawrence Livermore National Laboratory, in connection with approval of this system. The firewall hardware and software have been upgraded: the firewall hardware is a Sun Microsystems Ultra 5® workstation, and the software is the CheckPoint® Firewall NG. This software obviates the need for a proxy server and permits secure hypertext transmission protocol connections to the Southwest Research Institute computers and the Internet in general.

The CNWRA local area network operates on 100 Mbps Ethernet, and its external router now connects to the Southwest backbone via ATM link.

The current servers, workstations, personal computers, and peripherals on the CNWRA local area network in San Antonio, Texas, and the Washington Technical Support Office in Rockville, Maryland, are listed in Table 2-1.

2.3 Existing Hardware and Software Systems

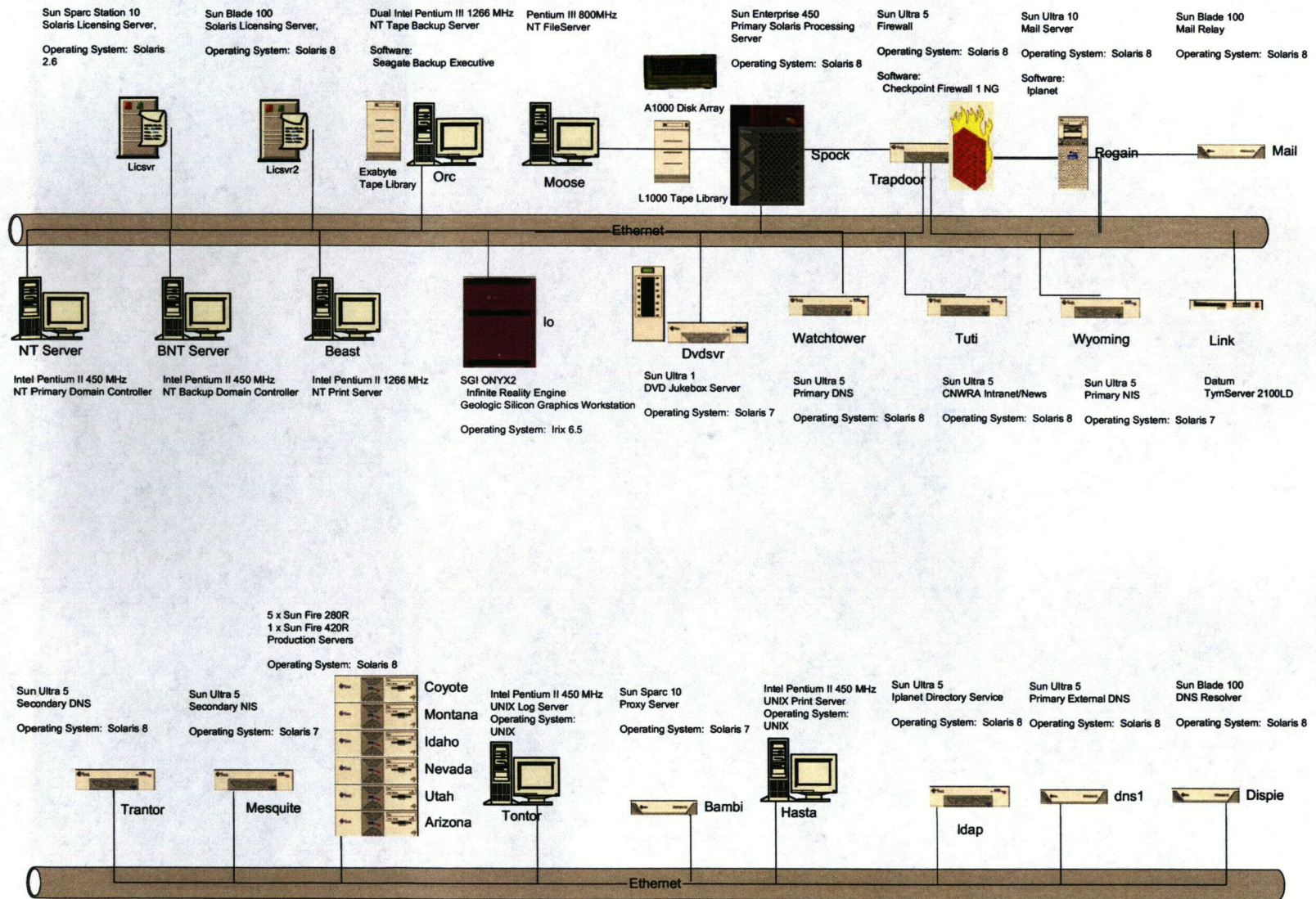
NRC authorized Corel® WordPerfect 8.0 service pack 7 and above as the standard word processing software. In addition, NRC also approved software other than WordPerfect from the Corel® suite. Moreover, NRC approved the following Microsoft® products: (i) EXCEL® 97 as the standard spreadsheet software, (ii) Access® 97 as the standard database software, (iii) PowerPoint® 97 as the standard presentation software, and (iv) Project® 97 as the standard project management software. Currently, each CNWRA personal computer is installed with the approved versions of these software packages for the NT operating system. All CNWRA major and intermediate milestones for NRC-funded projects are submitted electronically in the contractually required version of Corel® WordPerfect, together with the hard-copy documents.³

CNWRA increased its online storage capacity with the addition of new computing resources and online data storage units. Presently, CNWRA uses a generic Intel-based server with Veritas® Backup Exec software for NT and an Exabyte 220 Tape Library. All NT-based servers and clients (i.e., individual workstations and personal computers) use this hardware and software to backup user data on selected disk drives. CNWRA installed and is using a Sun Microsystems StorEdge® L1000 Tape Library with the Legato Soltice Backup® Jukebox and Software to backup UNIX-based servers and clients. CNWRA uses a Sun Microsystems A1000 Disk Storage Array with Volume Manager and Cygnet® infinite DVD Jukebox as auxiliary storage and backup devices. This data storage and backup facility, incorporating existing and

¹Seely, Perry, A., J. DeLaEspriella, and H.F. Garcia. "Center for Nuclear Waste Regulatory Analyses Local Area Network Certification Report." San Antonio, Texas: CNWRA. 2001.

²Seely, Perry and H.F. Garcia. "Center for Nuclear Waste Regulatory Analyses Local Area Network Security Plan." San Antonio, Texas: CNWRA. 2002.

³NRC. Attachment 12, "Contractor Procedures for Submitting Documentation to the NRC in Electronic (Machine Readable) Format." Contract between NRC and CNWRA, NRC-02-97-009. Washington, DC: NRC. 1997. (Updated 2001)



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Figure 2-2. CNWRA Local Area Network Technical, Database, and Office Automation Servers

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Table 2-1. Major Computers and Peripherals		
Category	Description	Quantity
Servers		
Silicon Graphics, Inc. (SGI)	SGI ONYX Infinite Reality Engine 2	1
Datum	Tymserve 2100LD	1
Sun Microsystems, Inc.	Sun Blade 100	3
	Sun Fire 420R	1
	Sun Fire 280R	5
	Sun Network E450 with Mass Storage Redundant Array of Inexpensive Disks System (60 and 30 GB)	1
	Sun Sparc 10	2
	Sun Ultra 5	8
	Ultra 1	1
Generic	Ultra 10	1
	Pentium II 750 MHz	2
	Pentium II 550 MHz	5
Workstations		
Silicon Graphics, Inc.	SGI Indy	2
	SGI Indigo	1
Sun Microsystems, Inc.	Sun Sparc 20	3
	Sun Ultra 1	1
	Sun Ultra 10	1
Personal Computers		
Generic	Data Acquisition	31
	Intel Pentium Class	95
Printers/Plotter		
Hewlett Packard (HP) Company	HP DeskJet 895C	2
	HP DesignJet 755CM	1
	HP LaserJet IV	3
	HP LaserJet 2100N	12
	HP LaserJet 4000	1

Table 2-1. Major Computers and Peripherals (continued)		
Category	Description	Quantity
	HP LaserJet 4000N	1
	HP LaserJet 4500N	1
	HP LaserJet 4550N	1
	HP LaserJet 8100DN	2
	HP LaserJet 8550N	1
	HP 800PS	1
Router		
Cisco Systems, Inc.	Cisco 3620 Router	2
	Cisco 3500 Switches	7
Bay Network	Bay Networks Routers (NRC-provided)	2

new hardware and software, will accommodate the present and near future needs of CNWRA for storage and backup management.

The CNWRA email system consists of a Sun Microsystems Ultra 10® server using the Iplanet Messaging System. This system is compatible with Simple Mail Transfer Protocol email systems.

CNWRA has two primary UNIX-based servers. These are a Silicon Graphics ONYX2 with Infinite Reality Engine and a Sun Microsystems E450 (Figure 2-2). Also, CNWRA has procured a Sun Microsystems, Inc., Sun Fire 420R and five Sun Microsystems Sun Fire 280R, configured as a grid cluster to improve computing performance. In fiscal year 2003, some old Sun Microsystems equipment (e.g., Sun Sparc 10 and 20) will be replaced with more state-of-the-art Sun equipment. In addition, NT-based servers have been installed to complement these UNIX servers and improve the CNWRA technical computing capabilities. NT-based personal computers constitute the bulk of computer-related hardware. Approximately 24 of the existing personal computers at the CNWRA will be replaced during fiscal year 2003. New personal computers will be acquired to fulfill computing requirements as needed. CNWRA will continue to upgrade and maintain its computer-related hardware on a rotating, as needed basis.

CNWRA is using Access® 97 database for general indexing of the CNWRA correspondence and documentation. This database, periodically updated, is available for general access by the CNWRA staff, and specific staff members have the database installed on their personal computers.

The CNWRA project management functions include operations planning, periodic cost reporting, commitment control, and project scheduling. CNWRA uses Microsoft® Excel 97 to support periodic cost reporting and Microsoft® Access 97 for commitment control. Microsoft® Project 97 has been selected for planning and scheduling purposes because it interfaces seamlessly with Microsoft® Excel 97. To ensure consistency with internal Southwest Research

Institute business operations, the CNWRA adopted Deltek® Project Planner for developing data for plans and projects.

CNWRA provides technical assistance to NRC in three areas: (i) Nuclear Waste Policy Act repository program, which is organized around key technical issues important to licensing the proposed high-level waste repository and supporting tasks; (ii) Nuclear Waste Policy Act-related projects; and (iii) non-Nuclear Waste Policy Act programs. Work is performed primarily for the Office of Nuclear Material Safety and Safeguards, Division of Fuel Cycle Safety and Safeguards; the Spent Fuel Project Office; and the Division of Waste Management. Technical computing software packages, developed at CNWRA or acquired from various government and commercial sources, are being and will be used in the conduct of work for these organizations.

NRC and CNWRA technically review a broad range of DOE and DOE contractor documents as well as reports and plans from private sector firms that are subject to NRC licensing; develop guidance, procedures, and issue resolution status reports; and draft regulations and other technical reports. The CNWRA presents results of their technical assistance to NRC. In addition, independent assessments and evaluations, many that are computationally intensive and draw on large and complex databases, are conducted to support the NRC and other client programs. Fulfilling these tasks requires (i) access to certain technical databases, (ii) analysis and display of spatial and temporal data, (iii) assessment and development of computer codes, (iv) conduct of literature searches and reviews, and (v) evaluation of calculations and documents. These tasks require Geographical Information Systems, two- and three-dimensional graphics displays, and other scientific and engineering software. In addition, technical review and technical assistance require confirmatory and independent calculations by the CNWRA staff.

The cost to develop, modify, and maintain many technical codes is included in the budgets for the appropriate key technical issues, projects, and task orders. The Defense Contract Audit Agency audit of Southwest Research Institute and CNWRA direct and overhead costs confirmed the practice that software generally applicable to the NRC-funded and other work of the CNWRA is purchased or leased using Southwest Research Institute capital monies or overhead funds. Table 2-2 identifies the major software used by CNWRA for the NRC-related tasks and project work for other CNWRA clients.

Table 2-2. Technical Computing Software Used at CNWRA During Fiscal Year 2002	
Software	
3D Stress	MathCad
ABAQUS—Explicit	Mathematica
ABAQUS—Standard	MATLAB—Floating Network License
ANSYS/LS-Dyna	MCNP
AQTESOLV	MELCOR
Arc/Info	MEPAS
ArcView/Image Analysis	MINTEQA2
ASHPLUME	MODFLOW96

Table 2-2. General Technical Computing Software Used at CNWRA Fiscal Year 2002 (continued)

Software	
Breath	MULTIFLO
Crystal Ball 2000	NRC-WVDP-GIS
D and D	Oasis Montaj
DDA-CT	Olympus DISS
Dthern	ORIGEN
EarthVision	PCSA
EINVRT	PHREEQC
EQ 3/6	PPSGS
ESP/CSP	ProShake
EZ-FRISK	PVHA YM
FITEQL	PVHVIEW
FLAC	RESRAD
Genie-PC Gamma Spectrometry System	RSAC
GENII-S	S-Plus
GEOINVRT	SAPHIRE
Geologic Modeling Package (Earth Vision)	SHOCK
GM-SYS Package	SOLCALC
GrafNav GPS Post-Processing	STELLA
GWB	STEREONET
HYDRUS2D	TECTRAN
HyperMesh	THCPROB
HyperWorks	TPA (Various versions)
Imagine Professional for Microsoft	UDEC
KINEROS2	Vnet PC 2000

3 REQUIREMENTS FOR COMPUTERS AND INTERFACES FOR FISCAL YEAR 2003

The CNWRA computer-related acquisitions planned for fiscal year 2003 are described in the following sections. Specific hardware and software required to support CNWRA computer systems and applications are described in the following sections. These systems will be leased or purchased on CNWRA overhead or purchased using Southwest Research Institute capital equipment funds, because none are able to be identified with a single project or deliverable.

3.1 Operating System and Application Software

In fiscal year 2003, CNWRA must convert from Windows NT4 to Windows 2000 Professional or XP Professional, because Microsoft will discontinue support for Windows NT after June 2003. CNWRA is evaluating and testing existing software applications for compatibility with currently available operating systems. As part of this transition, CNWRA will upgrade from Microsoft Office® 97 to Microsoft Office® 2000 because the newer version eliminated problems found in the older version of this application. In addition, the CNWRA will upgrade from Corel® WordPerfect 8 to a newer version of WordPerfect. This will alleviate known problems with Corel® WordPerfect 8, and is required because Corel has discontinued support for this version of WordPerfect.

3.2 Technical Computing Software

Most software needs were identified and fulfilled in previous years. Any specific additional software needed to accomplish the activities associated with fiscal year 2003 operations plans and proposals will be identified and purchased or leased with overhead funds.

3.3 Communications and Security Systems

During fiscal year 2002, CNWRA built and implemented a Virtual Private Network and function-specific firewall configuration. This configuration permits remote access by CNWRA staff to email services. CNWRA placed a Cisco PIX-515R hardware firewall on the Frame Relay connection between NRC and CNWRA. This link was recognized as a possible security weakness during the fiscal year 2002 Computer Incident Advisory Center audit. Consistent with these security upgrades, the CNWRA is planning to place a Cisco PIX-515E hardware firewall on the connection between NRC and CNWRA Washington Technical Support Office during fiscal year 2003.

4 SUMMARY

The CNWRA uses UNIX-based and NT-based servers, workstations, and personal computers, in addition to a variety of different peripherals, including storage units, printers, plotters, and routers, to conduct work for NRC and other clients. The CNWRA local area network uses fiber optic and Category 5 wiring. Both developed and acquired (commercial off-the-shelf or provided directly from the developers) software are used in the conduct of CNWRA work for NRC and other clients.

The CNWRA computer hardware and software requirements for fiscal year 2003 in the application categories will be purchased or leased with Southwest Research Institute/CNWRA overhead funds and, hence, do not constitute government furnished equipment or government purchased equipment.

This report defines the CNWRA anticipated hardware and software requirements. In addition, CNWRA assumes the continuation of funding to develop computer codes and other technical computing applications in fiscal year 2003 in support of NRC programs and projects; these costs are not included in this report.