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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES COMPUTER AND INTERFACE REQUIREMENTS FOR FISCAL YEAR 2004

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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) through fiscal year 2004. It briefly describes the CNWRA wide area and local area networks, and enumerates the existing hardware and software. This report identifies hardware, systems, and related application software that will be acquired in fiscal year 2004 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 does 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. 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 CNWRA and NRC systems and networks are compatible and will support delivery and use of the CNWRA reports, analyses, codes, and databases. 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 members from NRC and CNWRA.

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2 CURRENT SYSTEMS AND NETWORK CONFIGURATION

The CNWRA systems are configured in a wide area network and a local area network to support communications 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 offices in Rockville, Maryland; the CNWRA facilities in San Antonio, Texas; and the CNWRA Washington Technical Support Office in Rockville, Maryland. Other organizations may use the Southwest Research Institute® link on the Internet to access the wide area network.

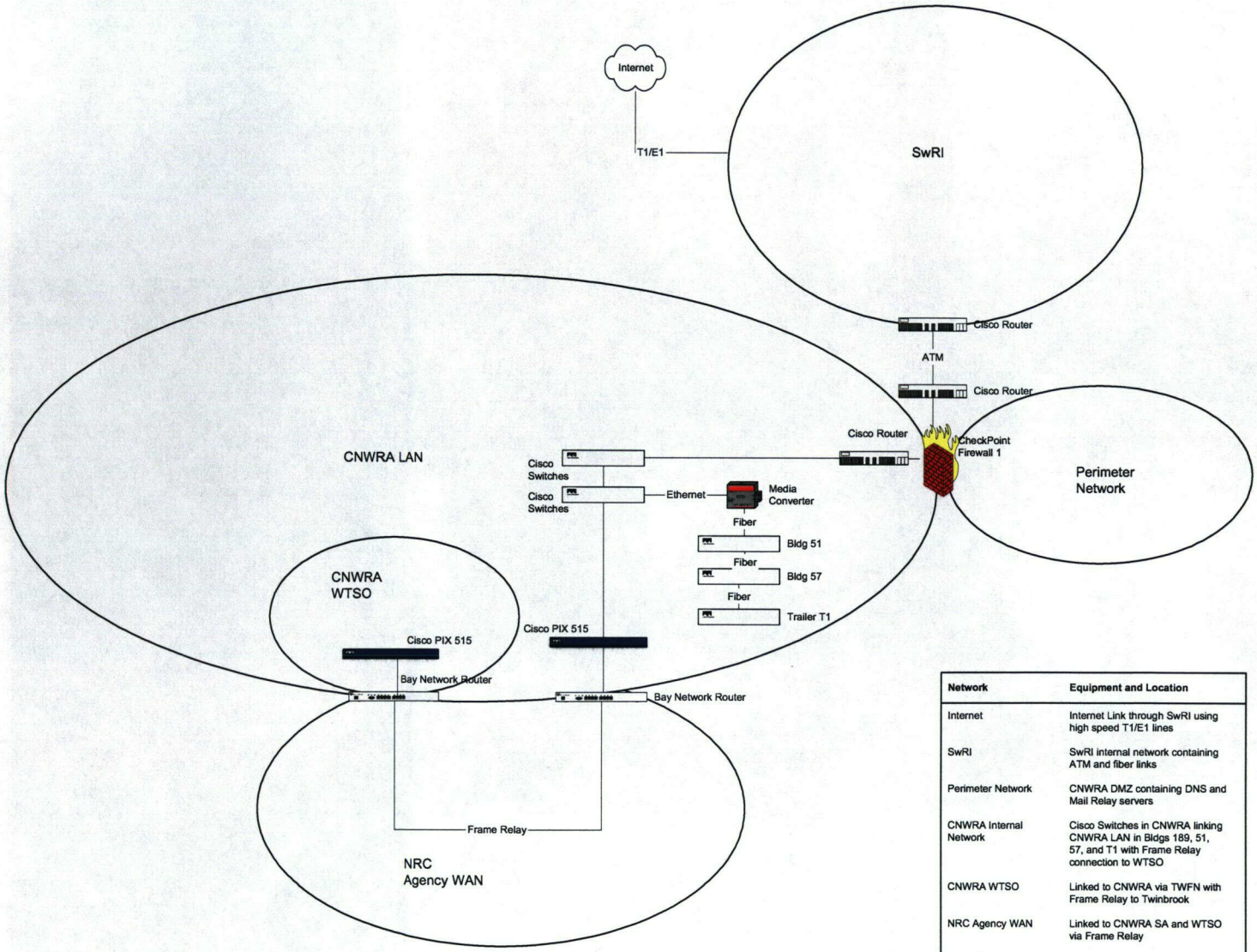
The primary CNWRA communication interface to its Washington Technical Support Office and NRC is an MCI frame relay leased line supported on the NRC wide area network. The current configuration for the Office of Nuclear Material Safety and Safeguards computer systems is based on a local area network implemented throughout NRC. In addition, the Office of Nuclear Material Safety and Safeguards uses a high-performance UNIX technical computing system (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. Large documents are exchanged via an external server that permits the exchange of files in native format.

2.2 Local Area Network

The 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. Without this line, the Washington Technical Support Office cannot connect to the CNWRA local area network. 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.

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 a 100 Mbps Ethernet, and its external router now connects to the Southwest Research Institute backbone via ATM link.



Network	Equipment and Location
Internet	Internet Link through SwRI using high speed T1/E1 lines
SwRI	SwRI internal network containing ATM and fiber links
Perimeter Network	CNWRA DMZ containing DNS and Mail Relay servers
CNWRA Internal Network	Cisco Switches in CNWRA linking CNWRA LAN in Bldgs 189, 51, 57, and T1 with Frame Relay connection to WTSO
CNWRA WTSO	Linked to CNWRA via TWFN with Frame Relay to Twinbrook
NRC Agency WAN	Linked to CNWRA SA and WTSO via Frame Relay

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

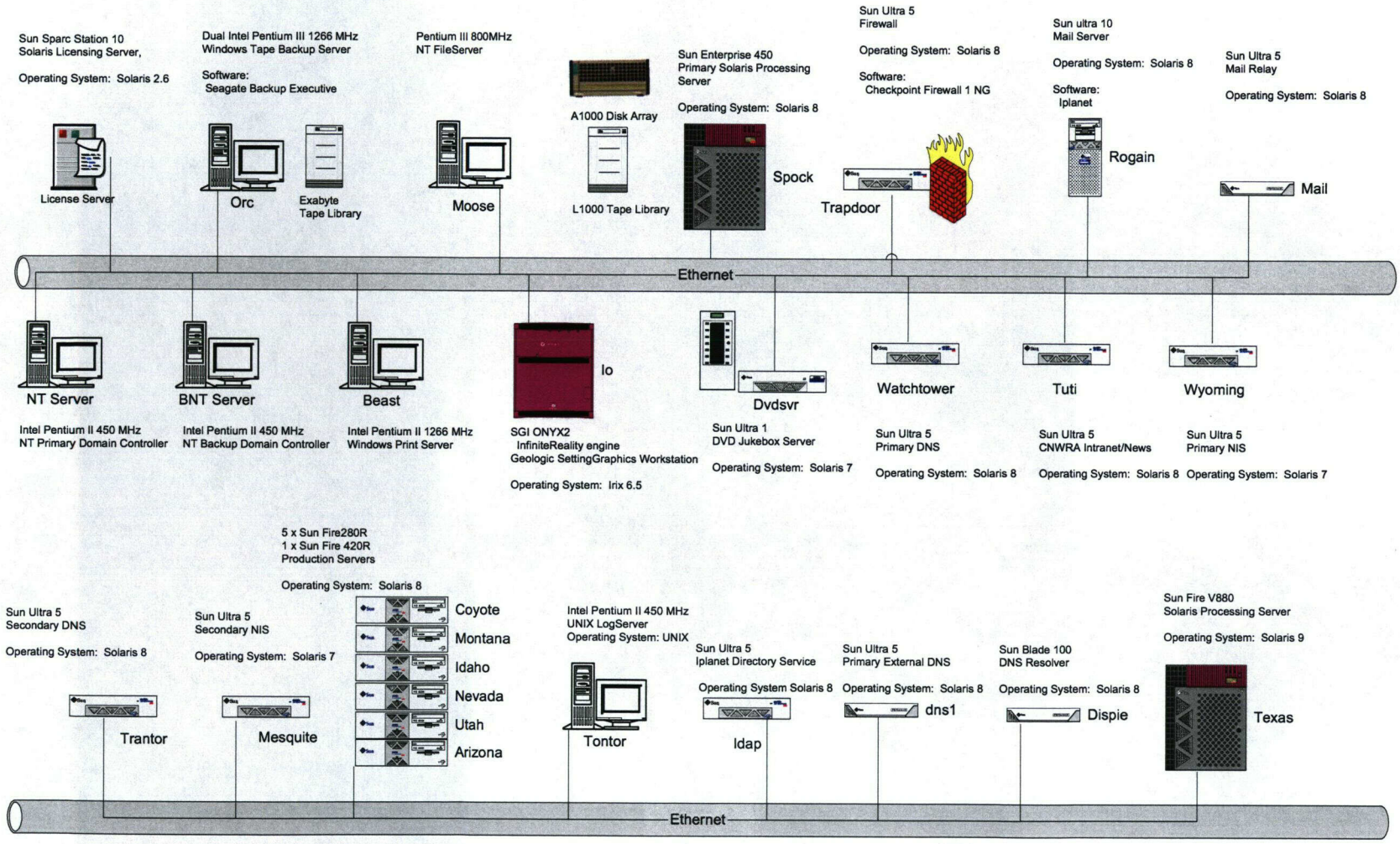


Figure 2-2. CNWRA Local Area Network Technical, Database, and Office Automation Servers

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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 requires use of Corel® WordPerfect 10 as the standard word processing software. NRC also accepts software other than WordPerfect from the Corel® suite. Moreover, NRC has approved use of the following Microsoft® products: (i) EXCEL® 2002 as the standard spreadsheet software; (ii) Access® 2002, as the standard database software; (iii) PowerPoint® 2002, as the standard presentation software; and (iv) Project® 2000 as the standard project management software. Currently, each CNWRA personal computer user has or is being upgraded with the approved versions of these software packages for the Microsoft® Windows operating system. All CNWRA major and intermediate milestones for NRC-funded projects are submitted electronically in WordPerfect, together with hard copies of the documents (NRC, 2002).

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 Microsoft® Windows and an Exabyte 220 Tape Library. All Microsoft® Windows-based servers and clients (i.e., individual workstations and personal computers) use this hardware and software to backup user data on selected disk drives. The CNWRA used 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 new hardware and software, accommodates the present 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., SunFire V880, a Sun Fire 420R, and five Sun Microsystems Sun Fire 280Rs, configured as a grid cluster to improve computing performance. During fiscal year 2003, some old Sun Microsystems equipment (e.g., Sun Sparc 10 and 20) was replaced with more capable Sun equipment (e.g. Sun Sunblade 100 and 150). In addition, Windows® Server 2003-based servers have been installed to complement these UNIX servers and improve the CNWRA technical computing capabilities. Microsoft® Windows-based personal computers constitute the bulk of computer hardware. Approximately 24 of the existing personal computers at the CNWRA will be replaced during fiscal year 2004. New personal computers will be acquired to fulfill computing requirements as needed. The CNWRA will continue to upgrade and maintain its computer-related hardware on a rotating, as needed basis.

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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	1
	Sun Ultra 5	8
	Ultra 1	1
	Ultra 10	2
Generic	Pentium IV 2.6 GHz	5
	Pentium III 750 MHz	2
Workstations		
Silicon Graphics, Inc.	SGI Indy	2
	SGI Indigo	1
Sun Microsystems, Inc.	Sun Sparc 20	1
	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

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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

CNWRA is using the Access® 2002 database for general indexing of correspondence and documentation. This periodically updated database is available for general access by the CNWRA staff, and specific staff members have the database installed on personal computers. This database server was upgraded during 2003.

The CNWRA project management functions include operations planning, periodic cost reporting, commitment control, and project scheduling. CNWRA uses Microsoft® Excel 97 or newer to support periodic cost reporting and Microsoft® Access 97 or newer for commitment control. Microsoft® Project 97 has been selected for planning and scheduling purposes because it interfaces seamlessly with Microsoft® Excel 97 and newer versions. 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) the 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 used to conduct work for these organizations.

NRC and CNWRA staffs 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. 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 2003

3DStress™	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
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

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Table 2-2. Technical Computing Software Used at CNWRA During Fiscal Year 2003 (continued)	
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 2004

The CNWRA computer-related acquisitions planned for fiscal year 2004 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 using CNWRA overhead funds or Southwest Research Institute capital equipment funds, because none are limited to use with a single project or deliverable.

3.1 Operating System and Application Software

Starting in fiscal year 2003, the CNWRA began converting from Windows® NT4 to Windows® XP Professional, because Microsoft discontinued support for Windows NT after June 2003. As part of this transition, the CNWRA is upgrading from Microsoft Office® 97 to Microsoft Office® XP because the newer version eliminates problems found in the older version of this application. In addition, the CNWRA began upgrading from Corel® WordPerfect 8 to WordPerfect 10. This has alleviated known problems with Corel® WordPerfect 8, and was required because Corel has discontinued support for that version of WordPerfect.

Upgrades to other applications will be purchased as needed to insure compatibility with operating system upgrades.

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 2004 operations plans and proposals will be identified and purchased or leased with overhead funds.

3.3 Communications and Security Systems

Consistent with security upgrades, the CNWRA placed a Cisco PIX–515E hardware firewall on the connection between NRC and CNWRA Washington Technical Support Office during fiscal year 2003. This link was identified as a possible security weakness during the fiscal year 2002 Computer Incident Advisory Center audit.

The CNWRA plans to purchase a Cisco Catalyst 3750-24 10/100/1000-T switch to provide additional communication ports for the local area network.

As CNWRA staff continues to grow, purchase of additional personal computes and associated communications and security systems may be required.

4 SUMMARY

The CNWRA uses UNIX-based and Microsoft Windows-based servers, workstations, and personal computers, in addition to a variety of peripherals, including storage units, printers, plotters, and routers, to conduct work for NRC and other clients. The CNWRA computer hardware and software requirements for fiscal year 2004 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 2004 in support of NRC programs and projects; these costs are not included in this report.

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5 REFERENCES

NRC. Attachment 12, "Contractor Procedures for Submitting Documentation to the NRC in Electronic (Machine Readable) Format." Contract between NRC and CNWRA, NRC–02–02–012. Washington, DC: NRC. 1997. (Updated 2002)