CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES COMPUTER AND INTERFACE REQUIREMENTS FOR FISCAL YEAR 2002

Prepared for

**Nuclear Regulatory Commission
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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 (WAN) and the local area network (LAN) and enumerates the existing hardware and software. Moreover, this report identifies hardware as well as systems and applications software that will be acquired in fiscal year 2002 (FY2002) to facilitate electronic communication with the various offices, divisions, and branches of the U.S. Nuclear Regulatory Commission (NRC) that are supported by the CNWRA, particularly those within the Office of Nuclear Material Safety and Safeguards (NMSS). It acknowledges that the CNWRA will not have direct access to the NRC Agency Documents Access and Management System (ADAMS) for document management, workflow, and record keeping, but will have full web-based access with respect to public information dissemination and electronic information exchange. Specific 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 the interfaces between CNWRA and NRC systems and networks are compatible and will support delivery of 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, as well as the use of technical computing software and communications and security systems by individual staff, including team members from the NRC and CNWRA.

2 CURRENT SYSTEMS AND NETWORK CONFIGURATION

The CNWRA systems are configured in a WAN and LAN to support communications by the staff with the NRC. 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.
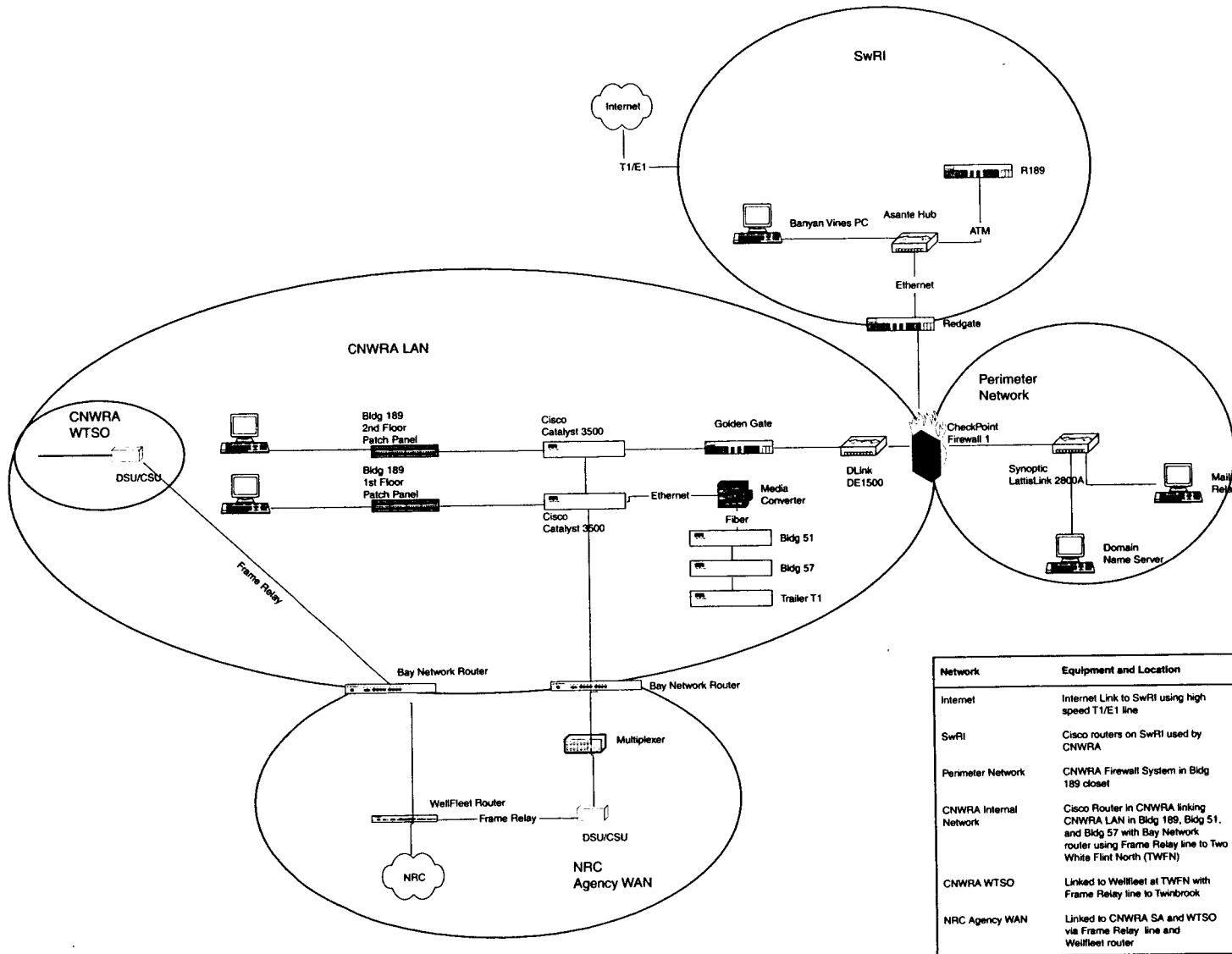
2.1   WIDE AREA NETWORK

Included in the CNWRA WAN are the NRC 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 contractor organizations, and other worldwide organizations that may provide information required in the execution of the high-level waste (HLW) program and other projects conducted by the CNWRA 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 MCI Frame Relay leased line supported on the NRC WAN. The WAN is illustrated in figure 2.1. The current configuration for the NMSS computer systems is based on a LAN implemented throughout the NRC. In addition, NMSS uses a high performance UNIX technical computing system, referred to as the Computerized Risk Assessment and Data Analysis Laboratory and uses the agency-wide ADAMS. The CNWRA accesses via a standard web browser the NRC "Agency Official Records." These records include official, public, and nonsensitive items. Moreover, during development of jointly authored documents, drafts will be transmitted between NRC and CNWRA staff as email attachments and voluminous documents will be exchanged via an NRC external server that allows users to drop large files in native format on this server and to wrap digital signature software around the object files to ensure the integrity of the documents (files). This capability is known as Electronic Information Exchange (EIE). This capability, outlined in an NRC internal memorandum dated May 28, 1999, does not provide CNWRA access to in-process, predecisional, and nonofficial materials/documents except through EIE-type transactions.

2.2   LOCAL AREA NETWORK

The current CNWRA LAN configuration is based on an Ethernet LAN using the Transmission Control Protocol/Internet Protocol. The MCI Frame Relay line (576 Kbps) on the NRC WAN supports current communications between the NRC and all CNWRA offices, and it forms the baseline for the anticipated email traffic volume and the use of file transfer protocol services. Without this line, the WTSO cannot connect to the CNWRA LAN. However, access to the DOE and other contractor databases is available via the Internet. The major segments of the LAN support an open-system architecture that consists of nine UNIX-based and four NT-based servers for major office automation and technical applications. The CNWRA LAN office automation and technical servers are shown in figure 2-2.

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

Sun Sparc Station 10
Solaris Licensing Server.

Operating System: Solaris 2.6

Dual Intel Pentium II 266 MHz
NT Tape Backup Server

Software:
Seagate Backup Executive

Pentium III 800MHz
NT FileServer

A1000 Disk Array

A100 Disk array

Sun Enterprise 450
Primary Solaris Processing
Server

Operating System: Solaris 8

Sun Ultra 5
Firewall

Operating System: Solaris 7

Software:
Checkpoint Firewall 1 v4.2

Sun ultra 5
Mail Server

Operating System: Solaris 7

Software:
SUN Internet Mail Server v4.0

Sun Sparc Station 20
Mail Relay

Operating System: Solaris 7

License Server

Orc

Qualstar
Tape Library

Moose

L1000 Tape Library

Spock

Trapdoor

Gargol

Mail

Ethernet

NT Server

BNT Server

Beast

IO

DVDSvr

Watchtower

Tuti

Wyoming

Intel Pentium II 450 MHz
NT Primary Domain Controller

Intel Pentium II 450 MHz
NT Backup Domain Controller

Intel Pentium II 266 MHz
NT Print Server

SGI ONYX2
InfiniteReality engine
Geologic SettingGraphics Workstation

Operating System: Irix 6.5

Sun Ultra 1
DVD Jukebox Server

Operating System: Solaris 7

Sun Ultra 5
Primary DNS

Operating System: Solaris 7

Sun Ultra 5
CNWRA Intranet/News

Operating System: Solaris 7

Sun Ultra 5
Primary NIS

Operating System: Solaris 7

Sun Fire280R
Production Servers

Operating System: Solaris 8

Sun Ultra 5
Secondary DNS

Operating System: Solaris 7
RAM Size: 256 MB
Disk: 9GB

Sun Ultra 5
Secondary NIS

Operating System: Solaris 7
RAM Size: 256MB
Disk: 9GB

Montana
Idaho
Nevada
Utah
Arizona

Intel Pentium II 450 MHz
UNIX LogServer
Operating System: UNIX

Intel Pentium II 450 MHz
UNIX PrintServer
Operating System: UNIX

Sun Sparc Station 20
Primary External DNS

Operating System: Solaris 7

Sun Sparc Station 20
DNS Resolver

Operating System: Solaris 7
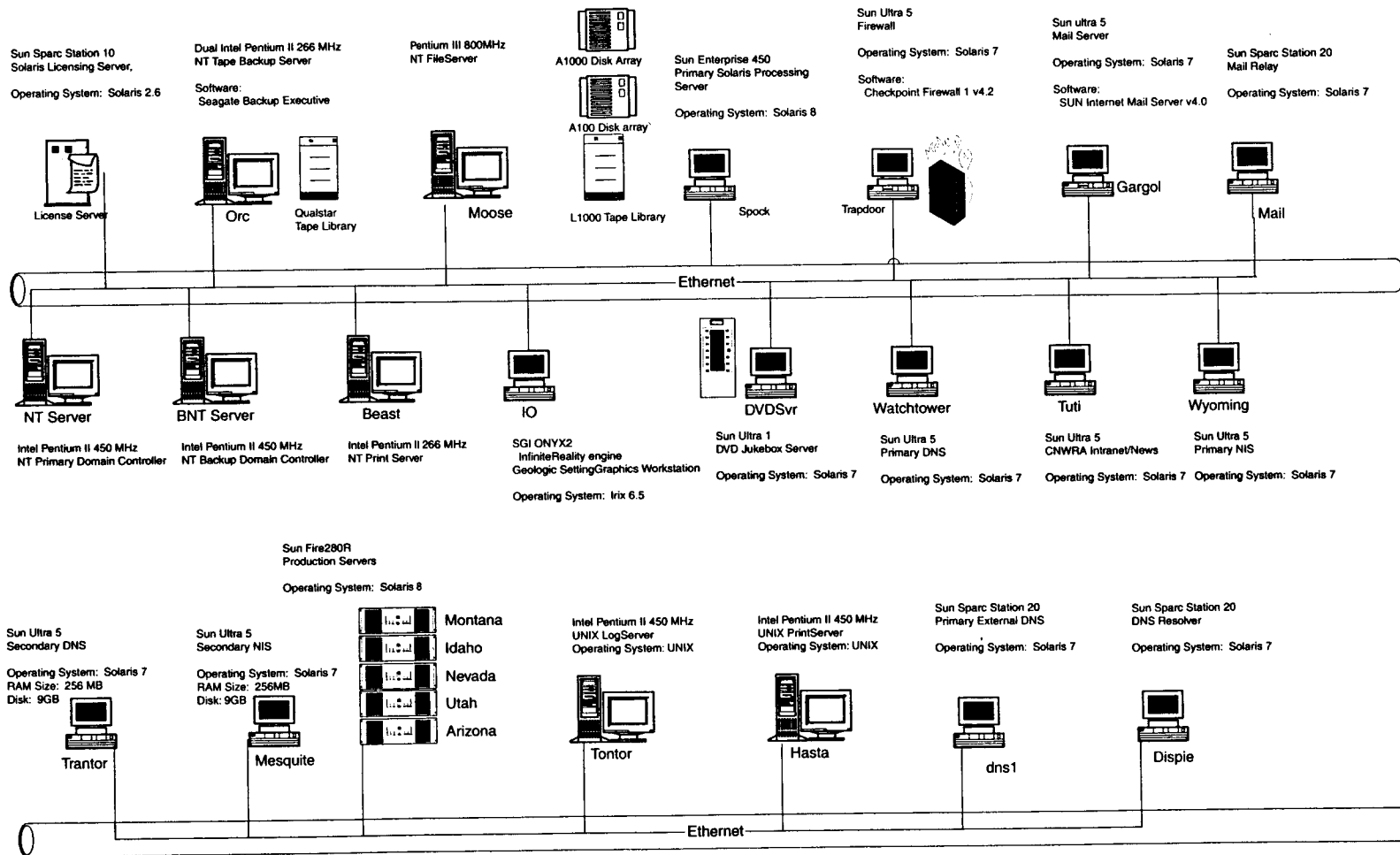
Trantor

Mesquite

Tontor

Hasta

dns1

Dispie

Ethernet

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

The CNWRA LAN Security System was implemented in FY1995. The CNWRA LAN Certification Report and a follow-up letter, issued in FY2001, documented the implementation and response to recommendations made by NRC and the DOE 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 1, Version 4.2. This software obviates the need for a proxy server and permits secure hypertext transmission protocol connections to the SwRI campus computers and the Internet in general.

CNWRA has completed an upgrade to the LAN in building 189 to 100 Mbps during FY2001, replacing wiring, switches, hubs and routers. The CNWRA external router now connects to the SwRI Backbone via ATM link.

The current servers, 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.

Table 2-1. Major computers and peripherals

Category	Description	Quantity
Servers		
Silicon Graphics, Inc. (SGI)	SGI ONYX Reality Engine 2	1
Sun Microsystems, Inc.	SUN Network E450 with Mass Storage Redundant Array of Inexpensive Disks System (60 and 30 GB)	1
	Sun Sparc 10	2
	Sun Sparc 20	3
	Sun Ultra 5	6
Generic	Pentium II 450 MHz	2
	Pentium II 550 MHz	4
Workstations		
Silicon Graphics, Inc.	SGI Indy	2
	SGI Indigo	1

Table 2-1. Major computers and peripherals (cont'd)

Category	Description	Quantity
Sun Microsystems, Inc.	Sun IPX	1
	Sun Sparc 5	2
	Sun Sparc 10	3
	Sun Sparc 20	10
	Sun Ultra 1	2
	Sun Ultra 10	2
	Sun E420-R	1
	Sun E280-R	5
Online Storage		
SCSI Tower	800 MHZ PC	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
	HP LaserJet 4000N	1
	HP LaserJet 4500N	1
	HP LaserJet 4550N	1
	HP LaserJet 8100DN	2
	HP LaserJet 8550N	1
Tektronix, Inc.	Tektronix Phaser 550	1

Table 2-1. Major computers and peripherals (cont'd)

Category	Description	Quantity
Datum GPS TymServer	GPS Time Synchronization Server	1
Router		
Wellfleet Communications, Inc.	Wellfleet Router/Concentrator [U.S. Nuclear Regulatory Commission (NRC)-provided]	1
Cisco Systems, Inc.	Cisco 3620 Router	2
	Cisco 3500 Switches	7
Bay Network	Bay Networks Routers (NRC-provided)	2

2.3 EXISTING HARDWARE AND SOFTWARE SYSTEMS

The NRC has authorized use of Corel® WordPerfect® (WP) 8.0 service pack 7 and above as the standard word processing software. In addition, NRC has approved use of software other then WordPerfect® from the Corel® suite. Moreover, NRC has approved use of 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 (PC) uses the approved versions of these software packages for the NT operating system (OS). All CNWRA major and intermediate milestones for NRC projects are to be submitted electronically in the contractually required version of WP along with the hard-copy documents.

The CNWRA has increased its online storage capacity with the addition of new computing resources and online data storage units. Presently, the CNWRA uses a generic Intel-based server with Seagate® Backup Exec software for NT and a Qualstar TSL–4220 Tape Library. All NT-based servers and clients (workstations and personal computers) use this hardware and software to backup user data on selected disk drives. The CNWRA has 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. The CNWRA uses a Sun Microsystems A1000 Disk Storage Array with Volume Manager, an Exabyte® Tape Library, and Cygnet® infinite DVD Jukebox as auxiliary storage and backup devices. This data storage and backup facility, incorporating existing and new hardware and software, will accommodate the present and near future needs of the CNWRA in the area of storage and backup management.

The CNWRA email system consists of a Sun Microsystems Ultra 5® server using the Sun Internet Mail Server® Release 4.0. This system is compatible with Simple Mail Transfer Protocol email systems. The CNWRA uses Access® 97 software for scheduling meetings and conference rooms as well as travel and vacations. Moreover, this software is used for the creation and maintenance of the Commitment Control Log.

The CNWRA has leased one primary UNIX-based server, a Silicon Graphics ONYX Reality Engine 2 and purchased a Sun Microsystems E450 (figure 2-2). CNWRA has also purchased a Sun Microsystems, Inc., E420R and five Sun Microsystems E280R Ultra III configured as a grid cluster to improve computing performance. Next fiscal year, some of the old Sun Microsystems equipment (e.g., SUN IPX, Sparc 5 and 10) 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 PCs constitute the bulk of computer-related hardware. About 15 of the existing PCs will be replaced during FY2002, and new PCs will be acquired to fulfill computing requirements on an as needed basis. Further, the CNWRA has installed an HP 4550N Color LaserJet printer in building 57 for use by staff in building 57, 51 and the T-1 trailer. The QMS 3825 printer was replaced with a HP 8100N LaserJet printer to be used as workgroup network printer. All of the HP IV printers used by the support staff have been replaced with HP 2100N LaserJet printers. The CNWRA will continue to upgrade and maintain its computer-related hardware.

The CNWRA has migrated from the Consolidated DOCument Management System to an Access® 97 database for general indexing of CNWRA correspondence and documentation. This database, periodically updated, is available for general access by CNWRA staff, and specific staff members have the database installed on their PCs.

The CNWRA project management function includes operations planning, periodic cost reporting, commitment control, and project scheduling. During FY1997, the CNWRA began using 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. The CNWRA is considering adopting Deltek® Project Planner for the development of first data for proposals, plans, and projects.

The CNWRA provides technical assistance to the NRC in three broad areas: (i) the Nuclear Waste Policy Act (NWPA) repository program, which is organized around key technical issues (KTIs) important to licensing the HLW repository; (ii) NWPA-related projects; and (iii) non-NWPA programs. The latter two areas include work for the NMSS Division of Fuel Cycle Safety and Safeguards for the Tank Waste Remediation System project; the Spent Fuel Project Office; and the NMSS Division of Waste Management, West Valley Demonstration Project, Uranium Recovery projects, and the Site Decommissioning Management Plan programs. Technical computing software packages, developed at the CNWRA or acquired from various government and commercial sources, are being and will be used in the conduct of work in all of these program areas.

The NRC and CNWRA technically review a broad range of DOE and DOE contractor documents as well as reports and plans from private sector firms, including those related to uranium mine sites, and develop guidance, procedures, issue resolution status reports, draft regulations, and other technical reports presenting results of its technical assistance to the NRC. Support to the NWPA repository program, as well as NWPA-related and non-NWPA projects, comprises technical review of DOE and other licensee documents, including those related to decontamination and decommissioning of contaminated sites. In addition, independent assessments and evaluations, many of which are computationally intensive and draw on large and complex databases, are conducted to support 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-dimensional and three-dimensional graphics displays, and other scientific and engineering software. In

addition, technical review and technical assistance require confirmatory and independent calculations by CNWRA staff.

The cost to develop, modify, and maintain many technical codes is included in the budgets for the appropriate KTIs, projects, and task orders. Based on the findings of a Defense Contract Audit Agency audit of SwRI/CNWRA direct and overhead costs, software generally applicable to NRC-funded and other work of the CNWRA is purchased or leased using SwRI capital monies or overhead funds. Table 2-2 identifies the major software used by the CNWRA for NRC-related tasks and project work for other CNWRA clients.

Table 2-2. General technical computing software used at the Center for Nuclear Waste Regulatory Analyses, fiscal year 2002

SOFTWARE	
3D Stress	Geosec 2D/3D
ABAQUS—Explicit	GM-SYS Package
ABAQUS—Standard	GrafNav GPS Post-Processing
ANSYS/LS-Dyna	GWB
ASHPLUME	Hyperworks
AQTESOLV	HYDRUS2D
ArcView/Image Analysis	Imagine Professional for Microsoft
Breath	KINEROS2
Crystal Ball 2000	MACSS
D and D	MathCad
DDA-CT	Mathematica
EINVRT	MATLAB—Floating Network License
EQ 3/6	MCNP
EZ-FRISK	MEPAS
ESP Software	MINTEQAS
FITEQL	MUTIFLO
GENII-S	NEFTRAN II
Genie-PC Gamma Spectrometry System	NRC-WVDP-GIS
GEOINVRT	Oasis Montaj
Geologic Modeling Package (Earth Vision)	ORIGEN

Table 2-2. General technical computing software used at the Center for Nuclear Waste Regulatory Analyses, fiscal year 2002 (cont'd)

SOFTWARE	
PCSA	S-Plus
PHREEQC	STELLA
PPSGS	STEREONET
PVHA YM	TECTRAN
RESRAD	TPA
RSAC	GPP (for TPA Code)
SAPHIRE	USCLIMATE.BAS
SHOCK	UDEC
SOLCALC	

3 REQUIREMENTS FOR COMPUTERS AND INTERFACES FOR FISCAL YEAR 2002

The CNWRA computer-related acquisitions planned for FY2002 are described in the following sections. Specific hardware and software required to support CNWRA computer systems and applications are identified, together with cost estimates. The items described in the following tables will be leased or purchased on CNWRA overhead or purchased using SwRI capital equipment funds, since none are able to be identified with a single project or deliverable.

3.1 PROJECT MANAGEMENT AND REPORTING

In FY2002, the CNWRA expects to begin using a Windows NT-based (Win NT) software product to expedite proposal and operations plan development, as well as pricing and cost estimating as shown in table 3-1. The Deltek® Project Planner software is part of a Deltek® support package presently used by SwRI operating and support divisions; its use by the CNWRA will facilitate communication and data exchange with the SwRI Contracts department. Moreover, it can seamlessly interface with Microsoft® EXCEL® 97, the software currently used to create financial data for operations plans. Table 3-1 provides a cost estimate for this software. No hardware costs will be incurred. Training costs cannot be determined at this time.

3.2 TECHNICAL COMPUTING SOFTWARE

Most software needs have been identified and fulfilled in previous years. Any specific additional software needed to accomplish the activities associated with FY2002 operations plans and proposals will be identified and purchased (or leased) with overhead funds as needed.

3.3 COMMUNICATIONS AND SECURITY SYSTEMS

The CNWRA is in the process of building and implementing a Virtual Private Network (VPN) and function-specific firewall configuration. This configuration will permit remote access by CNWRA staff to email services. The CNWRA is planning to place a Cisco PIX-515R hardware firewall on the frame relay connection between the NRC and the CNWRA early in FY2002. This was recognized as a possible security weakness during the FY2001 Computer Incident Advisory Center audit.

Table 3-1. Proposal and operations plan development, fiscal year 2001

Quantity	Item Description	Estimated Cost
1	Deltek® Project Planner	$25,000
	SUBTOTAL	$25,000

4 SUMMARY

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

The CNWRA computer hardware and software requirements for FY2002 in the application categories will be purchased or leased with CNWRA/SwRI overhead funds, and do not constitute Government Furnished Equipment or Government Purchased Equipment.

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. In addition, the CNWRA assumes the continuation of funding to develop computer codes and other technical computing applications in FY2002 in support of NRC programs and projects; these costs are not included here.