

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES ^{1/48}

CORRECTIVE ACTION REQUEST

CAR No: 99-4

Associated AR, SR, NCR No: CNWRA Audit 99-1

PART A: DESCRIPTION OF CONDITION ADVERSE TO QUALITY It does not appear that data, files, or computer programs used to support CNWRA programs are consistently backed up and maintained permanently as quality records. This applies to permanent storage of server back-ups as well as magnetic media required to complete scientific notebook documentation. Reference QAP-001, 3.6.6

Initiated by: D.W. Dunavant *SD*

Date: 6/11/99

PART B: PROPOSED ACTION

Responsible EM: ~~W. Patrick~~ *H. Babin*

Response Due: 7/12/99

W. Patrick
6/16/99

1) Extent of Condition:
See attached page.

2) Root Cause:
See attached page.

3) Remedial Action:
See attached page.

Proposed Completion Date:
See attached page.

4) Corrective Action to Preclude Recurrence:
See attached page.

Proposed Completion Date:
See attached page.

Element Manager:

Date:

7/1/99

PART C: APPROVAL
Comments/Instructions

reviewed by DWD 20 July 99
Reviewed by LGS 12/17/00

Director of QA:

Date:

7/12/99

PART D: VERIFICATION OF CORRECTIVE ACTION IMPLEMENTATION
On October 19, 2000, The CNWRA Administrative Procedure - 018, Electronic File Archival and Backup Procedures was signed off. This was the last needed part to close CAR 99-4. This procedure describes the process and equipment to all electronic archival & backup.

Verified by: *Sharon Malin* Date: 10/13/2000

Distribution: *original to QA records*
CNWRA Director
CNWRA ER&S manager
CNWRA President
D. Dunavant/DA/30
R. Weber/DA/30
Mr. Ehnstson/DA/30

CORRECTIVE ACTION REQUEST NO. 4

It does not appear that data, files, or computer programs used to support CNWRA programs are consistently backed up and maintained permanently as quality records. This applies to permanent storage of server back-ups as well as magnetic media required to complete scientific notebook documentation. Reference QAP-001, Para. 3.6.6

Extent of Condition: The CNWRA has historically supported various operating systems for personal computers (PCs) and workstations: (i) PC operating systems (e.g., DOS, OS/2, and Windows NT); (ii) UNIX operating systems (e.g., SunOS and Solaris, SGI IRIX); and (iii) Macintosh. Although these operating systems can accommodate the use of various backup techniques, capability exists to centrally backup those machines (servers and clients) using the NT operating system. There is not a centralized capability for backup of machines (servers and clients) using the UNIX operating systems. Therefore, all data and information files, other than those resident on the primary SUN server (Enterprise 3500-VULCAN) and the SGI server (ONYX2-PLUTO) including homes' and projects' directories, have not been backed up consistently. With specific regard to scientific and engineering software that has been determined to be subject to the controls of TOP-018, a Master Directory of Scientific and Engineering Software is maintained for software that is used in the NRC licensing process or in support of other clients. All such scientific and engineering software in the QA Records Room are being adequately maintained and archived in a timely manner. This aspect of the audit finding will continue to be monitored.

Root Cause: Requirements and associated processes for controlling backup of quality-assurance and mission-critical information were not adequately documented. Furthermore, informal/administrative techniques for controlling backup have not kept pace with the evolving computer systems and project requirements. Contrary to the audit finding, no cases were found where software items controlled under TOP-018 were not being adequately archived as quality records.

Remedial Action: Certain actions have been underway for some time. For example, the CNWRA has phased out or is in the process of phasing out the DOS, OS/2, and Macintosh operating systems by the end of calendar year 1999. This will greatly simplify implementing effective controls on production of backups. To address the immediate need for backup of files, two actions will be taken. First, staff will be advised by memorandum from the Director of Administration as to which systems are able to be automatically backed up from a central location. The IMS group will immediately begin backing up these systems on a weekly basis. Second, for those systems that cannot be backed up automatically, the Director of Administration will instruct the staff and provide appropriate equipment and supplies so that staff can backup the other systems themselves. All backups will be maintained in the IMS locked and fire resistant cabinet until such time as a more permanent solution is implemented as a part of the corrective action outlined below.

Proposed Completion Date: August 13, 1999

Corrective Action to Preclude Recurrence: An appropriate procedure will be prepared, reviewed, and implemented that defines the criteria for what data, files, and programs require backups, timing for backups, responsibilities for doing backups, and the places and durations of maintaining the backups.

It is anticipated that a combination of new hardware and software will be needed to implement an effective and lasting solution to the identified problem. Details of the appropriate corrective action must be delineated and this will be accomplished by the Director of Administration through the Computer Users Group or a special ad hoc task force, as appropriate.

Proposed Completion Date: September 30, 1999

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ADMINISTRATIVE PROCEDURE

Proc. AP-018

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Title AP-018 ELECTRONIC FILE ARCHIVAL AND BACKUP PROCEDURES

EFFECTIVITY AND APPROVAL

Revision 0 of this procedure became effective on October 13, 2000. This procedure consists of the pages and changes listed below.

<u>Page No.</u>	<u>Change</u>	<u>Date Effective</u>
All	0	10/13/2000

Supersedes Procedure No. None

Approvals

Written By <i>Arnold J. Galloway</i> Arnold J. Galloway	Date 10-13-2000	Concurrence Review <i>Brittain Hill</i> Brittain Hill	Date 10/13/00
Quality Assurance <i>Bruce Mabrito</i> Bruce Mabrito	Date 10/13/2000	Cognizant Director <i>[Signature]</i>	Date <i>[Signature]</i>

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ADMINISTRATIVE PROCEDURE

AP-018 ELECTRONIC FILE ARCHIVAL AND BACKUP PROCEDURES

1. PURPOSE

The purposes of this procedure are to define backup, archives and disaster recovery methods and/or processes, and delineate the responsibilities for copying, storing and retrieving data on various media that reside in the disk drives of CNWRA servers and clients (e.g., workstations).

2. DEFINITIONS

Administration Tool – A system administration utility with a graphical interface that enables administrators to maintain system database files, printers, serial ports, user accounts, and hosts.

Archive – The storage of a backup outside of the original device that was used to generate the backup, for possible review or recovery at a later date. This may be a local or off-site archive.

Backup – The process of copying electronic file system data to alternative media from the hard disk drive on which the data originally resided, (e.g., tape, CD-Rom, Zip disk), and the media that results from that process.

Client – Desktop unit that is dependent on a server for some of its processes (e.g., security).

Disaster Recovery – Recovery of data in case of a catastrophic event at the local site (e.g., fire, flood, an intentional malicious destruction of original files) using an archive that typically is stored off-site or in an on-site facility that is safe from any disaster and its effects.

Disk Mirroring – a feature used to guard against component failure by writing the same data to two or more disk drives at the same time.

Full backup – Backup of all selected data on a LAN.

Incremental Backup – The process of saving all data created or modified since the previous backup was performed; incremental backups are performed more frequently than full backups.

Local Area Network (LAN) – The portions of a network that servers and processes have direct control over.

Multi-Volume Backup – A backup where the data to be copied require more than one tape cartridge or diskette.

File – A plain file is a file containing data. The data may be text or other content.

Restore – The process of copying files and directories from backup to hard disk for review or recovery.

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Server – A host process that communicates to a client process. Commonly, the term server is used to refer to a host that provides network processing and storage resources to one or more clients. These resources may include logon security, shared storage devices, e-mail, network printer control and other functions that are performed more efficiently when controlled with a centralized process. A server is connected to the clients it serves through a LAN.

3. RESPONSIBILITIES

3.1 Technical and Support Staff

Staff members shall familiarize themselves with the manufacturer's operating instructions for the appropriate media storage device prior to its usage. Staff members shall be familiar with relevant portions of Quality Assurance Records Control Procedures (QAP-012) and must use the desktop backup devices to meet its requirements, as appropriate. If any backup is generated to satisfy the provisions of section 3.2 of QAP-012, it is each staff member's responsibility to provide that backup with their scientific notebook to the Quality Assurance Director at the normal 6 month interval. It is not mandatory that staff members backup any other data on their desktop systems, however they may do so at their discretion.

3.2 NT Administrator

The NT administrator is responsible for ensuring the availability of an adequate supply of the correct tapes to meet the backup requirements stated in section 4.2.1. The NT Administrator shall verify via the Administration Tool that the backups were performed successfully and change out the tapes at the appropriate time. Restoring data from the automated NT backup system will be performed by the NT administrator. The NT Administrator will install any software updates or patches that pertain to the NT servers.

3.3 UNIX Administrator

The UNIX Administrator is responsible for ensuring the availability of an adequate supply of the correct tape cartridge to meet the backup requirements stated in section 4.2.2. The UNIX administrator will verify via the Administration Tool that the backups were performed successfully and change the tapes at the appropriate time. Restoring data from the automated UNIX backup system will be performed by the UNIX administrator. The UNIX Administrator will install any software updates or patches that pertain to the UNIX backup server.

3.4 IMS Project Manager

The IMS Project Manager periodically will verify that the NT and UNIX administrators have performed their tasks correctly & ensure there is an adequate supply of backup media for staff needs. The IMS Project Manager will provide support in the absence of either of the administrators and will contact vendors for hardware failure support if required.

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4.0 PROCEDURES

4.1 Desktop Backup

CNWRA staff members have multiple methods of data backup available to them at their desktop or through the support staff. Automated backup of hard drives "D:" and above will be accomplished per section 4.2. Data to be part of the automated backup must be moved to one on these hard drives. Data stored on the "C:" drive will not be part of the automated backup and the staff member must back this data up manually to meet the requirements of QAP-012. Blank storage media are available in the IMS Laboratory, room A136 in building 189.

Technical Staff Desktop NT units

Desktop NT units (personal computers) have been equipped with read/writeable devices to allow the user to individually create backups of critical data and computer records. These backups will be maintained by the individual users. Those required to meet requirements of QAP-12, 3.2.1 will be stored in QA records.

Support Staff Desktop NT units

Support staff desktop NT units (personal computers) are equipped with read/writeable units. This allows the support staff to backup large specific files resident in any computer over the LAN. These backups will be maintained by the individual users. Those required to meet requirements of QAP-12, 3.2.1 will be stored in QA records.

Sun Microsystems and Silicon Graphics UNIX based units

All of these units are on the LAN and some have a tape drive (4mm or 8mm) attached directly to them. These drives can be used to back up specific data. These backups will be maintained by the individual users. Those required to meet requirements of QAP-12, 3.2.1 will be stored in QA records.

4.2 Automated Network Backup

The CNWRA IMS group is responsible for automated network backup and archiving as set forth in section 3.

4.2.1 Backup of Windows NT Systems

The backup of the NT portion of the LAN will be accomplished with a read/writeable device connected to the LAN. Full backups will be accomplished automatically once a month after normal business hours. Incremental backups will occur each evening of the normal work week.

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The NT Administrator removes the tapes that are to become part of the archive once a month. The most recent backup is then placed in the fireproof safe to become the local archive. The existing archive tapes that are in the fireproof safe are then transferred for disaster recovery purposes to the storage facility at Iron Mountain, an off-site storage facility. The archive tapes already at Iron Mountain then are rotated back to the CNWRA. See figure #1.

Instructions for use of the backup/restore software can be found on the manufacturers CD, or in the user manuals that are kept in the IMS Lab.

4.2.2 Backup of UNIX portion of CNWRA LAN

Full backups will be accomplished automatically once a month after normal working hours. Incremental backups will occur each evening of the week. This system backs up all UNIX equipment.

The UNIX Administrator removes the tapes that are to become part of the archive once a month. Those tapes subsequently are labeled and stored in the fireproof safe in the IMS Laboratory. The label includes the dates corresponding to the backup from the UNIX system. The existing archive tapes that are in the fireproof safe will be transferred for disaster recovery purposes to the storage facility at Iron Mountain, an off-site storage facility. The archive tapes already at Iron Mountain then are rotated back to the CNWRA. See figure #1.

The disk mirroring capabilities of the UNIX applications server will be used to provide a redundant file system in case of a hard disk failure in the primary UNIX applications server. In case of disk failure, the UNIX Administrator would be notified via a console pop-up message. At that time the UNIX administrator will contact the appropriate vendor for further corrective action.

A scheduled backup will be run during periods of low network traffic so as to not encumber machine resources during business hours.

For specific instructions on using the backup/restore administration program, refer to the online help or the manufacturer's manuals.

5.0 COMMERCIAL APPLICATIONS SOFTWARE

Commercial applications software is loaded on Drive "C:" and will not be backed up. However original copies will be kept in a fireproof safe for purposes of disaster recovery.

6.0 DATA RETRIEVAL

Incremental backup will be used to recover any file or set of files lost. Files can be recovered for three months. The backup tapes are reused after that. Full backup will be used to recover from a major disaster in which all data is lost.

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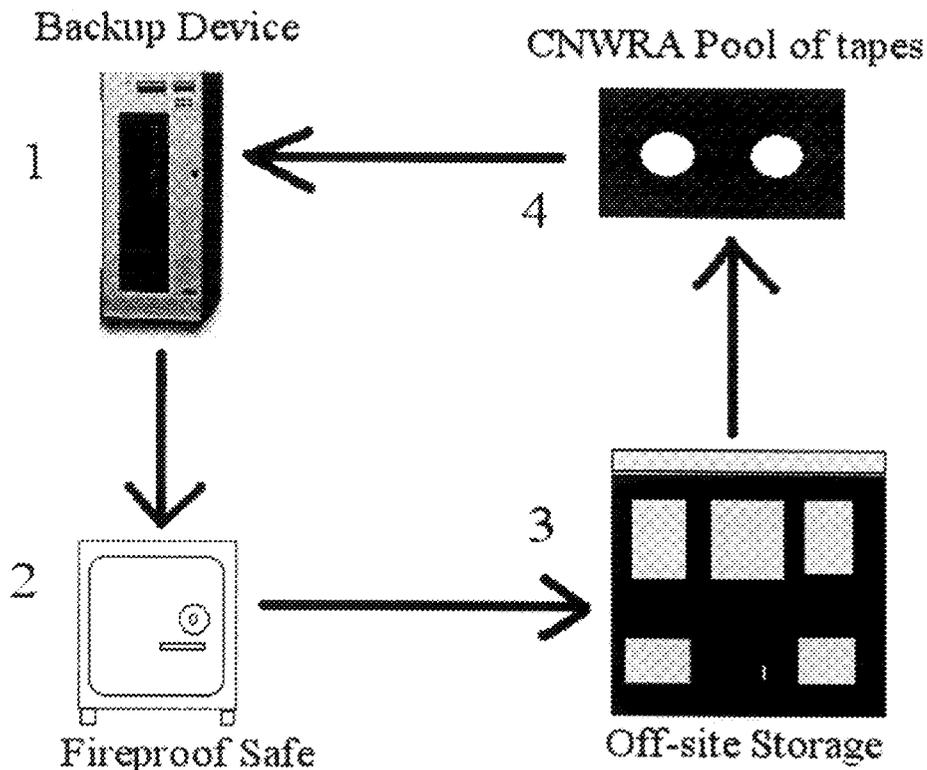


Figure 1: Three consecutive sets of backup are available at any time. Each set contains incremental backups for all days of the month and at least one full backup for the month.

7.0 Records

This procedure in itself does not generate any QA records. Therefore no QA record requirements exist for the actual process. However the retention of backups in accordance with QAP-012 section 3.6 applies to this procedure.

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*Connective Action
Request Folder -
CAR No. 99-4*

MEMORANDUM

August 13, 1999

TO: CNWRA Staff

FROM: Henry F. Garcia *ABJ/pn HFG*

SUBJECT: Acquisition of Automated Tape Backup

Presently, the IMS group uses a clone server with Seagate® Backup Exec software for NT and a Qualstar TLS-4220 tape drive to backup all NT-based servers and clients data disk(s) (i.e. D:\) located in workstations and personal computers on a daily and weekly basis. This software, covering operating system and application software on these servers and clients, will backup incrementally the data on the NT-based servers and clients, and will activate a full backup of such servers and clients weekly. Backup is accomplished on tape medium, and the tape drive can accommodate three weeks of data. On the fourth week, the backup will write over the first week's data, and this process will continue each week. This NT-based backup system is designed for disaster recovery.

Currently, the IMS group makes a bi-weekly (every two weeks) backup of the Home and Project directories only on two UNIX-based servers (i.e., SUN Enterprise 3500 and SGI Onyx 2 Reality) This backup is done over the weekend.

The CNWRA has purchased an automated tape backup system consisting of a Sun Microsystems StorEdge® L1000 Tape Library with the Solstice Backup® software for backup of UNIX-based servers and clients. This backup system should be installed and implemented either by the end of FY 1999 or the start of FY 2000. This will permit the automated backup of all data on UNIX-based servers and clients. The backup procedure will be the same as that already used for NT-based servers and clients.

CNWRA staff, along with SwRI staff as well as consultants and students, should continue to make weekly backups of individual data on available tape drives, and this data should be retained by these individuals on their tape medium.

This memorandum updates a recent e-mail on Stop Work Order—UNIX Systems. If you have any questions, please contact me.

/lg

11/45

CAR-99-4

Date: 8/19/99
Sender: Bruce Mabrito
To: Wesley Patrick, Budhi Sagar, Henry Garcia
cc: Bruce Mabrito, josed@trantor.cnwra.swri.edu
bcc: mehnstrom@swri.org, Maria Padilla, Perry Seely
Priority: Normal
Subject: Verification Action on CAR 99-4

A copy of this note will be filed in the Corrective Action Request folder as partial verification action on CAR 99-4.

On August 19, 1999, I asked J. De La Espriella to see the "back up tapes" being maintained by the Information Management Services group. In the IMS room, I was taken to a locked, FireKing File Cabinet (Insulated Record Container Class 350 - 1 hour fire rating; No. H457418; Statement on top drawer: "The manufacturer certifies the file is made to specifications of a sample that protected paper contents for 1.5 hours in a test with temperatures reaching 1700-degrees F.").

Inside the third drawer, there were 38 - 8mm tapes with individual labels on each 8mm tape with different servers and dates identified. I was told that this comprised the total non-automated computer back ups accomplished in the last one-and-a-half months. Other back ups for Windows NT of servers and workstations' data drives (D:Drives) are now handled automatically.

The statement being verified in this review is part of the Response to Corrective Action Request 99-4, which reads: "All backups will be maintained in the IMS locked and fire resistant cabinet until such time as a more permanent solution is implemented as part of the corrective action outlined below (referring to other actions to be taken as described in the CAR response).

Three 8 mm tapes were selected for the Home Directory and one was run on the Vulcan 8mm drive unit in the IMS room. Once the proper protocol was determined, the tape showed literally hundreds of files scrolling on the screen.

Based on this verification, the items proposed for remedial action of CAR 99-4 appear to have been implemented. Bruce Mabrito x 5149

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CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

*CAR Folder -
CAR 99-04
Backup Storage*

September 20, 1999

MEMORANDUM

TO: Wesley C. Patrick

FROM: Henry F. Garcia
Michelle Loranger
Jose DeLaEspriella

SUBJECT: CNWRA Backup Storage of Computer-generated Data

The CNWRA Local Area Network (LAN) consists of three platforms (systems software). These are: (i) Silicon Graphics (SGI) Irix, (ii) Sun Microsystems (SUN) Solaris, and (iii) Microsoft Windows NT. The first two are UNIX-based platforms. The backup process requires the use of several software utilities (i.e., BRU, TAR, and others) for individual machine backup and long-term storage of data in UNIX-based servers (i.e., SUN Enterprise 3500 and SGI Onyx 2 Reality) and clients (i.e., Sparc/Ultra and Indy/Indigo workstations). Presently, no software is used for short-term storage. Disaster recovery backup for these servers and clients employs the Solstice Backup® software. The backup of Windows NT-based servers and clients (i.e., Pentium class PCS) uses the Easy CD Creator Deluxe® Suite software for long-term storage and Seagate Backup Exec® software for disaster recovery. Currently, no personal backup or short-term storage software is utilized.

Personal backup is used for those data with which CNWRA staff are working (i.e., project deliverables). Short-term storage is used for those data that may be reusable for different projects and that should be readily available and easily restorable (i.e., formulae, test beds, and databases). Long-term storage is used for those data that should be archived or benchmarked for future reference (i.e., past deliverables and process documentation). Disaster recovery is used for data that would be necessary to rebuild a piece of hardware or to reestablish system configuration, systems software, or stored user data (i.e., power loss, operator error).

The following describes the type of backup needs, the current/approved software/hardware used for backup of the three platforms, the present/acceptable media utilized, and the improvements needed to facilitate the backup process. See Tables 1-3, attached, for a brief description.

- **Backup of the Silicon Graphics Server and Clients on the UNIX-based Irix Platform**

For personal backup, CNWRA staff working on these machines are asked to backup their critical data. An 8mm tape drive attached to the SGI Onyx 2 Reality server (Pluto), using regular 8mm tape medium and the BRU software utility resident within Irix, is available for this purpose, or staff may use the TAR utility. Pluto and the Indy/Indigo workstations, with several directories and partitions, currently are on the network. The 8 mm tape used for personal backup must be shared by several users, occasionally causing a cuing problem. Additionally, the BRU utility used to facilitate these backups is a weak and outdated (i.e., file size restrictive) version. According to the technical staff

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at BRU, Inc., this outdated version's recovery capabilities are extremely limited, and it lacks the versatility, robustness, and reliability of the currently available version.

For short-term backups, CNWRA staff can use any of several hard drives (scratch drives). The data in this temporary storage area can be placed on 8mm tape for personal backups. Periodically, these drives are cleaned out to accommodate current project data. The IMS group will evaluate the use of a Cygnet infiniDVD® 100DVD-RAM jukebox to augment and supplement the short term backup on existing hard drives and 8mm tapes. This evaluation will define this jukebox's storage capacity, ease of restoration, and possible length of storage.

For long-term storage, CNWRA staff currently use the BRU and TAR utilities along with the 8mm tape drive. The existing hardware and software are not capable of processing the volume of data requiring long-term storage. The DVD-RAM jukebox would also resolve this problem. In addition to the possible implementation of the DVD-RAM jukebox, the existing Exabyte® 210 tape library has been approved for an upgrade to the Exabyte® 220 library, increasing and improving data storage and recovery capability tenfold.

For disaster recovery, the CNWRA staff is using a mix of the utilities available for other types of backup. The new StorEdge® L1000 Tape Library with the Solstice Backup® software, when implemented, will be used for disaster recovery backup of data on the SGI machines. Moreover, the Exabyte® 220 tape library, when implemented, would support this backup. This additional capability will also be useful for rebuilding or regenerating the SGI machines.

• **Backup of the Sun Microsystems Server and Clients on the UNIX-based Solaris Platform**

For personal backup, a single 8 mm tape drive, operating with the TAR utility and the UFS dump utility, is attached to the SUN Enterprise 3500 server (Vulcan). Again, CNWRA staff working on this server and the Sparc/Ultra workstations are asked to backup their critical data. Currently, backups are accomplished over the network to this tape drive or onto regular 1.44 MB diskettes. The efficiency of this tape drive could be significantly enhanced by acquiring the new version of the BRU software.

Short-term backup of SUN machines is accomplished using hard drives located on an A1000 hard disk array attached to Vulcan. These drives operate the same way as the SGI short term "scratch" drives. Users store their data here temporarily until they can backup onto the 8 mm tape drive. If approved, the DVD-RAM jukebox will improve on the present manual method of short-term backups by allowing the automatic backup of these data.

Concerning long-term storage, data are stored via the 8 mm tape drive using the TAR utility. The TAR utility is insufficient because this software is incapable of processing the abundant data requiring long-term storage. Use of the BRU utility would alleviate the problems of file size and data volume. The new StorEdge® L1000 Tape Library with the Solstice Backup® software, will serve as a vehicle for long term storage in addition to the existing 8 mm tape drive, supplemented by the Exabyte 220.

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Disaster Recovery is done using the hard drives in the A1000 attached to the SUN Enterprise 3500 server. The implementation of the StorEdge® L1000 Tape Library with the Solstice Backup® software and the adoption of the Exabyte® 220 tape library will augment this backup capability.

- **Backup of the Pentium Class PC Servers and Clients on the Windows NT Platform**

For personal backup, CNWRA staff working on these machines are asked to backup their critical data. Currently, each staff member uses various media (e.g., 8 and 4mm tapes, 1.44MB diskettes, and 100mb Zip disks) for this backup. The purchase of the requested internal Iomega 250 Mb Zip drives and 2 Gb Jazz drives will facilitate the backup of this data. These drives, with their respective disks, will permit the storage of more data than the 1.44mb diskettes. These drives are user friendly and are less expensive than the 8 mm or 4 mm tape drives. Moreover, the data stored in these disks is can be easily retrieved and modified.

For short-term backup, we are currently using hard drives located on a NetApp® Filer device. This device serves the same function as the hard drives for both the SUN and SGI servers, and these hard drives are written over periodically to permit the recycling of data storage space. Again, the possible acquisition of the DVD-RAM jukebox would allow for the short-term storage of this data.

Long-term storage is being accomplished via the Easy CD Creator Deluxe® Suite and the writeable CD drives using the Hewlett Packard CD writer 8100 series drive and writeable CDS. The implementation of the StorEdge® L1000 Tape Library with the Solstice Backup® software and the adoption of the Exabyte® 220 tape library will augment this backup.

For disaster recovery, the Seagate Backup Exec® software for Windows NT and a Qualstar® TLS-4220 tape jukebox are used. In the future, the StorEdge® L1000 Tape Library with the Solstice Backup® software and the adoption of the Exabyte® 220 tape library, along with the purchase of additional licenses, could be used for this purpose. However, the need for these licenses is not immediate.

To further explain, some redundancy exists in the backup capability. However, this redundancy is inherent in the design and configuration of the CNWRA LAN. The nature of CNWRA activities demands the routine retention and retrieval of voluminous data. These data are scattered throughout the network and their growth has been extensive in relation to the increase in the technical staff. The seemingly dispersed placement of these data can be attributed to the nature of data creation and recovery (e.g., staff, students, and consultants independently producing data and placing them in the most convenient location for future retrieval), contributing to the proliferation of such data and its population in the various storage devices. A reasoned and responsible backup scheme for CNWRA data suggests the initial determination of data importance and frequency of its use to achieve better network performance and improved growth strategy. This determination would be made by the IMS group in close coordination with the technical staff to avoid any misinterpretation relative to the gravity of any data.

The volume of existing and expected critical data should be the determinant of hardware/software selection. Personal short- and long-term backups are necessary for the recovery of lost or misplaced data. Disaster recovery backups are used for larger scale and catastrophic data loss and in response to uncontrollable events such as power loss and hardware failure. Each platform offers different solutions for the various facets of the backup scheme. The proposed backup scheme allows for redundant disaster recovery among the three

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platforms and sufficient incremental backup of each platform. A reliable backup scheme requires a certain amount of redundancy for fault tolerance. In the IMS-proposed LAN backup scheme, a reliable vehicle is provided for each platform, including a reliable and reasonably redundant vehicle for disaster recovery. Again, this approach is outlined in the attached tables.

In conclusion, the addition of one 8 mm tape drive for Pluto and Vulcan would facilitate the simultaneous backup of personal critical data by multiple users. Another improvement would be the acquisition of capable and reliable software such as the BRU utility for Irix and Solaris platforms. For short- and long- term backups, the addition of better utilities would further improve the longevity of these backups. The installation and implementation of the 250Mb Zip and 2Gb Jazz drives will complement rest of the backup scheme. This hardware and software will interface well to provide the CNWRA staff a reliable, fault tolerant, and robust backup network.

lg

cc: Directors and Element Managers

G:\MSBACKUP\HOLISTIC-~~BACKUP~~ MEM WPD

Table 1. UNIX (SGI)

Needs	Software	Hardware	Media	Improvements Needed
Personal Backup (e.g., home directory, submittal of data to client, etc.)	Tar-Tape Archive Bru-Improved Tape Archive	8mm tape drive attached to Onyx 2	8mm tape	Purchase BRU 2000 Utility Add one 8mm tape drive to Onyx 2 for concurrent back ups
Short-Term Storage (e.g., this week's project, temporary data for a project)	N/A	Hard disk drives	Hard disk drives	Purchase BRU 2000 Utility Evaluate a DVD-RAM Jukebox (pending arrival)
Long-Term Storage	Tar-Tape Archive Bru-Improved Tape Archive	8mm tape drive attached to Onyx 2	8mm tape	Purchase BRU 2000 Utility Evaluate a DVD-RAM Jukebox (pending arrival) Exchange the existing Exabyte® 210 Tape Library for an Exabyte® 220 Library
Disaster Recovery	Solstice Backup®	SUN StorEdge® L1000 Tape Library	DLT tapes	Implement the new StorEdge® L1000 Tape Library with the Solstice Backup® Software Exchange the existing Exabyte® 210 Tape Library for an Exabyte® 220 Library

1-10-01

Table 2. UNIX (SOLARIS)

Needs	Software	Hardware	Media	Improvements Needed
Personal Backup. (e.g., home directory, submittal of data to client, etc.)	Tar-Tape Archive USF Dump Archive	8mm tape drive attached to Enterprise 3500	8 mm tape	Purchase Bru 2000 Utility Add one 8mm tape drive to Enterprise 3500 for concurrent back ups
Short-Term Storage (e.g., this week's project, temporary data for a project)	N/A	Hard disk drives	Hard disk drives	Purchase Bru 2000 Utility Evaluate a DVD-RAM Jukebox. (pending arrival)
Long-Term Storage	Tar-Tape Archive	8mm tape drive attached to Enterprise 3500	8 mm tape	Purchase Bru 2000 Utility Exchange the existing Exabyte® 210 Tape Library for an Exabyte® 220 Library
Disaster Recovery	Solstice Backup®	Sun StorEdge® L1000 Tape Library	DLT tapes	Implement The new StorEdge® L1000 Tape Library with the Solstice Backup® Software Exchange the existing Exabyte® 210 Tape Library for an Exabyte® 220 Library

17/1/08

Table 3. WINDOWS NT

Needs	Software	Hardware	Media	Improvements Needed
Personal Backup (e.g., home directory, submittal of data to client, etc.)	N/A	Iomega 100MB Zip drives 8 & 4mm tape drives	Iomega 100MB Zip disks 8 & 4mm tape	Purchase of internal Iomega 250 MB Zip drives and 2 GB Jazz drives
Short-Term Storage (e.g., this week's project, temporary data for a project)	N/A	NetApp® Filer	Hard disk drives	Evaluate a DVD-RAM Jukebox (pending arrival)
Long-Term Storage	Easy CD Creator Deluxe®	HP CD writer 8100 series.	Writable CD	Implement The new StorEdge® L1000 Tape Library with the Solstice Backup® software Exchange the existing Exabyte® 210 Tape Library for an Exabyte® 220 Library
Disaster Recovery	Seagate Backup Exec®	Qualstar® TLS-4220 Tape Jukebox	DLT tapes	Implement the new StorEdge® L1000 Tape Library with the Solstice Backup® Software Exchange the existing Exabyte® 210 Tape Library for an Exabyte® 220 Library

1/3/98

10/1/99

Date: 9/18/99
Sender: Henry Garcia
To: #DIRS-MGRS
Priority: Normal
Subject: COPS Activities

The review continues on FY2000 capital equipment. Some of this equipment has been approved for purchase during FY1999, and requisition for same are in process.

The conversion process in QA continues. A new temporary "employee" has replaced the previous person.

IMS group is testing the new automated tape backup system for UNIX-based machines. M. Loranger will advise when testing has been completed and automated backups will begin. We are awaiting the receipt of Sun equipment for the upgrade to the existing firewall hardware. The old software, too, will be replaced. The Y2K process continues and we expect to have most, if not all, of the compliance issues resolved by October 15, 1999. We await response from Legal on our software license status.

Repair of the air conditioning system in Bldg. 57 and installation of Cat. 5 cable in Bldgs. 51 and 57 continues. We will receive a status report from facilities engineering.

Paul and Roseanne are pursuing the payment of outstanding invoices from Div. 20 suppliers, consultants, and subcontractors. This is the last week of the fiscal year, and these folks are looking for any "logjams" in the system that would preclude the payment of approved vouchers.

--Henry