The Arizona Border Study

An Extension of the
Arizona National Human Exposure Assessment Survey (NHEXAS)Study
Sponsored by the Environmental Health Workgroup of the Border XXI Program

Quality Systems and Implementation Plan for Human Exposure Assessment

The University of Arizona
Tucson, Arizona 85721

Cooperative Agreement CR 824719

Standard Operating Procedure **SOP-UA-D-1.1**

Title: Standard Operating Procedure for Operation and Maintenance of the LAN and Related Microcomputer Environment

Source: The University of Arizona

U.S. Environmental Protection Agency
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Title: **OPERATION AND MAINTENANCE OF THE LOCAL AREA NETWORK AND RELATED MICROCOMPUTER ~~ENVIRONMENT FOR UNIVERSITY OF ARIZONA NHEXAS~~** LAN Equipment ESG 7.11.97

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Form TP-1

Operation and Maintenance of the LAN & Related Microcomputer Equipment

1.0 Purpose and Applicability

The purpose of this SOP is to describe procedures for using and maintaining the Local Area Network (LAN) and related microcomputer equipment at the HRP Site of the Arizona Prevention Center.

These methods will be used for all data operations and maintenance routines on the NHEXAS, Border Study and other Health and Environment microcomputer LANs.

2.0 Definitions

2.1 AWK (Ajo, Weinberger, Kernighan -- Creators) = A string-based data manipulation program developed by AT&T/Bell Labs.

2.2 Backup = (v) The process of creating a duplicate of a file, directory or drive to protect against data loss during a hardware or software failure. (n) The duplicate copy created during this process.

2.3 Bernoulli Box = A peripheral mass storage device with removable data media (Bernoulli disks).

2.4 Berrnoulli Disk = A removable mass storage media used for storing or transferring large amounts of data. At the HRP site, there are 10MB and 20MB Bernoulli disks.

2.5 BORDER STUDY = An alias for "Total Human Exposure Arizona: A Comparison of the Border Communities and the State" conducted in Arizona by the University of Arizona/Battelle/Illinois Institute of Technology consortium.

2.6 CHKDSK = A utility program, included with DOS, that checks for any corruption on a microcomputers' hard disk drive.

2.7 Client = A computer connected to a fileserver (i.e. Ipomea, the HRP Sun Sparcstation) that depends on that fileserver for resources.

2.8 Data Cleaning = The process of locating and correcting data processing errors. The errors can be individual level (encountered in the electronic and physical data) or they can be system level (encountered in the data collection, packaging, coding, and cleaning

procedures themselves). This process is also referred to as "Data Validation."

2.9 Data Validation = See Data Cleaning.

2.10 Data Verification = The process of re-entering data into the same table and database into which it was originally entered, and comparing to the originally entered values.

2.11 Data Entry = The transformation of data from a manually completed form to computer-readable electronic medium. The product of this process is referred to as "Entered Data."

2.12 Data Packet = A small unit (usually a low number of bytes) of data transferred electronically from one machine to another.

2.13 DOS Windows = A program that emulates DOS on Sun computers.

2.14 DBMS/COPY = A program for data translation on DOS platforms. The program may be menu or script driven. It is used to allow the sharing of data between programs and platforms.

2.15 Diskette (or Floppy Disk) = A small, removable data storage media used for storing or transferring small amounts of data. Diskettes used in this project, are usually available in 2 sizes: 3 1/2 inch (1.44MB) and 5 1/4 inch (1.2MB).

2.16 DOS (Disk Operating System) = The standard operating system on IBM and compatible microcomputers. DOS provides tools and utilities for the management of data on microcomputers.

2.17 E-mail (Electronic Mail) = An electronic messaging system available on most networks.

2.18 File Compression = A method of reducing the space required to store a file. Common compression programs are PKzip, Stacker and DoubleSpace.

2.19 File Protection = A security scheme used by UNIX whereby access to files is limited to certain users and groups of users.

2.20 Fileserver (or server) = A powerful machine that contains resources (data, programs, devices) for access by client machines. The HRP fileservers are Ipomea and Lonicera, both Sun Sparcstations.

2.21 FTP (File Transfer Protocol) = The Internet standard high-level protocol for transferring files from one computer to another.

2.22 HEALTH AND ENVIRONMENT PROJECTS (or H&E) = An umbrella title for all projects funded to M.D. Lebowitz and/or M.K. O'Rourke (or their designees) which examine purported or real relationships among environmental factors and any aspect of human health.

2.23 HRP (Health Related Professions Building) = 1435 North Fremont, Building location of the computer network for NHEXAS/Arizona. This local area network is a sub domain of the University campus network connected via a Spread Spectrum bridge using TCP/IP and IPX protocol.

2.24 Internet = A concatenation of many TCP/IP campus, state, regional, and national networks into one single logical network, all sharing a common addressing scheme.

2.25 LAN (Local Area Network) = Any physical network technology that operates at high speed over short distances.

2.26 Master Database = The accumulative database generated from validated data processing batches. Newly cleaned batches are appended to the master database. Copies of the master database are used in analyses. All corrections to copies are made to the database itself. Thus, it is the most complete and accurate of its kind.

2.27 Multi-Tasking = A scheme that permits a user to run two or more applications simultaneously.

2.28 Multi-User = A scheme that permits multiple users to log into and use a single machine simultaneously.

2.29 Network = A group of machines connected together so they can transmit information to one another.

2.30 NHEXAS Arizona: Acronym for **N**ational **H**uman **EX**posure **A**ssessment **S**urvey, a research project conducted in Arizona by the University of Arizona/Battelle/Illinois Institute of Technology consortium.

2.31 Node = A computer that is attached to a network; also called a host.

2.32 PC (Personal Computer) = Microcomputers based on the Intel 8088/8086 instruction set. Developed by IBM, the PC has grown to become the most popular microcomputer standard in the world. The HRP site has 14 operating PC machines.

2.33 PC/NFS (Personal Computer/Network File System) = A method developed by Sun Microsystems to allow microcomputers to share files with Sun Workstations in a way that makes them appear to be located on the client machine (or system).

2.34 Platform = A class of machine, usually characterized by the operating system or processor (e.g., A DOS platform, A RISC platform, etc.).

2.35 SparcStation = A computer developed by Sun Microsystems and based on a RISC (Reduced Instruction Set Computer) processor. The Sun SparcStation is a fast, multi-tasking, multi-user platform that runs the Sun version of the UNIX operating system, SunOS (Solaris). The node names of the HRP Sun SparcStation are Ipomea (ELC) and Lonicera (LX).

2.36 Spread Spectrum Bridge = Unit that connects the HRP LAN to the University campus network using radio waves. Outgoing and incoming data packets are transferred between the HRP LAN and the University campus network at 2 Million bits per second.

2.37 SPSS (Statistical Package for the Social Sciences). Known for its ease of use, SPSS has become the most used of any statistical package.

2.38 SPSS/PC+ = A statistical package for PC standard microcomputers. SPSS/PC+ contains a subset of the commands and capabilities available in SPSS.

2.39 TCP/IP (Transmission Control Protocol/Internet Protocol)= A set of protocols used by the Internet to support services such as remote login (telnet), file transfer (FTP) and mail.

2.40 Telnet = The Internet standard protocol for remote terminal connection service. Telnet allows a user at one site to interact with a remote system at another site as if the user's terminal were connected directly to the remote computer.

2.41 UNIX = A multiple platform operating system developed by AT&T. UNIX is currently installed on many different kinds of machines, from small microcomputers to large mainframes.

2.42 Workstation = A computer, usually on a network with more power than a standard IBM PC or Macintosh. Typically, a workstation has an operating system such as UNIX that is capable of running several tasks at the same time. It has several megabytes of memory and a large, high-resolution display. Examples are Sun Workstations and Digital DECstations.

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(g) "Learning dBASE IV."
(h) "Network Installation."
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(e) "R:BASE for DOS: Learning Guide."
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(c) "SPSS/PC+4.0 Base Manual for the IBM PC/XT/AT and PS/2."
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(c) "Wordstar Starting & Learning."

4.0 Discussion

The microcomputer equipment at the HRP site serves a number of uses vital to the continuing operation of the study. These include verification, validation, storage and analysis of data, word processing, presentation graphics, and communications.

The site maintains a constant outside world connection by means of a radio link called Spread Spectrum. This link operates at 2 Megabits per second and allows the ability to ftp, email, and access remote sites from the HRP LAN.

Periodic maintenance and backup is required in order to keep the hardware, software and data in an organized, uncorrupted and secure condition. Replicate backups of data must be kept off-system and rotated off-site.

The complexity of the tasks involved and the ever-changing state of the art of both hardware and software necessitate flexibility in the use of tools for the operation, maintenance and administration of the network. It is standard practice to leave the choice of programs to perform specific tasks up to the operator or administrator, unless other factors prohibit this choice.

5.0 Responsibilities

The Project Data Analyst/System Manager is responsible for:

(a) the maintenance of the master databases stored on the local server. This includes the development of routines and procedures to insure the completeness and accuracy of the master databases (See SOP# UA-D-27.X).
(b) the addition of new users to the network.
(c) training users, including Student Data Technicians, in the basic operation of the system, specific to the needs of the user.
(d) development of procedures to protect the security and integrity of the system and the data.
(e) maintenance of system hardware and software (in conjunction with the Departmental Systems Administrator currently Royce Robbins).

(f) research, implementation and evaluation of new hardware and software.

6.0 Materials and Equipment

6.1 System Hardware

(a) Acacia -- A 80386dx class PC (UA No. A205021):
80387 math co-processor
Monochrome display (amber) and graphics adaptor
30MB IDE hard disk drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Ethernet Network Adaptor
Rm. 128a

(b) Agave – A Pentium 166 class PC (UA No. A273983, S/N 9609366):
SVGA Panasonic Monitor Model E15 (S/N 6349925)
1 MB Diamond Stealth Graphics Card
16 MB EDO Dram
1.6 GB Hard Drive
1 1.44 MB Teac 3.5" Floppy Drive
Ethernet Network Adaptor
Keyboard
Rm. 106e

(c) Betula -- A 80386dx class PC (UA No. A214171):
Monochrome display (amber) with adaptor
30MB IDE hard disk drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Ethernet Network Adaptor
Keyboard
Rm. 128c

(d) Cereus -- A 80386dx class PC (UA No. A234804):
80387 math co-processor
SVGA monitor (9014A304-0606253) and adaptor
120MB IDE hard disk drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Ethernet Network Adaptor
Keyboard
Mouse
Light Pen
Rm. 130b

(e) Cieba -- A 80386sx class PC (UA No. A207184, S/N 831685170):
Color graphics display (S/N 79D01315J) adaptor
Dual 10MB Bernoulli drive (UA No. A196970, S/N 019U5) and adaptor
40MB IDE hard disk drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Ethernet Network Adaptor
Keyboard
Rm. 135

(f) Cycad -- A 80286 class PC (UA No. A209096 S/N 124175):
80287 math co-processor
Monochrome display (amber) with adaptor
Dual 20MB Bernoulli drive with adaptor (S/N 01J7A)
25MB hard disk drive
(2) 5 1/4 inch 360KB diskette drives
Ethernet Network Adaptor
Keyboard
Rm. 130 Scale Lab

(g) Dotter – HP Laserjet Series III laser printer
(UA No. A241208, S/N 3140J07871)
Configured as network printer
Pacific Data Products 25-in-1 font cartridge.
Rm. 106e

(h) Encelia -- A 80386dx class PC (UA No. A213107 Tag is on monitor)
80387 math co-processor
Monochrome display (amber) and graphics adaptor
30MB IDE hard disk drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Ethernet Network Adaptor
Rm. 130

(i) Ephedra – A Compaq Pentium 120Mhz class PC (S/N X716BKTU1034)
SVGA display monitor
2.1 Gig hard disk drive
8X CD-Rom
3 1/2 inch 1.4MB diskette drive
Ethernet Network Adaptor
Keyboard
Rm. 137
Note: Network node Ephedra is the personal property of M. K. O'Rourke

(j) Ficus -- An 80486 class PC (EPA Tag: 652897):

Nanao 9070U display with adaptor
16 Meg Ram
405 MB hard disk drive
1.17 GB hard disk drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Ethernet Network Adaptor
Keyboard
2400 baud modem
Note: Machine owned by EPA
Rm. 128e

(k) Gaura -- A 80486dx class PC (UA No. A263281 S/N 105584)
SVGA Monitor (S/N 4250131977)
540MB Hard Disk Drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Double Speed CD ROM
Keyboard
Mouse
Light Pen
Rm. 128d

(l) Ipomea -- Sun SparcStation ELC (UA No. A235866)
Configured as network server
Monochrome Monitor
Central Data 1 Parallel, 2 Serial port Terminal Server
Artecon DSU-2 Peripheral Cabinet (UA No. A240807, S/N 9200110248)
with:
1GB SCSI hard disk drive
150-250MB (depending on cartridge) tape backup subsystem
Rm. 128e

(m) Jatropha -- HP Laserjet Series II laser printer (UA No. A226264, S/N 465235)
Configured as network printer
Pacific Data Products 25-in-1 font cartridge.
Extended Systems ExtendedLink printer cable extension device

(n) Lonicera -- Sun SparcStation LX (UA No. A252989 S/N 316U3811)
GX plus color graphics workstation (S/N 9318DX1764)
Sun 19 inch color monitor
424 MB hard disk drive
3.25 inch 1.44 MB diskette drive
Falcon Model 1 Peripheral Cabinet (S/N 9421-9443)
4GB SCSI hard disk drive

5-10GB (depending on file compression) tape backup subsystem
Rm. 106e

(o) Northhp -- HP Laserjet Series III laser printer
(UA No. None, S/N 2945J62611)
Configured as WIN95 network printer
Rm. 106e

(p) Pentax Document Scanner – We have 4 of these
Model number DS10
1. UA No. A270924 S/N 4020054-DS1
2. UA No. A274464 S/N 60600016-DS1
3. UA No. A274465 S/N 60600018-DS1
4. UA No. A274466 S/N 60600020-DS1
All in Rm. 106e

(q) Puccinia -- A 80386sx class PC (UA No. A218854):
Monochrome display (amber) (S/N 8741191167) with adaptor
Dual 20MB Bernoulli drive (S/N 07N8D) with adaptor
40MB hard disk drive
5 1/4 inch 1.2MB diskette drive
5 1/4 inch 360KB diskette drive
Ethernet Network Adaptor
Keyboard
Rm. 130a

(r) Ribes -- A 80486dx class PC (UA No. A263280 S/N 105582)
SVGA Monitor (S/N 4250131883)
540MB Hard Disk Drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Dual 20MB Bernoulli drive (UA No. 208257, S/N 02T31) and adaptor
Keyboard
Mouse
Rm. 106e

(s) Salix -- A 80486dx class PC (UA No. A260142)
SVGA Monitor (S/N CIKKU4829439)
200MB Hard Disk Drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Double Speed CD-Rom
Economy Speakers (2)
Keyboard
Mouse
Rm. 106e

(t) Spread Spectrum Machines – 2 MBPS Bridge Units
Unit in Rm. 111 - (UA No. A268629)
Unit on Roof of Hospital - (UA No. A268630)

(u) Trixis -- A 80486dx class PC (UA No. A263279, S/N 105583)
SVGA Monitor (S/N 425130007)
540MB Hard Disk Drive
5 1/4 inch 1.2MB diskette drive
3 1/2 inch 1.4MB diskette drive
Keyboard
Mouse
Rm. 135

(v) UMAX UC630 MaxColor Scanner (UA No. A671095, FCC ID G2E-UCG630)

(w) Unnamed -- A 80386sx class laptop PC (UA No. A243427, S/N 202FD111281):
Monochrome VGA display
80MB hard disk drive
3 1/2 inch 1.4MB diskette drive
This machine is portable

(x) Yucca – A Pentium 166 class PC (UA No. A273984, S/N 9609367):
SVGA Panasonic Monitor Model E15 (S/N 6349929)
1 MB Diamond Stealth Graphics Card
16 MB EDO Dram
1.6 GB Hard Drive
1 1.44 MB Teac 3.5" Floppy Drive
Ethernet Network Adaptor
Keyboard
Rm. 106e

(y) 3COM SuperStack II – 24 Port Ethernet Hub Model # 3C16671A
(UA No. None, S/N 7WSV030118)
24 10Base-T ports and 1 AUI port
Rm. 119

(z) Addtron UTP8/SL – 8 10Base-T Ethernet Hub
1 AUI, 1 BNC (S/N 617504240)
Rm. 106e

(zz) Addtron E-MPR5 – 2 10Base-T Ethernet Hub
1 AUI, 2 BNC
Rm. 128

6.2 DOS & Win95 Software

(a) Operating System
(i) Microsoft DOS v. 6.2

(ii) Microsoft Windows 95

(b) Communications
- (i) Kermit
- (ii) PC/NFS
- (iii) Procomm

(c) Database Management Packages
- (i) dBase IV
- (ii) R:Base V
- (iii) Microsoft Access Ver. 7.0

(d) Data Translation = DBMS/Copy Plus

(e) File Compression
- (i) PKzip
- (ii) PKunzip

(f) Memory Managers = DesqView

(g) Presentation Graphics Packages
- (i) Harvard Graphics v3.0
- (ii) SigmaPlot v4.0
- (iii) Sygraph

(h) Programming Languages and Compilers
- (i) IBM Basic
- (ii) Microsoft C Optimizing Compiler
- (iii) Microsoft FORTRAN Compiler
- (iv) Microsoft Pascal

(i) Scanning Software
- (i) Teleform Ver. 5

(j) Spreadsheet Packages
- (i) Microsoft Excel Ver. 7.0
- (ii) SuperCalc 4

(k) Statistical Analysis Packages
- (i) SPSS/PC+
  SPSS/PC+ Base System

SPSS/PC+ Advanced Statistics
SPSS/PC+ Data Entry
SPSS/PC+ Graphics
SPSS/PC+ Tables
SPSS/PC+ Trends

(ii) SYSTAT

(l) Utilities

(i) PC Tools Deluxe
(ii) Sidekick
(iii) Tree Printer

(m) Word Processors and Text Editors

(i) Brief
(ii) Microsoft Word Ver. 7.0
(iii) WordPerfect
(iv) Wordstar 2000

6.3 UNIX System Software

(a) Operating System = Sun OS

(b) Communications = PCNFS

(c) DOS Emulator = DOS Windows

(d) File Compression

(i) Zip
(ii) Unzip

(e) Presentation Graphics

(i) ACE/gr
(ii) Khoros

(e) Programming Languages and Compilers

(i) AWK
(ii) C
(iii) FORTRAN
(iv) ICON

(f) Statistical Package = SPSS

(g) Utilities

(i) DumpTool
(ii) Open Windows
(iii) SunView

(Note: Many modern software products perform a number of tasks. These tasks may fall into more than one of the categories listed.)

6.4 Supplies

(a) 3 1/2" 1.4MB Diskettes
(b) 5 1/4" 1.2MB Diskettes
(c) 8 1/2" X 11" Copier/Printer Paper
(d) 9 1/2" X 11" Continuous Form Tractor Feed Paper
(e) 112M 8mm Computer Grade Data Cartridges (5-10GB)
(e) 10MB Bernoulli Disks
(f) 20MB Bernoulli Disks
(g) DC-6150 1/4" Data Cartridges (150MB)
(h) DC-6250 1/4" Data Cartridges (250MB)
(i) HP LaserJet Series II Toner Cartridges
(j) Ribbons for Epson FX-85 Printer
(k) Ribbons for Epson LQ-1500 Printer
(l) Ribbons for Panasonic KX-P1091i Printers
(m) Ribbons for Panasonic KX-P1123 Printer

6.5 Reagents (Not Applicable)

7.0 Procedure

7.1 Preparations

7.1.1 Existing literature, descriptions, and other materials should be consulted to familiarize the user with the normal operations of the system.

7.1.2 Constant attention should be given to the current state of the network to ensure that it is operating correctly.

7.2 Standards and Blanks

Not Applicable

7.3 Procedure Description

7.3.1 The Cleaning of Data (See SOP# UA-D-16.X).

7.3.2 Delivery of Cleaned Data (See SOP# UA-D-16.X).

7.3.3 Addition to Master Databases (See SOP# UA-D-27.X).

7.3.4 Logging in to the System from a PC.

(a) Turn power on.
(b) At username prompt, type the *<username> [return]* given by the system manager.
(c) At the password prompt, type *<password> [return]*.

7.3.5 Logging in to the System from Ipomea/Lonicera

(a) Type *<username> [return]*.
(b) At the password prompt, type *<password> [return]*.

7.3.6 Logging in to the System as SuperUser.

(a) Log in as described in 6.3.3 or 6.3.4.
(b) Type *"su" [return]*.
(c) At the password prompt, type in the superuser *<password> [return]*.

7.3.7 Accessing Ipomea (Lonicera) through a PC.

(a) Log in as described in 6.3.3.
(b) Type *"telnet ipomea" ("telnet lonicera") [return]*.
(c) At the username prompt, type *<username> [return]*
(d) At the password prompt, type *<password> [return]*.

7.3.8 Adding New Users to the System.

(a) Log in to Lonicera.
(b) Log in as superuser.
(c) Change directory to /var/yp.
(d) Edit the file "passwd" using VI (The UNIX text editor).
    (i) Copy an existing user line. Be sure to copy from someone who is in the same group as the new user. After editing, this will become the line for the new user.
    (ii) Delete the old user name and insert the new user's name.
    (iii) Delete the encrypted password. Do not place any text in

this area.

(iv) Change the user number to a unique number (All HRP user numbers are three digits beginning with '5'.

(v) Change the full name field to the new user.

(vi) Change the path in the shell field to the new user's home directory.

(vii) Exit.

(e) Change directory to /etc

(f) Edit the file "group" using VI.

(i) Add the new user's user name to the applicable group(s).

(ii) Exit.

(g) Edit the file "aliases" using VI

(i) Add the new user to the aliases list

(ii) Exit

(h) Change directory to /var/yp

(i) Type *"make passwd"*

(j) Type *"make group"*

(k) Type *"make aliases"*

(l) Type *"newaliases"*

(m) Log in to Ipomea

(n) Log on as Superuser

(o) Type *"newaliases"*

(p) Exit

(q) Exit

(r) Build a home directory for the new user.

(i) Create a new subdirectory in /rsc51 under the new user's username.

(ii) Copy all the files from /rsc51/cbittel/need to the new user's home directory.

(iii) Change ownership of the new directory to the new user.

(iv) Log in to the new user's account.

(v) Use the "yppasswd" command to give the new user a temporary password. Inform the new user to change his/her password as soon as possible.

7.3.9 User Training

(a) Actively observe users while they work to ensure that they are proficient with the hardware and software they use to perform tasks relating to their work. Ask pertinent questions.

(b) If, in the course of observation, a user seems to have trouble with a specific task, provide assistance to alleviate any ambiguity the user may be having.

(c) If a number of users are having the same problem, schedule an in-service workshop or seminar to train a number of users at once.

(d) Provide literature and visual aids to assist the user.

(e) Inform the users (using E-mail or a "Notice" message) when new software is implemented or a change in procedure has been established.

(f) Place system documentation in a place accessible to all users and inform the users of its location.

(g) Show patience in explaining procedures and answering questions. Convey a willingness to provide information to users.

7.3.10 System Security and Integrity

(a) Remind users to change passwords periodically.

(b) Kill inactive user accounts promptly after the user leaves.

(c) Do not allow users to access diskettes or other media originating outside the HRP site without first checking that media for viruses.

(d) Remove old iterations of data from the master database area after updating the master.

(e) Daily Data Backup

(i) Wednesday -- Tape Exchange
Remove the complete system and incremental backup tapes from the box labeled "Last Week's Backups". Place these tapes in a bag for transportation to the Respiratory Sciences Center, AHSC. Put the current active system and incremental backup tapes (remove current incremental backup from the tape drive) in the "Last Week's Backups" box. Check the Respiratory Sciences Backup Calendar for the correct Tapes for the Hospital Site. Remove the

specified tapes from the tape shelf and place them in the bag for transportation to the Respiratory Sciences Center, AHSC. Take the bag of tapes to be exchanged to the Respiratory Sciences Center. Exchange them for the next weeks incremental backup tapes.

(ii) Wednesday -- Thursday Morning System Backup
On Wednesday, after exchanging tapes with the Respiratory Sciences Center, check the backup schedule to confirm which weekly, monthly or quarterly tape will be used for the current week's full system backup. Insert the specified tape with the printed side up, and the hinged cartridge door entering first. Dumptool will perform the system backup automatically at 4:00 a.m., Thursday morning. After backup is completed, the tape will be ejected.

(iii) Friday through Wednesday -- Daily Incremental Backup.
On Thursday afternoon, place the current 8mm 112m tape cartridge (should be marked "incremental daily backup") in the tape drive located in the Falcon peripheral cabinet attached to Lonicera. Insert the tape with the printed side up and the hinged cartridge door entering first. DumpTool will perform the incremental system backup automatically at 4:00 am.

7.3.11 Data Analysis

Data Analysis is performed to write scientific papers or for presentation at scientific meetings. This usually involves use of a statistical package like SPSS. Specific applications are determined by the Principal Investigator on a case by case basis.

7.3.12 Maintenance of System Hardware and Software

(a) Periodic System Maintenance must be performed to optimize the ongoing performance of the system.

(i) Inform users to compress and archive any files that are no longer in use.

(ii) Use the "find" command to locate any core dumps that are on the hard disk. To do this type:

find / -name core -print [return]

it will return the paths of all core dumps. Use the "rm" command to delete them.

(iii) Clean all system diskette and tape drives at the first symptom of trouble.

(iv) Perform system backup daily [see 7.3.10 (e)].

(v) Keep the SLIP connection active as much as possible.

(b) System Repair and Troubleshooting.

(i) Pay constant attention to the state of the system, noting any irregularities or malfunctions.

(ii) If a malfunction occurs, log it on a CRUMR (Computer Repair, Update, and Maintenance Record) form [see figure 2].

(iii) Locate any warranty information that may exist on the defective device. If the device is still under a parts and labor warranty, contact the vendor and arrange for service. If the warranty is for parts only, ask that a replacement part be shipped as soon as possible. If the device is no longer under warranty, contact a member of the Arizona Prevention Center Repair Subcommittee immediately to determine if the repair is financially feasible. If the replacement of the defective part is not in your area of expertise, consult the Departmental System Administrator for further instructions.

(iv) In the case that the Spread Spectrum link to the outside world goes down the first job is to reboot the machines found in Rm. 111 and in the Penthouse

on top of UMC. This is done by pushing the power button on and then off. If this fails to bring the radio link up the data manager will need to call the University's computer staff to assist in the repair of the link. The number to call is 621-7999.

7.3.13 Research, Implementation, and Evaluation of New Hardware and Software

(a) Stay familiar with the state of current technologies by reading trade journals, attending seminars, trade shows and symposiums and communicating with colleagues and users.

(b) If a problem arises that causes an undue expenditure of resources, consult the resources mentioned in (a) as to a cost-effective solution.

(c) If a cost effective solution can be determined, consult with the Principal Investigator and the Departmental System Administrator regarding the feasibility of implementing the solution.

(d) If the Principal Investigator and Departmental System Administrator approve the expenditure, write a memo to the departmental bookkeeper asking that the new hardware or software be purchased.

(e) When the new equipment arrives, install it as per the included documentation.

(f) Check with users to ensure that the new equipment has solved the problem, and should be kept as a permanent component of the network.

7.4 Calculations

Calculations are specific to the database involved. These are recorded in the data generation SOPs.

7.5 QA Checks

7.5.1 CHKDSK and SunOs Power-On Diagnostics

The CHKDSK utility is run automatically when any DOS microcomputer is turned on at the HRP Site. The program checks for any hard disk corruption and reports any failure.

SunOs checks for any system malfunction or disk corruption any time the system is started.

7.5.2 Detection Limits: Any detection of disk corruption or system error is cause for corrective action.

7.5.3 Corrective Action: When a malfunction has occurred, the erroneous file (or files) is (are) deleted from the disk drive, and then restored from backup (in the case of data error) or retrieved from the original diskettes (in the case of software error).

7.6 Tolerance Limits

All computer equipment at the HRP site is designed to operate at between 110 and 120 volts, 60Hz AC. Data and equipment can be destroyed at voltages outside these parameters. Protocols are in place to safeguard the equipment from power fluctuation.

7.6.1 Surge Suppressers: Surge Suppressers protect all equipment at the HRP site. No computer equipment is to be operated without a surge suppresser in place.

7.6.2 Uninterruptable Power Supply: Power to Ipomea and Lonicera, the network servers, is run through an Uninterruptable Power Supply (UPS). This device isolates the computer from possible power fluctuations.

7.6.3 Electrical Storm Policy: All computer equipment not powered through a UPS is unplugged from the wall sockets at the first visual confirmation of lightning strikes. This includes power cables and Ethernet 10baseT cables. The determination of hazard is the responsibility of the Project Data Analyst/System Manager.

8.0 Records

8.1 Data Collected by this Procedure (Not Applicable)

8.2 Record Forms

D-G-1.X Figure 1. Tape Back Up Log Form

D-G-1.X Figure 2. Computer Repair, Upgrade and Maintenance Report
D-G-1.X Figure 3. HRP Net Backup Schedule
D-G-1.X Figure 4. HRP Local Area Network Layout

8.3 Location/Placement of Records

8.3.1 The Current Week's Backup Tape Set: The current week's backup tape set is located on a shelf rack located in the Data Student Office, NHEXAS/Arizona, University of Arizona, Tucson, AZ.

8.3.2 Off-Site Backup Tape Set: An off-site backup tape set is located in the Respiratory Sciences Center at the Arizona Health Sciences Center.

8.3.3 Data Batch Backup Diskettes: Data batch backup diskettes are kept in the Data Staff Office, NHEXAS/Arizona, University of Arizona, Tucson, AZ.

8.3.4 Data Dictionaries: Descriptions of file layouts, valid ranges, data types, etc. (referred to as Dictionaries) are built into each individual database.

8.3.5 Computer Equipment Manuals and Documentation: Manuals and documentation for computer equipment are stored in the room that contains that equipment.

8.3.6 A log of maintenance records for network computers is updated with each equipment repair and resides in a notebook labeled "Computer Maintenance Logs" at NHEXAS/Arizona, University of Arizona, Tucson, AZ.

8.3.7 Each computer user must login and logout of the system on a selected machine. Equipment and user information reside in an electronic file that can be monitored and dumped at any time. The machine/user/use duration file is backed up along with all system files and will not be lost on system failure.

8.3.8 The HRP Net Backup Schedule illustrates the backup scheme used across the network. It is posted beside host Lonicera in the Data Manager's office, NHEXAS/Arizona, University of Arizona, Tucson, AZ.

8.3.9 Software Diskettes, Manuals and Documentation program Diskettes, manuals, license agreements and other associated documentation are located in the main lobby, NHEXAS/Arizona, University of Arizona, Tucson, AZ.

8.3.10 The Tape Back Up Log Form logs the tape back up routine. The form is posted beside host Lonicera in the Data Manager's office, NHEXAS/Arizona, University

of Arizona, Tucson, AZ.

Inclusions:

Figure 1. Tape Back Up Log Form (1 page)
Figure 2. Computer Repair, Upgrade and Maintenance Report (1 page)
Figure 3. HRP Net Backup Schedule (2 pages)
Figure 4. HRP Local Area Network Layout (1 page)

Figure 1. Tape Back Up Log Form

Tape Back Up Log Form

Tape Backup By:	Type	Date	Tape Backup By:	Type	Date
	☐ Full System ☐ Daily			☐ Full System ☐ Daily	
	☐ Full System ☐ Daily			☐ Full System ☐ Daily	
	☐ Full System ☐ Daily			☐ Full System ☐ Daily	
	☐ Full System ☐ Daily			☐ Full System ☐ Daily	
	☐ Full System ☐ Daily			☐ Full System ☐ Daily	
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Figure 2. Computer Repair, Upgrade and Maintenance Report

Computer Repair, Upgrade, and Maintenance Report

Date:_____

Node Name:_____ Device Serial # (if app):_____

- ☐ Problem
- ☐ Maintenance
- ☐ Upgrade
- ☐ Other:_____

Description:_____

Corrective Action(s) Attempted:_____

Technician Use Only:

Diagnosis:

1. _____
2. _____
3. _____

Corrective Action(s):

1. _____
2. _____
3. _____

Part(s) Removed	Part(s) Installed	Cost
1. _____	1. _____	$_____
2. _____	2. _____	$_____
3. _____	3. _____	$_____
4. _____	4. _____	$_____
5. _____	5. _____	$_____

On-Site Service:

Work Performed By: _____ Date:_____

Notes:_____

Off-Site Service

Authorized By: _____ Under Warranty?: [] Yes [] No

Serviced By:_____ _____ _____

(business name) (contact person) (phone #)

Estimated Cost: $_____ Actual Cost: $_____

Date Shipped:_____ Date Returned:_____

Figure 3. HRP Net Backup Schedule

Jan-07	Tapes for the week:W197 D297
Jan-14	Tapes for the week: W297 D397
Jan-21	Tapes for the week: W397 D497
Jan-28	Tapes for the week: W497 D597
Feb-04	Tapes for the week: M197 D197
Feb-11	Tapes for the week: W197 D297
Feb-18	Tapes for the week: W297 D397
Feb-25	Tapes for the week: W397 D497
Mar-04	Tapes for the week: M297 D597
Mar-11	Tapes for the week: W497 D197
Mar-18	Tapes for the week: W197 D297
Mar-25	Tapes for the week: W297 D397
Apr-01	Tapes for the week: Q297 D497
Apr-08	Tapes for the week: W397 D597
Apr-15	Tapes for the week: W497 D197
Apr-22	Tapes for the week: W197 D297
Apr-29	Tapes for the week: W297 D397
May-06	Tapes for the week: M397 D497
May-13	Tapes for the week: W397 D597
May-20	Tapes for the week: W497 D197
May-27	Tapes for the week: W197 D297
Jun-03	Tapes for the week: M497 D397
Jun-10	Tapes for the week: W297 D497
Jun-17	Tapes for the week: W397 D597
Jun-24	Tapes for the week: W497 D197
Jul-01	Tapes for the week: Q397 D297
Jul-08	Tapes for the week: W197 D397
Jul-15	Tapes for the week: W297 D497
Jul-23	Tapes for the week: W397 D597
Jul-29	Tapes for the week: W497 D197
Aug-05	Tapes for the week: M197 D297
Aug-12	Tapes for the week: W197 D397
Aug-19	Tapes for the week: W297 D497
Aug-26	Tapes for the week: W397 D597
Sep-02	Tapes for the week: M297 D197
Sep-09	Tapes for the week: W497 D297
Sep-16	Tapes for the week: W197 D397
Sep-23	Tapes for the week: W297 D497
Sep-30	Tapes for the week: Q497 D597
Oct-07	Tapes for the week: W397 D197
Oct-14	Tapes for the week: W497 D297
Oct-21	Tapes for the week: W197 D397
Oct-28	Tapes for the week: W297 D497
Nov-04	Tapes for the week: M397 D597
Nov-11	Tapes for the week: W397 D197

Nov-18	Tapes for the week: W497 D297
Nov-25	Tapes for the week: W197 D397
Dec-02	Tapes for the week: M497 D497
Dec-09	Tapes for the week: W297 D597
Dec-16	Tapes for the week: W397 D197
Dec-23	Tapes for the week: W497 D297
Dec-30	Tapes for the week: W197 D397

Figure 4. HRP Local Area Network Layout