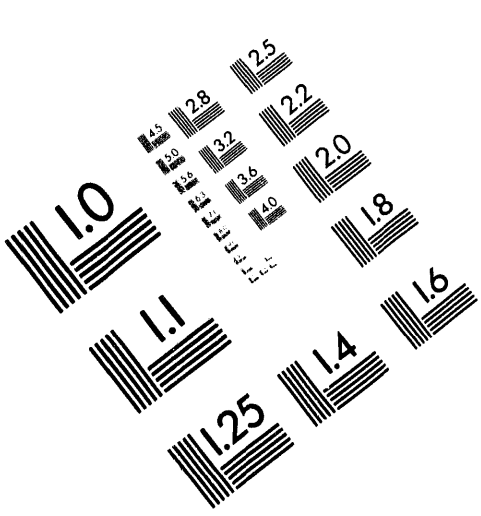
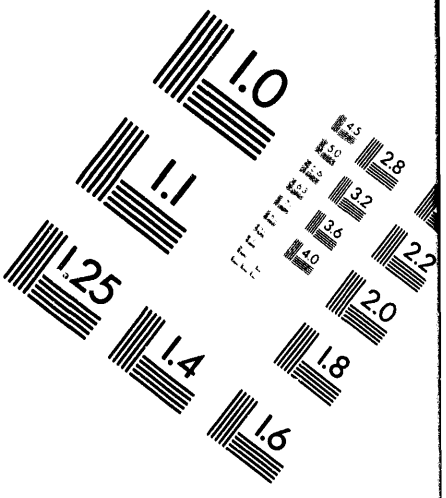
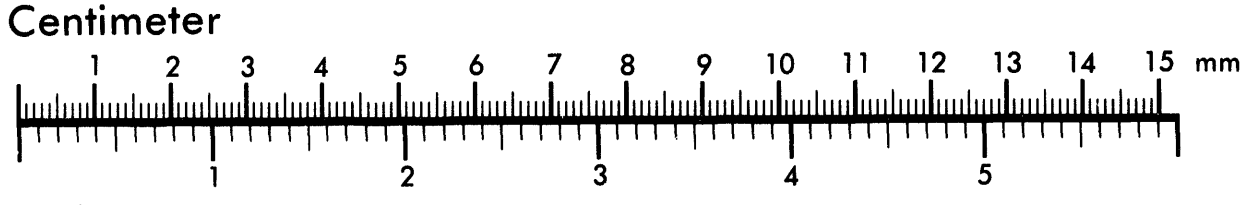
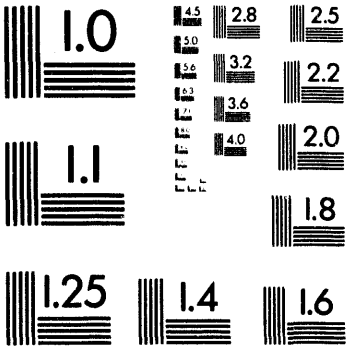
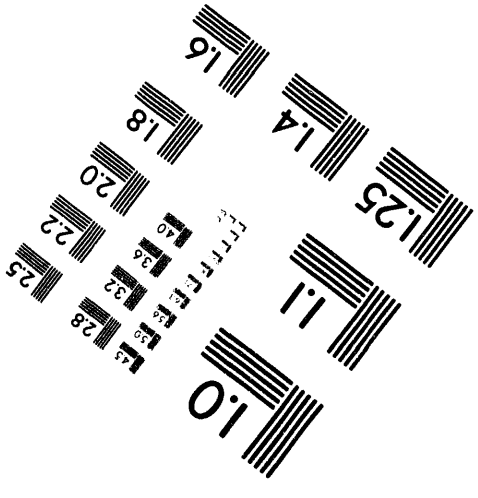


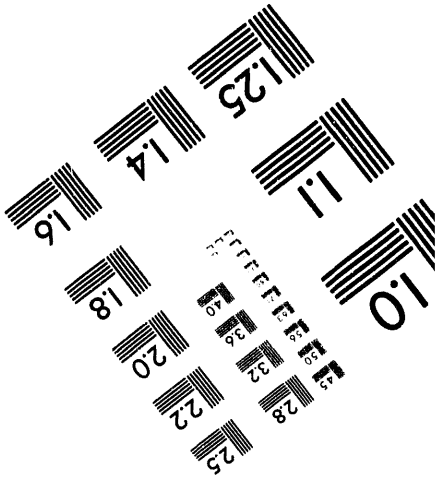
Association for Information and Image Management
1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910
301/587-8202











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1 of 3

DOE/RL-93-24-1
UC-510, 702, 705, 721

Hanford Environmental Information System (HEIS)

Volume 1 User's Guide

Date Published
January 1994

United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

EXECUTIVE SUMMARY

The Hanford Environmental Information System (HEIS) is a consolidated set of automated resources that effectively manage the data gathered during environmental monitoring and restoration of the Hanford Site. HEIS includes an integrated database that provides consistent and current data to all users and promotes sharing of data by the entire user community.

Data stored in HEIS are collected under several regulatory programs. Currently these include the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA); the *Resource Conservation and Recovery Act of 1976* (RCRA); and the Ground-Water Environmental Surveillance Project and the Surface Environmental Surveillance Project, both managed by the Pacific Northwest Laboratory.

As the title suggests, HEIS is an information system with an inclusive database. Although the database is the nucleus of the system, HEIS also provides user access software: query-by-form data entry, extraction, and browsing facilities; menu-driven reporting facilities; an ad hoc query facility; and a geographic information system (GIS). These features, with the exception of the GIS, are described in this manual set.

The HEIS manual set describes the facilities available to the scientist, engineer, or manager who uses the system for environmental monitoring, assessment, and restoration planning; the regulator responsible for reviewing Hanford Site operations against regulatory requirements and guidelines; and the operational user responsible for data entry, processing, scheduling, reporting, and quality assurance.

Because HEIS contains data from the entire Hanford Site, many varieties of data are included and have been divided into subject areas. Related subject areas comprise several volumes of the manual set.

The manual set includes a data dictionary that lists all of the fields in the HEIS database, with their definitions and a cross reference of their locations in the database; definitions of data qualifiers for analytical results; and a mapping between the HEIS software functions and the keyboard keys for each of the supported terminals or terminal emulators.

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ACKNOWLEDGMENTS

The following staff members of the Pacific Northwest Laboratory were the primary architects of the Hanford Environmental Information System (HEIS) and were major contributors to the HEIS manuals:

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J. S. Littlefield
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D. D. Cabrey
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C. Winter
N. A. Reitz
J. J. Jou
S. M. Safford
R. A. Burnett

The following staff members of Westinghouse Hanford Company were the primary facilitators in the publishing of the HEIS manuals:

R. I. Schreck, Document Coordinator
E. A. Gordon, Technical Editor

HEIS CONTACT LIST

To view [--More--(nn%) shows what percent you have already seen]:
Press SPACE BAR to view the next screenful.
Press [ENTER] to advance one line.
Press **q** to quit.

A "HEIS mail" address indicates that you can send mail to that person directly on the HEIS Sequent by typing "mail <HEIS mail address>."

A cc:Mail address indicates that you can send mail to a person at a cc:Mailbox (via personal computer or MacIntosh) by typing "mail <ccMail address>." For example, to send a mail message to Roger Schreck at his cc:Mail address, type the following:

```
mail Roger_I_Schreck%ccmail@pnl.gov
```

Send mail to Roger I Schreck if you have any questions, comments, or problems concerning this contact list.

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ABBREVIATIONS AND ACRONYMS

ACM	Access Control Module
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
BSD	Berkeley Software Distribution
CAS	Chemical Abstract Services
CCB	HEIS Configuration Control Board
CERCLA	*Comprehensive Environmental Response, Compensation and Liability Act of 1980*
CLP	Contract Laboratory Program
CPPM	Computer Protection Program Manager
DBA	Database Administrator
DOE	U.S. Department of Energy
DOS	disk operating system
Ecology	Washington State Department of Ecology
E/W (EW)	east-west
GIS	Geographic Information System
GPC	gel permeation chromatography
HCR	HEIS Change Request Form
HEIS	Hanford Environmental Information System
HLAN	Hanford Local Area Network
ID	identifier
INORG	inorganics
IRM	Information Resource Management (Westinghouse Hanford)
IS&S	Information Systems and Services (PNL)
LAS	Laboratory Analytical Services
MS (GC/MS)	mass spectrometer
NCSA	National Center for Supercomputing Applications
N/S (NS)	north-south
PC	personal computer
PNL	Pacific Northwest Laboratory
RCRA	*Resource Conservation and Recovery Act of 1976*
SAS	Special Analytical Services
SDG	Sample Delivery Group
SOW	Statement of Work
SQL	Structured Query Language
SQR	Structured Query Report (Writer)
TCP/IP	Transmission Control Protocol/Internet Protocol
TIC	tentatively identified compound
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order* (Ecology et. al 1990)
UST	United States Testing Company, Inc. (U.S.Testing)
Westinghouse Hanford	Westinghouse Hanford Company
WHC	Westinghouse Hanford Company (Appendix A and database only)

TRADEMARKS

Trademark Name	Trademark Owner
ACE	Security Dynamics Technologies, Inc.
DOS	Microsoft Corporation
IBM	International Business Machines, Inc.
Laser Jet	Hewlett Packard
Macintosh	Apple Computer Company
MacTCP	Apple Computer Company
MS-DOS	Microsoft Corporation
MSWindows	Microsoft Corporation
ORACLE	Oracle Corporation
SecurID	Security Dynamics Technologies, Inc.
Sequent	Sequent Computer Systems, Inc.
SmarTerm	Persoft, Inc.
SQL*Plus	Oracle Corporation
Uniface	Uniface B. V.
UNIX	American Telephone and Telegraph Bell Laboratories
VAX	Digital Equipment Corporation
VMS	Digital Equipment Corporation
VT100, VT220, VT240	Digital Equipment Corporation
WordPerfect	WordPerfect Corporation

Metric Conversions

To convert from	Multiply by	To convert to
Inches	2.54	Centimeters
Feet	30.48	Centimeters
Feet	0.30	Meters
Miles	1.61	Kilometers
Acres	0.40	Hectares
Gallons	3.79	Liters
Ounces	28.35	Grams
Pounds	0.45	Kilograms

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CONTENTS

FIGURES

TABLES

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1.0 GENERAL ADMINISTRATIVE PROCEDURES

INTRODUCTION

These General Administrative Procedures establish the method for requesting a change to the Hanford Environmental Information System (HEIS) software, procedures, documentation and some types of data.

1.1 SUBMISSION OF SOFTWARE, PROCEDURE, OR DOCUMENTATION CHANGES

INTRODUCTION

This section describes how to submit a request for a change to the HEIS software, procedures, or documentation. The process of requesting, approving, and implementing software changes is described in detail in Section 1.3, "HEIS Configuration Control Board Procedures."

PROPOSING A CHANGE

The steps for submitting a proposed change to the HEIS software, procedures, or documentation are as follows:

1. Prepare a HEIS Change Request (HCR) form (see Figure 1.1-1) by completing only the shaded portion. You are asked to identify yourself, describe the desired change, and specify the "Requested Priority." The meaning of the possible priorities are as follows:

   - 1 - Critical. The change must be implemented as quickly as possible. All work with the affected portions of the database must stop until the change is implemented.

   - 2 - Important. The change has the possibility of significant impact, is visible to multiple users, or has complex test procedures.

   - 3 - Routine. The change has minimal impact, is a day-to-day event, or has a swift and easy test procedure. It also includes editorial corrections.

2. Submit the HCR to the HEIS Software Coordinator. The coordinator's address appears on the HCR form.

3. The HCR will be checked for completeness and comprehensibility by the Software Coordinator. You will be contacted if additional information

or clarification is needed. The HCR will be accepted or rejected by the Coordinator and the HEIS Project Manager, and you will be notified of the initial disposition of the HCR.

Accepted HCRs will be assigned an implementation priority. Priorities other than "routine change" require the HCR be presented to the HEIS Change Control Board (CCB).

Figure 1.1-1. HEIS Change Request (HCR) Form.
(sheet 1 of 2)

Submitter Instructions:
Fill in shaded area only. Send form to
HEIS Software Coordinator - H4-52
Westinghouse Hanford Company
P.O. Box 1970
Richland, WA 99352

HCR NO._____

HEIS Project Account Name:_____ Date: _____

Submitted by: _____ Phone: _____

Address: _____ Requested Priority: __
(1 - Critical 2 - Important 3 - Routine)

Description: (Attach additional pages as needed)

_____

_____

_____

_____

ASSESSMENT OF REQUEST (Completed by Software Coordinator)

HCR Assessment:

Accept (Y/N):____ If no, reason:_____

Disposition Assessment:

Accepted as requested (Y/N): ____ Consultation with Subject Expert ___
New description/Comments:

_____

_____

_____

_____

Type: _____ Assigned Priority: _____
(1 - Development 2 - Problem 3 - Enhancement) (1, 2, or 3)

Assessment Approvals:

_____ _____ _____ _____
Software Coordinator Date HEIS Project Manager Date

(If Priority 1 or 2, proceed to CCB ACTION block)
(If Priority 3, proceed to SOFTWARE CHANGE/DEVELOPMENT block)

Figure 1.1-1. HEIS Change Request (HCR) Form.
(sheet 2 of 2)

CCB ACTION

Approved: ____ Assigned Priority: __ (1 - Critical 2 - Important 3 - Routine) Target Implementation Date: _____

Deferred: ____ (Reactivation Date: _____) Disapproved: ____
Reason:

_____

_____

_____

Software Coord _____ Date _____ QA Engineer _____ Date _____ CCB Chair _____ Date _____

SOFTWARE CHANGE/DEVELOPMENT (Completed by Software Developers, if applicable)

Propagation of Production Data Required (Y/N/NA)? _____

Revised Description/Comments: _____

_____

Other Impacts: _____

Software moved to TESTHEIS: _____ Date: _____

TESTING

Testing completed successfully. Initials: _____ Date: _____

DOCUMENTATION (Completed by Technical Editor, where applicable)

HEIS Manual set revised (Y/N/NA): ___ Initials: _____ Date: _____

HCR CLOSURE

Software moved to production (Y/NA): ___ Initials: _____ Date: _____

Production data propagated (Y/NA): ___ Initials: _____ Date: _____

Affected users notified (Y/N/NA): ___ Initials: _____ Date: _____

Other Impacted Area Notified (Y/N/NA):___ Initals: _____ Date: _____

QA(Priorities 1 or 2) _____ Date _____ Software Coord _____ Date _____ HEIS Proj Mgr _____ Date _____

1.2 SUBMISSION OF DATA CHANGES

To be issued.

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2.0 OVERVIEW

INTRODUCTION

The Hanford Environmental Information System (HEIS) is used to store, manipulate, and retrieve data gathered from many types of environmental samples taken at the Hanford Site. HEIS provides menu-driven user access software, data reporting facilities, data browsing facilities, and ad hoc querying. A multiwindow computing environment is supported on the engineering workstation where a geographic information system (GIS) resides.

A Sequent S27 UNIX-based multiprocessor computer and ORACLE software are used for the central HEIS database. An integrated database, a GIS that allows data to be displayed on a map, and a graphics support capability allow users to generate spatially related visualizations and to perform data extractions for a complete picture of the pertinent data. In addition, HEIS data can be moved to other software environments for further analysis and assessment.

The purpose of the HEIS manuals is to describe and explain how to use HEIS for viewing and reporting data. The manuals are intended to meet the needs of the manager, engineer, or scientist who uses the system for environmental monitoring, assessment, and restoration planning. They also serve to instruct data entry personnel in basic HEIS operation.

These manuals describe the menu-driven user access software, data reporting facilities, data browsing facilities, ad hoc query facilities, and the graphics support capabilities available in HEIS.

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2.1 HOW TO USE THE MANUAL SET

AVAILABLE VOLUMES

The HEIS manuals are structured as a series of volumes that provide guidance for users who need only particular areas of information. All users will need two fundamentals:

- This user's guide, which describes basic HEIS operations, including HEIS access requirements and accounts, the HEIS database structure, how to use the HEIS Sequent computer, how to navigate among the HEIS forms, how to retrieve data, and how to operate the reporting software. Style features used in the HEIS manuals are presented in this section (see "Conventions").

- The *HEIS Subject Area Reference Manual* (DOE-RL 1994c), which provides instructions for accessing and using the subject areas within the HEIS database and describes the subject areas that serve as the foundation for all other HEIS subject areas. These include the Constituent, Support, Sample, Site, and Location subject areas. Appendixes to this volume include the HEIS data dictionary and a list of valid data qualifiers.

  -- The Constituent subject area provides data about constituents, analysis methods, and analysis laboratories.

  -- The Support tables provide codes for the code lookups used in many subject areas.

  -- The Sample subject area stores data about the sample; it ensures that a unique identifier is used for each sample regardless of type.

  -- The Site subject area contains basic data about waste sites.

  -- The Location subject area stores data about where sampling activities have taken place.

  -- The Miscellaneous Material subject area stores data about samples collected from human-made materials.

Other volumes contain subject areas either grouped according to affinity or that stand alone. You may request any or all of these volumes. Some of these areas, such as Ground-Water, Atmospheric, Biota, Surface Water, and Soil, contain information about samples taken and analyzed for contaminants. Data stored for these areas include the following:

- When the samples were taken and analyzed
- Which laboratory performed the analyses
- What method was used during the analyses
- Traceability to the data source
- The results of the analyses.

The other HEIS subject area volumes include the following:

- *Well-based Subject Areas* (DOE-RL 1994d), including Well, Ground-Water, and Geologic.
  - -- The Well subject area provides data about the wells, boreholes, and test pits constructed on the Hanford Site, and periodic water level measurements.
  - -- The Ground-Water subject area manages the data acquired from ground-water samples taken at Hanford Site wells. Also included are field measurements such as conductivity, ph, and temperature.
  - -- The Geologic subject area contains data about field evaluations and laboratory analyses of particle sizes, and interpretive geologic summaries.
- *Surface-based Subject Areas* (DOE-RL 1994e), including Atmospheric, Biota, Surface Water, and River Characteristics.
  - -- The Atmospheric subject area includes data about air monitoring samples and meteorologic data.
  - -- The Biota subject area manages data collected from plant and animal samples. Included are counts from population studies as well as species distribution maps.

-- The Surface Water subject area contains data from water samples collected on the surface. Included are samples from rivers, springs, and ponds.

-- The River Characteristics subject area contains temperature and flow measurements for the Columbia River. Currently, this type of data is not being collected, but historical data are available.

- *Soil Subject Area* (DOE-RL 1994f). -- The Soil subject area contains data about all types of soil, including geologic soil (from well or vadose borehole drilling or test pit excavation), surface soil, and sediment samples.

- *Sample and Data Tracking Subject Area* (DOE-RL 1994g), which tracks the status of a particular sampling effort.

- *Tank Characterization Data Subject Area* (DOE-RL 1994h), which manages data acquired from waste tank characterization efforts. The data are used to determine disposal requirements; provide bases for developing safety analyses and closure plans; and establish and verify compliance with waste acceptance specifications.

- *Field Quality Control Subject Area* (DOE-RL 1994i), which manages data collected from field quality control samples. These samples are used to determine if sample contamination has occurred at some point in the sampling process.

Data entry personnel and certain data owners will also need the *HEIS Operator's Guide* (DOE-RL 1994b). Whether you need this guide is determined when your request for database access is processed.

CONVENTIONS

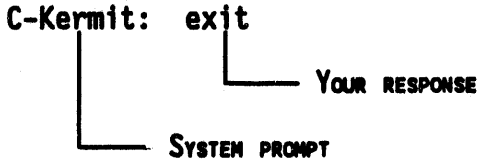
When using the HEIS Sequent computer, you are asked to (1) provide input by typing certain information and (2) press certain keys to move the cursor, enter or modify data, and perform other functions. (The HEIS Sequent uses a UNIX-based operating system, which is case sensitive. Use lower case except where noted.) The following conventions are used in this manual.

User Input

When the system prompts you to type in specific information, the system prompt appears in text in quotation marks ("%"), and your response appears in

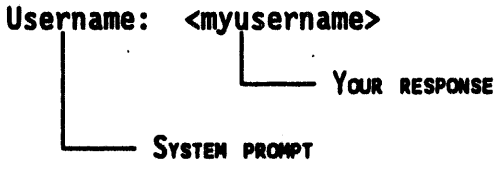
text in boldface (Y). For example, "'% Are you sure you want to delete this record (Y/N)?' Answer Y."

In examples set off from the text, the system prompt and your response appear as normal, as follows.



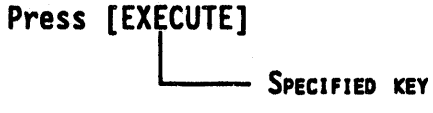
When the system prompts you to supply variable information such as a file name, a site, or a constituent, the system prompt appears in text in quotation marks ("username"), and your variable response appears in text in angle brackets <myusername>.

In examples set off from the text, the system prompt is appears as normal, and the variable part of your response is shown in angle brackets, as follows.



Function Keys

When you are instructed to perform a specific function by pressing a certain key, that key is identified in brackets. For example, you are instructed to press [EXECUTE]:



NOTE: The [RETURN] key must be used to terminate the following:

- Commands typed at the "%" prompt
- Data requested by the system to generate reports.
- Within the query-by-form user interface, responses typed on the interface activity line.

If you receive no system response, try pressing [RETURN]. If [RETURN] is not required or allowed, an error message appears.

Because HEIS can be accessed from many different terminals, personal computers (PC), and workstations, a function such as [REFRESH] or [HOME] may not be represented by the same key on all keyboards. Where appropriate, these functions and the various keys used to perform them are listed in text. A complete listing of the function keys is provided in Appendix A, "Key Bindings."

Sometimes, more than one key must be pressed to perform a specific function. In some cases, you will be instructed to press these keys consecutively; in other cases, you will be instructed to press the keys simultaneously. The following are examples:

- Press and release the [ESC] key, then type b (pressed consecutively).
- Press [ALT] y (pressed simultaneously).

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2.2 HARDWARE/SOFTWARE REQUIREMENTS

INTRODUCTION

HEIS users need the following or help from someone who has the following:

- Experience with at least one kind of word processing program or with an engineering workstation
- The ability to connect with and use the network in which HEIS is maintained (see Section 3.1).

The following information is provided as an overview for using the HEIS Sequent computer, its UNIX-based operating system, and the HEIS software.

HARDWARE REQUIRED

Using the HEIS menus and screens requires a keyboard that has at least 10 function keys. Use a terminal, a PC with a terminal emulator, or a workstation with a terminal emulator. If you use a terminal, it must be VT220 or VT240 compatible. For a PC, use one of the following emulators:

- MS-DOS Kermit (Version 3.01 or later). MS-DOS Kermit is a public domain emulator for IBM-compatible machines.

  MS-DOS Kermit is also known by Kermit-MS and MS-Kermit. It implements the Kermit file transfer protocol and is a terminal emulator. Both of these features are useful in the HEIS environment.

  A copy of Kermit, with its initialization file and documentation, can be downloaded from the HEIS Sequent. The file `/disk0/heistool/emulators/howtocopy.doc` provides a description for how to download the Kermit files (emulator, initialization file, and documentation). If you cannot copy these files to your PC, send a written request to the HEIS Software Coordinator (the HEIS Change Request [HCR] form in Figure 1.1-1 contains the mailing address).

- NCSA Telnet, version 2.5. NCSA Telnet is a public domain emulator for MacIntosh machines. It requires MacTCP; thus, it is available if you are connected to either the HLAN or the PNL LAN.

To connect your PC or terminal to the system, you will need a network connection, a data phone, or a modem.

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2.3 HEIS ACCOUNTS AND DATABASE ACCESS

INTRODUCTION

Access to the HEIS database is restricted to users who (1) have a computer user account and (2) have access privileges to a project account. The relationship between the HEIS project accounts and computer user accounts is shown in Figure 2.3-1.

Computer User Accounts

Users of HEIS must have individual user accounts. This account is an area on the computer system where one person may store information or execute software. This type of account is only a means of logging on to the HEIS Sequent computer; it does not provide access to the HEIS database. Section 2.3.1, Obtaining a Computer User Account, provides detailed information.

Project Accounts

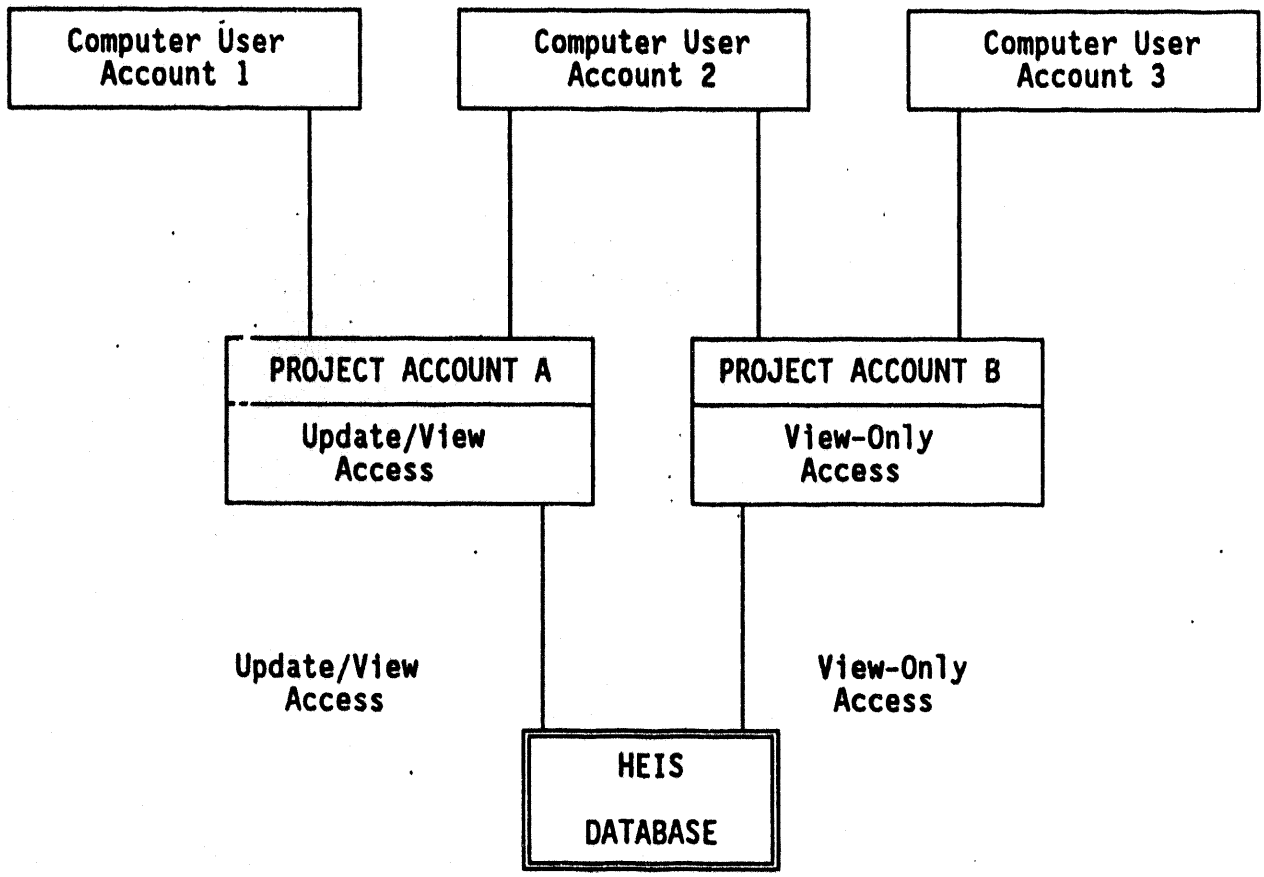
A project account is an area on the computer where one or more computer users may access the same information or execute software; it is where the bulk of the work is performed. A project account provides access to the HEIS database. Section 2.3.2, Obtaining a Project Account, provides detailed information.

Each project account has its own project account manager responsible for specifying the levels of access that the project account will have and granting or denying access to that account. Section 2.3.2 describes the account management commands available to the project account manager.

Database Access

Database access privileges for each project account vary depending on the purpose of the account. Separate project accounts should be set up for different functions. For example, there could be one account for data analysis and one for data entry. When access to the project account is granted to a user, that user automatically receives all the database privileges of the project account. In Figure 2.3-1, Computer User 2 has access to two project accounts. Using Project Account A, this user can update and view data in the HEIS database. Using Project Account B, this user can only view data. Section 2.3.3, Obtaining Access to the HEIS Database, provides detailed information.

Figure 2.3-1. Relationship Between HEIS Project Accounts and Computer User Accounts.



2.3.1 OBTAINING A COMPUTER USER ACCOUNT

INTRODUCTION

Every user of the HEIS Sequent must have a user account, which is accessed with a username and a personal password. A computer user account is an area on the computer system where one person may store information or execute software; when you first log on to the HEIS Sequent computer, you are in your computer user account.

No database access is associated with a computer user account. To obtain access to the HEIS database, a project account must be established (see Section 2.3.2, Obtaining a Project Account).

For those users working for Hanford Site contractors, a username consists of a letter and the user's 5-character payroll number. For others, usernames will be assigned.

When you open a user account, a computer-generated 8-character pronounceable password is provided. You can change this password when desired. Periodically, you will be required to select a new password. See Section 3.4, Changing Your Password, for more information.

UNDER NO CONDITION ARE YOU PERMITTED TO SHARE YOUR PASSWORD WITH ANOTHER PERSON. If your password is compromised, change it immediately (see Section 3.4).

U.S. Citizens

To access the HEIS Sequent computer, personnel who are U.S. citizens must obtain a computer user account.

Non-U.S. Citizens

If you are not a U.S. citizen, U.S. Department of Energy (DOE) approval to obtain a computer user account is required on a case-by-case basis. Contact the Authorized Security Point of Contact [a person within DOE or the applicant's institution, approved by the Pacific Northwest Laboratory (PNL) Computer Protection Program Manager (CPPM), who has the authority to verify that security requirements have been met] for instructions on how to obtain a HEIS computer account.

PROCEDURE

Applicant

1. Obtain a "PNL Computer User Account Request Form" from the PNL Information Systems and Services (IS&S) Customer Service Center or electronically from the PNL network (not available on HLAN).

Instructions for electronic access are provided below.

- PNL personnel use Form A, shown in Figure 2.3.1-1. Instructions for completing Form A are presented in Table 2.3.1-1.
  - At the DOS prompt, type issinfo [ENTER].
  - From the IS&S main menu, pick the "Forms" Option (#7).
  - From the FORMS menu, pick Computer User Account Request Form (for PNL users).
- All others use Form B. To access the form electronically, follow the instructions for PNL users, but select the Computer User Account Request form for non-PNL users. Form B is shown in Figure 2.3.1-2. Instructions for completing Form B are presented in Table 2.3.1-2.

Forms accessed and completed electronically must still be submitted in hardcopy to IS&S.

2. If employed by a non-Hanford Site contractor, attach one of the following acceptable proofs of U.S. citizenship:
   - A copy of your birth certificate or any valid picture ID, including a driver's license, U.S. passport, or military ID
   - Naturalization papers (original documents must be submitted in person because they cannot be copied).

   If you are employed by a Hanford Site contractor, your company's CPPM will verify your U.S. citizenship.

3. Obtain the following signatures:
   - Authorized Security Point of Contact
   - The CPPM.

Authorized Security Point of Contact

4. Review the Request Form to verify that the applicant understands the restrictions and responsibilities that are associated with using a HEIS computer account.

Figure 2.3.1-1. PNL Computer User Account Request Form A.

Statement of Restrictions and Responsibilities

Your personal PNL computer account is assigned only to you. Through this account you are allowed certain system and project access privileges appropriate to performing your specific job function. With these privileges, however, are associated certain restrictions and responsibilities.

System Use Restrictions _____ (initial)

Computer systems within PNL
and computer systems which ar
as sensitive if the equipmen
sensitive unclassified proces

PNL computing equipment is t
including, but not limited t
to others for such purposes,
this policy are sometimes all
written approval in advance

Security Awareness

- PNL multi-user comput
application may not be
of other users. All
Protection Program Man
restrictions.
- Many of the source co
restrictions. Such
software, most statis
prudence in the use o

If you are issued a "Smartca
access from offsite and it is

- Carry your card on yo
- Do not disclose your
- Do not allow another
- Report a missing or

Password Protection

Passwords to computer account
They should therefore be prot
be followed to ensure the pro

- Memorize your passwor
locked drawer. DO NO
- The sharing of person
person.
- Have colleagues look
logs on.
- Never store passwords
- Notify the system mana
held responsible for
- Always log off when l

Computer Etiquette

- Smoking and eating in
- Clean up after yoursel
cups, pencils, etc. l
- Familiarize yourself
Guide, available from
- Manage the computer r
archiving and deletin
- Notify the system man
system manager is alr

Note: Incomplete forms can no
and initialed each of the abo

ISES Cus
Battelle
P.O. Box
Richland

PNL COMPUTER USER ACCOUNT REQUEST
FORM A (for access by PNL users)

User Identification Information

Last Name_____ First Name_____ MI____

Payroll Number_____ Organization Code_____

Area_____ Building_____ Room_____ MSIN_____

U.S. Citizen? (circle) yes no Phone_____

Requested Systems Access

Open Personal Account on System(s) _____

Project Account or Work Package to charge personal account to_____

Work Order _____ Expiration Date_____
(applicable to accounts outside PNL)

User Acknowledgement of Restrictions and Responsibilities

I have read, initialed, understand, and agree to conform to the Restrictions and Responsibilities regarding computer use at PNL stated on the back of this form.

Signed _____ Date _____

Line Manager Certification

"All personnel are to be screened before being granted access to sensitive unclassified PNL or government computer systems. Personnel who have been granted a DOE access authorization (clearance) based upon favorable review of a government-sponsored investigation are considered to have been adequately screened. Determination of an individual's eligibility or continued eligibility for access to sensitive computer systems is the responsibility of the individual's supervisor." (PNL-MA-40)

I certify that access to this PNL computer system is necessary for this staff member. I have reviewed the personnel file of the above staff member and have found no evidence to preclude his/her use of PNL computer systems.

Signed _____ Date _____

Printed _____

PNL System Administration

Verification of U. S. Citizenship by checking Foreign Nationals Database.

Signed _____ Date _____

Computer Center Use Only

[ ] ISES Access Request Sent: __/__/__ Username _____
(date) (initials)

Smart Card Serial Number _____ Date _____ Network/Modem

Username _____ Date _____ By _____ Password Issued [ ]

Entered in ALEPNL [ ] Date _____ By _____

DOC-FRM-001 Revision 3.01 May 10, 1991

Table 2.3.1-1. Instructions for Completing PNL Computer User Account Request Form A - PNL Users.

User Identification Information--If you are a U.S. citizen, complete the requested information.

If you are not a U.S. citizen, contact the Authorized Security Point of Contact at your institution for instructions on how to obtain a HEIS computer account.

Requested Systems Access--Write in "HEIS" on the "Open Account..." line.

- Work Package/Order--Provide the work package or work order number that will pay for the computer account.
- Expiration Date--Enter the estimated date when work requiring this account will be completed. The computer account will be closed on this date. To obtain extensions, contact the PNL IS&S Customer Service Center.

User Acknowledgement of Restrictions and Responsibilities--

1. On the back of the Request Form, read and initial each portion of the "Statement of Restrictions and Responsibilities."
2. On the front of the form, read, sign, and date the "User Acknowledgement of Restrictions and Responsibilities."

Line Manager Certification--Have your line manager sign and date the form. This must be completed.

Figure 2.3.1-2. PNL Computer User Account Request Form B.

Statement of Restrictions and Responsibilities

Your personal computer account is assigned only to you. Through this account you are allowed certain system and project access privileges appropriate to performing your specific job function. With these privileges, however, are associated certain restrictions and responsibilities.

System Use Restrictions ______ (initial)

DOE computing equipment
including, but not limit
to others for such purpc

One of the following cor
1. Access to computer s
2. Access to computer s
 • Proof of citizens
 naturalization dc

Security Awareness

DOE multi-user computer
sensitive, you have a sh
report immediately to th
violations of system usc

If you are issued a "Sm
access from offsite and

- Carry your card on
- Do not disclose you
- Do not allow anothe
- Report a missing or

Password Protection

Passwords to computer ac
They should therefore be
be followed to ensure th

Memorize your passwor
times. DO NOT keep w

The sharing of person

Have colleagues look

Never store passwords

Notify the PNL Comput
You will be held resp

Always log off when l

Computer Etiquette

Familiarize yourself
available from the s
announcements.

Manage the computer r
deleting files you no

Notify the system man
that the system manag

Note: Incomplete forms
and initialed each of th

ISE
Bat
P.C
Ric

PNL COMPUTER USER ACCOUNT REQUEST
FORM B (for access by non-PNL users)

User Identification Information

Last Name ______________ First Name ______________ MI ____

Institution/Company ______________ Phone ______________

Address ______________ Mail Stop ______________
(must be EXACT street address to be FedEx'd)

City ______________ State/Prov. ______________ Zip Code ______________

ID/Payroll Number ______________ U. S. Citizen? (circle) yes no

Requested Systems Access
[ ] PNL Gateway [ ] HSES [ ] HEIS [ ] Standalone [ ] Other ______________
Access will always be from on site? yes no (see reverse side under System Use Restrictions)

User Acknowledgement of Restrictions and Responsibilities
I have read, initialed, understand, and agree to conform to the Restrictions and Responsibilities regarding computer use at Hanford stated on the back of this form.

Signed ______________ Date ______________

Authorized Security Point of Contact or PNL Information Security Contact
(not required if signed below by Hanford Contractor CPPM)
Signed ______________ Date ______________

Print Name ______________

Designated PNL Point of Contact or Line Manager

Work Order PNL ______ Org Code ______ Expiration Date ______________
(if applicable) (required for Non-PNL employees)
Project Account or Work Package to charge personal account to ______________

Signed ______________ Date ______________

Print Name ______________ Payroll # ______________

Computer Protection Program Manager (must be on list of designated CPPM's)

Signed ______________ Date ______________

Print Name ______________

PNL System Administration
Verification of U. S. Citizenship [ ] Attached (b.c./passport) [ ] Viewed (naturalization) [ ] Hanford Site Badge (NO Foreign Nat. designation)
Signed ______________ Date ______________

Computer Center Use Only

[ ] HSES Access Request Sent __/__/__ (date) ______ (initials) Username ______________

[ ] Gateway [ ] HEIS [ ] Other ______________ Username ______________

Password: Sent __/__/__ (date) ______ (ini.) Acknowledged __/__/__ (date) ______ (ini.) Enabled __/__/__ (date) ______ (ini.)

Smart Card Serial Number ______________ Date ______________ Network/Modem

DOC-FRM-010 Revision 2.02 January 18, 1994

Table 2.3.1-2. Instructions for Completing PNL Computer User Account Request Form B.

User Identification Information--If you are a U.S. citizen, complete the requested information.

If you are not a U.S. citizen, contact the Authorized Security Point of Contact at your institution for instructions on how to obtain a HEIS computer account.

Requested Systems Access--Check the box marked "HEIS."

User Acknowledgement of Restrictions and Responsibilities--

1. On the back of the Request Form, read and initial each portion of the "Statement of Restrictions and Responsibilities."

2. On the front of the form, read, sign, and date the "User Acknowledgement of Restrictions and Responsibilities."

Authorized Security Point of Contact--Signature of the Authorized Security Point of Contact (the person at the applicant's institution, approved by the PNL CPPM, who has the authority to verify that security requirements have been met). A CPPM can also sign as an Authorized Security Point of Contact.

Designated PNL Point of Contact--Obtain the following information from the cognizant project manager:

- Work Package/Order--Provide the work package or work order number that will pay for the computer account.

- Expiration Date--Enter the estimated date when work requiring this account will be completed. The computer account will be closed on this date. To obtain extensions, contact the PNL IS&S Customer Service Center.

Computer Protection Program Manager (CPPM)--Signature of the person (or authorized designee) at each DOE contractor who is responsible for ensuring that computer security requirements are met. The PNL CPPM will review and sign the form if this signature is otherwise omitted.

5. Sign the Request Form indicating that computer access is approved.

Computer Protection Program Manager

6. Review and sign the Request Form.

   NOTE: The PNL CPPM will review and sign the form if this signature is otherwise omitted.

7. Send the completed Request Form and proof of U.S. citizenship (if required) to the PNL IS&S Customer Service Center. The address is provided on the bottom of the "Statement of Restrictions and Responsibilities" (on the back of the Request Form).

Applicant

8. For applicants on the Hanford Site--When notified, go to the PNL IS&S Customer Services Center to receive your username and password.

   For applicants not on the Hanford Site--Your username, password, and SmartCard will be sent to you by mail. To activate your password, call the PNL IS&S Customer Service Center. (The phone number is given at the bottom of the "Statement of Restrictions and Responsibilities.") During this call, you will be asked to do the following:

   - Verify your identity by answering a question that only you are likely to know
   - Access the computer and change your password while talking with the Customer Service Center's representative.

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2.3.2 OBTAINING A PROJECT ACCOUNT

INTRODUCTION

A project account is an area on the computer where one or more computer users may access the same information or execute software; it is the location where the bulk of the work will be done. Because a project account provides access to the HEIS database, this procedure applies to project managers, task leaders, and other individuals responsible for managing work that requires access to the HEIS database.

Once a project account is set up, the project account manager can grant access to the account to other users. When access to the project account is granted to a user, that user automatically receives all the database privileges of the project account. Therefore, to control user access, the project account manager must set up a separate project account for each different class of users (e.g., one project account for view-only access and another project account for inserting, modifying, and deleting data).

You may apply for a project account when you apply for a user account on the HEIS Sequent computer (see Section 2.3.1, Obtaining a Computer User Account). Project accounts are granted only to those who already have a computer user account.

PROCEDURE

Obtaining a Project Account

Project Account Manager

1. Obtain a "Computer Project Account Request Form" from the PNL IS&S Customer Service Center or electronically from the PNL network (not available on HLAN). Instructions for electronic access are provided below. The form is shown in Figure 2.3.2-1. Instructions for completing the form are presented in Table 2.3.2-1.

   - At the DOS prompt, type **issinfo** [ENTER].
   - From the IS&S main menu, pick the "Forms" Option (#7).
   - From the FORMS menu, pick Computer Project Account Request Form (for Shared Data Access).

Figure 2.3.2-1. Computer Project Account Request Form.

Statement of Restrictions and Responsibilities

This PNL Project account is assigned to you, the project manager. Through this project you are allowed certain project access privileges and control of specific resources. With these privileges, however, are associated certain restrictions and responsibilities.

System Use Restrictions _____ (initial)

Computer systems withi
and computer systems w
as sensitive if the
sensitive unclassifie

PNL computing equipmer
including, but not li
to others for such pur
this policy are someti
written approval in ac

Security Awareness

PNL multi-user compute
be considered sensiti
obligated to report in
or suspicious activity

Host vendor and PNL de
restrictions. You ar
disclosure or export.

Project Manager Respor

As project man
your responsib

The project ma
periodically a

As project man
specific and P
updates and ar

Manage the com
archiving and

Notify the sys
system manager

Notify the ISS
form, you are

IRM Manager Responsibi

Project accounts on th
the designated inform
see that access is de

COMPUTER PROJECT ACCOUNT REQUEST
FORM C (for shared data access)

Project Information

Name _____ (8 chars max) Work Package/Order _____

System(s) _____

Project Account Manager Information (User with management privilege)

Last Name _____ First Name _____ MI ____

Personal Account Name _____

Authorized Project Users

			management privilege
Last Name _____	Personal Account	_____	[ ]
Last Name _____	Personal Account	_____	[ ]
Last Name _____	Personal Account	_____	[ ]
Last Name _____	Personal Account	_____	[ ]
Last Name _____	Personal Account	_____	[ ]

(Note: A current user account is needed for each of the above on each system)

Project Account Manager Acknowledgement of Restrictions and Responsibilities

I have read, initialed, understand, and agree to conform to the Restrictions and Responsibilities regarding management and use of a PNL computer project as stated on the back of this request.

Signed _____ Date _____

Designated PNL Point of Contact (PNL Project Manager)

Org Code _____ Project Expiration Date _____

Signed _____ Date _____

Print Name _____ Payroll # _____

Database Access Needed (IRM, HEIS) ? (circle) yes no
(If "yes" attach database access request form)

Computer Center Use ONLY

Date Opened _____ By _____ UID (for UNIX only)

Date Closed _____ By _____

Notes:

DOC-FRM-002 Revision 4.00 January 15, 1994

Table 2.3.2-1. Instructions for Completing the Computer Project Account Request Form.

Project Information--

- Name--The project name must be a unique name of fewer than 8 characters.
- Work Package/Order #--Identify the work package or work order number that will pay for the account.
- System(s)--Enter "HEIS."

Project Account Manager Information--

Enter the name (first, last, and middle initial) and computer user account username of the project account manager. For those users working for Hanford Site contractors, a username consists of a letter and the user's 5-character payroll number. For others, usernames will be assigned. The computer user account username is assigned when a computer user account is obtained. To obtain a computer user account, see Section 2.3.1, Obtaining a Computer User Account.

Authorized Project Users--

- Last Name--List the people who must have access to the project account.
- Personal Account--List the computer user account username for each user. For those users working for Hanford Site contractors, a username consists of a letter and the user's 5-character payroll number. For others, usernames will be assigned. The computer user account username is assigned when a computer user account is obtained. To obtain a computer user account, see Section 2.3.1, Obtaining a Computer User Account.
- Management Privilege--Check the box if the project manager would like the user to have project manager authority (the ability to add or remove users from the project account).

Project Account Manager Acknowledgement of Restrictions and Responsibilities--

- On the back of the form, the project account manager must read and initial each portion of the "Statement of Restrictions and Responsibilities."
- On the front of the form, the project account manager must sign and date the "Project Manager Acknowledgement of Restrictions and Responsibilities."

Designated PNL Point of Contact--

Project Expiration Date--Provide an approximate completion date for work that uses the project account. The project account will be closed on the original completion date. To change the completion date, contact the PNL IS&S Customer Service Center.

Database Access Needed--

PNL's IRM, HEIS? Circle HEIS and enter yes in the space provided.

Forms accessed and completed electronically must still be submitted in hardcopy to IS&S.

2. On the back of the Request Form, read and initial each portion of the "Statement of Restrictions and Responsibilities."

3. On the front of the Request Form, sign and date the "Project Account Manager Acknowledgement of Restrictions and Responsibilities."

4. Send the Request Form to the PNL IS&S Customer Service Center.

5. Indicate what type of HEIS database access you require. Write a memo to the PNL HEIS Project Manager (see the Contact List) documenting your needs.

   For Hanford Site personnel, the memo may be delivered via cc:Mail. For other personnel, attach the memo to the Computer Project Request Form.

Granting or Revoking Access to a Project Account

After a project account has been established, the project account manager has the authority to grant or deny access to the project account to users with computer user accounts. Use the following instructions to grant or revoke access:

Project Account Manager

1. Log on to the HEIS Sequent computer (see Sections 3.1 and 3.2).

2. Granting access to the project account automatically gives the user all database privileges associated with the project account; therefore, only the user's username needs to be specified. For command formats, see Table 2.3.2-2.

To see which users have access to a project account, "sp" to the project account and enter the command

```
% shop -u <myproject>
```

where <myproject> is the name of the project account.

Table 2.3.2-2. Project Account Access Command Formats.

Granting Access	
Command Format	% spmgr -a <-p project list> <-u user list>
Example (one user)	% spmgr -a <-p myproject> <-u user1>
Example (two or more users)	% spmgr -a <-p myproject> <-u user1> <user2> <user3>
Revoking Access	
Command Format	% spmgr -r <-p project list> <-u user list>
Example (one user)	% spmgr -r <-p myproject> <-u user1>
Example (two or more users)	% spmgr -r <-p myproject> <-u user1> <user2> <user3>

< > means that you may choose to omit this parameter from your command. If you do, you will be prompted for the information.

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2.3.3 OBTAINING ACCESS TO THE HEIS DATABASE

Access to the HEIS database is not automatically granted when you receive access to the HEIS Sequent. As a user, you can gain access in two ways.

- If a project account with the appropriate access to HEIS exists, you can be added to the list of users who can access that project account. The project account manager for that account can grant access to you once you have your personal account on HEIS. You will then have to access HEIS through that project account.

- If no appropriate project account exists, a project account must be opened. See Section 2.3.2.

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3.0 USING THE HEIS SEQUENT COMPUTER

OVERVIEW

Using the HEIS Sequent involves several steps:

- Accessing the HEIS Sequent; see Section 3.1 for a description.
- Logging onto the HEIS Sequent computer using your personal account. Section 3.2 describes logging on. Obtaining a personal account is described in Section 2.3.1.
- Using a HEIS application.
  - -- To use the query-by-form interface, see the "sp," "keyboard," and "heis" commands described in Section 3.2.
  - -- To use the reporting capabilities, see the "sp," "keyboard," and "rpt" commands described in Section 3.2 and Chapter 6.0.
- Logging off of the HEIS Sequent; see Section 3.2 for a description.

Section 3.3 describes online system bulletins and database notices that are available when you log onto the HEIS Sequent. Using electronic mail on the Sequent is also explained.

Section 3.4 describes your responsibilities for using the HEIS system. This includes managing your password and controlling access through your machine to the HEIS Sequent.

Section 3.5 describes recovery measures if your machine "hangs" or your query is taking too long. The procedures in this section describe how to avoid excess charges to your computer account.

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3.1 ACCESSING THE HEIS SEQUENT COMPUTER

INTRODUCTION

This section outlines several methods for connecting to the HEIS Sequent, from both on- and off-site.

CONNECTING TO THE HEIS SEQUENT

The HEIS Sequent can be accessed from any of the following:

- A VT220 or VT240-compatible terminal with a modem and telephone
- A PC or MacIntosh with terminal emulation software and a modem and telephone
- A PC or MacIntosh connected to either the Hanford Local Area Network (HLAN) or the Pacific Northwest Laboratory (PNL) network using a terminal emulation software package
- A workstation connected to HLAN or the PNL network.

Supported terminal emulation software packages are Kermit for PCs, and NCSA Telnet for MacIntosh.

This procedure assumes that you have a working knowledge of the hardware and software that you will use to connect to the HEIS Sequent. If you have questions about how to operate your hardware or software, contact the cognizant representative at your company.

You can gain access to the HEIS Sequent from your terminal or PC in one of the following ways:

- Through HLAN or the PNL network
- By off-site phone, dialing into Westinghouse Hanford Company (WHC)
- By off-site phone, dialing into PNL
- By PNL data phone.

These methods are described below.

ACCESS VIA HLAN OR PNL NETWORK FROM A PC OR MACINTOSH

To use this method, you must have a PC with emulation software, a network board, and access to the HLAN or PNL network. Because off-site staff do not have access to the HLAN or the PNL network, they cannot use this method.

Use your terminal emulation software to access the HLAN or the PNL network (HLAN is not part of the PNL network). If you are unsure how to do this, contact the cognizant representative at your company.

1. Connect to the network.

1a. If you successfully reach the HLAN, you will see the following prompt:

```
You may now enter Net/One commands.
>>
```

At the network prompt, enter the following command:

```
>> c pnl tcp
```

This connects you to the PNL network using the Transmission Control Protocol/Internet Protocol (TCP/IP).

NOTE: The first "c" in the command stands for "connect." You will see the entire word "connect" filled in after you type c and one space.

If you cannot reach the TCP/IP prompt with the above command, substitute the following command:

```
>> c *pnl tcp
```

At the "connecting..." prompt, press [RETURN] or [ENTER] two or three times.

```
connecting...
[RETURN]
[RETURN]
[RETURN]
```

1b. If you successfully reach the PNL network, you will see the following prompt:

```
*** Welcome to the PNL Local Area Network
You may now enter commands.  Type ? for help.
PNLtcp>>
```

1c. If you did not reach the PNL TCP/IP network (you see the "PNLnet>>" prompt), type the following:

```
>> c pnl tcp
```

2. At the "PNLtcp>>" prompt, enter the following command to connect to the HEIS Sequent:

```
PNLtcp>> c heis
```

NOTE: The first "c" in the command stands for "connect." You will see the entire word "connect" filled in after you type **c** and one space.

3. The HEIS Sequent then asks for a username with the following prompt:

```
login:
```

4. To log on to HEIS, see Section 3.2, "Logging On" and "Logging Off."

ACCESS BY TELEPHONE

To access the HEIS Sequent by telephone, you need a terminal or a PC (with terminal emulation), a modem, and telephone. This method can be used by either on-site or off-site staff. However, off-site staff must also use a SmartCard to gain access to the HEIS Sequent.

- If you work at the Hanford Site and have a PNL data telephone, see "Access by PNL Data Phone."
- If you work at the Hanford Site but do not have a PNL data telephone or access to the HLAN or the PNL network, or if you work off the Hanford Site, your access method is determined by which organization issued your SmartCard. See "Access by Phone, Dialing into WHC or PNL" for details.

Access by Phone, Dialing into WHC or PNL

Westinghouse Hanford employees and subcontractors and all off-site users who have a SmartCard (also known as an ACE SecurID card) issued by WHC may access the HEIS Sequent by dialing into the WHC system. Employees and subcontractors of PNL (those having a SmartCard issued by PNL) may access the HEIS Sequent by dialing into the PNL system.

Before beginning access, make sure you have your SmartCard readily accessible. Also check to see that your terminal and modem are properly configured. The computer access system accepts data calls from 9,600, 2,400, 1,200, and 300 bits-per-second modems only.

- If you are attempting to connect to the HEIS Sequent for the first time, see "Establishing Your Personal Identification Number (PIN)."
- If you have already established your PIN, go to "Access Procedure."

Establishing Your PIN

Your PIN is a 4-digit number that is required each time you log on to the HEIS Sequent. For security reasons, you are requested to memorize it instead of writing it down.

Perform the following steps to establish your PIN:

1. Place a data call to the Access Control Module (ACM).
   - For WHC users, dial one of the following:
     - (509) 376-4260 for 2400, 1200, or 300 bits-per-second
     - (509) 376-9975 for 9600 bits-per-second.
   - For PNL users, dial one of the following:
     - (509) 375-2990 for 9600, 2400, or 1200 bits-per-second.
     - (509) 375-6753 for 300 bits-per-second.
2. After the data connection has been established, press [RETURN] or [ENTER] once.
3. At the "ENTER PASSCODE" prompt, type the 6-digit serial number on the back of your SmartCard, immediately followed by the 6-digit number currently displayed on the SmartCard liquid crystal display (LCD). There should not be a space between the two numbers.

   ENTER PASSCODE 111111222222
4. Press [RETURN] or [ENTER] once.

   The ACM will display the following message: "ARE YOU READY TO RECEIVE YOUR PIN NUMBER?"

   Enter Y (yes) and press [RETURN] to receive your PIN number.

The ACM will then display your PIN and ask you to memorize it. DO NOT WRITE DOWN YOUR PIN. You are given ten seconds to memorize your PIN, after which the ACM will terminate the modem connection and you will be required to log on with your new PIN.

Access Procedure

To access the HEIS Sequent, perform the following steps:

1. Place a data call to the ACM.

   - For WHC users, dial one of the following:

     - (509) 376-4260 for 2400, 1200, or 300 bits-per-second

     - (509) 376-9975 for 9600 bits-per-second.

   - For PNL users, dial one of the following:

     - (509) 375-2990 for 9600, 2400, or 1200 bits-per-second.

     - (509) 375-6753 for 300 bits-per-second.

2. After the data connection has been established, press [RETURN] or [ENTER] once.

3. At the "ENTER PASSCODE" prompt, type your PIN immediately followed by the 6-digit number currently displayed on your SmartCard. There should be no space between the two numbers.

   ```
   ENTER PASSCODE 1111222222
   ```

4. Press [RETURN] or [ENTER] two or three times.

5. For WHC users (PNL users go to step 6):

5a. At the "ENTER CLASS" prompt, enter the following command:

```
ENTER CLASS
NET1
```

5b. At the "You may now enter Net1 commands" prompt, enter the following command:

```
You may now enter Net1 commands
c pnl tcp
```

5c. Continue with step 7.

6. For PNL users:

6a. At the "CONNECT TO THE PNL DATA SWITCH" prompt, press [RETURN] or [ENTER] two or three times.

```
CONNECT TO THE PNL DATA SWITCH
[ENTER]
[ENTER]
[ENTER]
```

6b. At the "PNL SWITCH: DESTINATION" prompt, enter the following command:

```
PNL SWITCH: DESTINATION
tcp
```

7. Both PNL and WHC users press [RETURN] or [ENTER] two or three times.

8. At the "PNLtcp>>" prompt, enter:

```
PNLtcp>> c heis
```

8. Press [RETURN] or [ENTER] a few times.

9. The HEIS Sequent asks for your username with the following prompt:

```
login:
```

10. To log on to the HEIS Sequent, see Section 3.2, "Logging On" and "Logging Off."

On-site Access by PNL Data Phone

Data telephones at PNL have a 375 prefix. To connect to PNL TCP/IP, apply the following steps:

1. Enter your terminal emulator (Kermit, etc.).

2. Dial 5-4971. When you hear the tone, push the data button on the phone.

3. Press [RETURN] or [ENTER] several times.

4. At the "PNLtcp>>" prompt, enter the following command:

```
PNLtcp>> c heis
```

5. The HEIS Sequent asks for a username with the following prompt:

```
login:
```

6. To log on to the HEIS Sequent, see Section 3.2, "Logging On" and "Logging Off."

ACCESS BY HLAN OR PNL NETWORK THROUGH A WORKSTATION

To use this method, your workstation must be connected to the HLAN or the PNL network.

1. At the UNIX prompt, type in the following command:

   ```
   % telnet heis
   ```

2. The HEIS Sequent asks for a username with the following prompt:

   ```
   login:
   ```

3. To log on to the HEIS Sequent, see Section 3.2, "Logging On" and "Logging Off."

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3.2 PREPARING TO RUN HEIS APPLICATIONS

INTRODUCTION

This section describes the fundamentals for accessing the HEIS system. It serves as a roadmap for using HEIS.

CASE SENSITIVITY

The HEIS Sequent computer uses a UNIX-based operating system that is case sensitive. For example, your username and password entered in uppercase are not the same as your username and password in lowercase. Use lowercase to enter your username and password.

Except where noted, you should always use lowercase on the HEIS Sequent.

LOGGING ON

After you have connected to the HEIS Sequent (see Section 3.1), perform the following steps to log on.

1. Set your terminal keyboard to type lowercase letters only.

2. At the "login" prompt, enter your personal account username.

   login: <username>

3. At the "Password:" prompt, enter your personal password. Your password will not appear on the screen.

   Password: <password>

Once you have entered your username and password, current system messages and notices are displayed. Finally, the terminal screen displays a percent symbol (%), which is the operating system prompt of the HEIS Sequent. The "%" prompt means that the HEIS Sequent is waiting for you to enter a command.

SET PROJECT

The first command you need to enter at the "%" prompt is "sp" (set project), which moves you to a project account. This provides access to the HEIS database and its functions. To move to a project account named <ourproj>, enter the following command:

% sp <ourproj>

General system messages followed by messages specific to your project are displayed before you actually move

into the project. See Section 3.3 for information on system messages.

SPECIFYING EMULATOR TYPE

To use the software that allows access to the HEIS forms, specify which emulator or terminal you are using. To do this, enter the following command:

```
% keyboard <emulator_name>
```

Specifying the <emulator_name> on the command line is optional. Not specifying it allows you to see what emulators options are available. The keyboard mappings are provided in Appendix A.

- If you do not specify the <emulator_name>, you will see the following list of options. Select the correct option.

```
Please pick the correct keyboard type for your current session:
        PC-based Emulators
  kermit          PC running kermit with HEIS ini file
  mac_telnet      Macintosh running NCSA 2.5 telnet
     Terminals
  vt220           vt220 terminal
  vt240           vt240 terminal

Enter Choice:
```

- If you specify the <emulator_name> on the command line, you will not receive any prompt. The next line will simply show the operating system prompt (%).

Key mappings for other emulators can be done. Contact the HEIS Software Development Coordinator.

ACCESSING THE HEIS QUERY-BY-FORM INTERFACE

After specifying the keyboard, enter **heis** at the "%" prompt to access the HEIS user interface. The main HEIS menu will appear, from which you can access the HEIS forms. See Chapter 5.0 for information and instructions.

```
% heis
```

REPORTING

A few reports are currently provided. In fiscal year 1994, user requirements for additional useful reports will be solicited and developed.

GRAPHICS

No graphics software is currently provided. This software will be developed and fiscal year 1994.

EXITING PROJECT

You can return to your computer user account by entering the following command:

```
% exit
```

You may move to a different project account by setting project again (see "Setting Project" above).

LOGGING OFF

1. To log off the HEIS Sequent from your project account, type **exit.**

   ```
   % exit
   ```

   The HEIS Sequent responds with "% logout."

2. To log off the HEIS Sequent from your computer user account, type **exit.**

   ```
   % exit
   ```

   The HEIS Sequent responds with "% logout."

3. Exit at the "PNLtcp" prompt by typing the following command:

   ```
   PNLtcp>> logout
   IDLE
   ```

4. If you logged on via HLAN, step 3 returns you to HLAN. To log off HLAN, enter

   ```
   >> logout
   ```

   If you accessed the HEIS Sequent via the telephone, step 3 breaks your phone contact.

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3.3 HEIS COMMUNICATIONS

3.3.1 ONLINE BULLETINS

INTRODUCTION

Two types of bulletins are displayed to inform HEIS users of system availability, software changes, and database status.

- HEIS system bulletins are automatically displayed on the terminal when a user logs on to HEIS. These messages are posted on the system by the HEIS System Manager or the HEIS Database Administrator and are of general interest to all HEIS users.
- HEIS database notices are displayed when you access your project account by entering **sp <project name>**. They contain the date and time that the notices were updated. This allows you to determine whether to read the messages.

HEIS SYSTEM BULLETINS

System Maintenance

Scheduled maintenance on the HEIS production database that may impact the work of any users is announced by system bulletins. Whenever possible, users are notified of scheduled computer down times by system bulletins several days in advance.

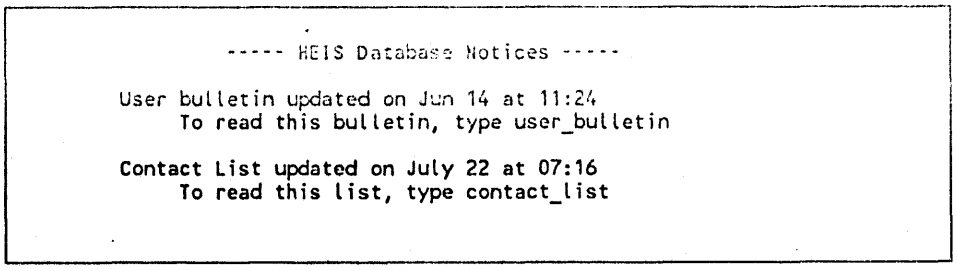
Occasionally the system manager must map data into HEIS tables in the production database to correct the data or to accommodate software changes to tables. Warning messages informing users that they may witness data changes are posted in system bulletins. When data mapping activities may impede the work of users, the system manager may elect to make the affected HEIS tables unavailable to users. The unavailability of HEIS tables are pre-announced in system bulletins.

System bulletins are posted prior to system maintenance regardless of the time or day of such maintenance.

HEIS DATABASE NOTICES

These messages appear after the general system messages and just before you receive the "%" prompt. A sample notice is shown in Figure 3.3.1-1.

Figure 3.3.1-1. HEIS Database Notice.



Using user_bulletin

Using the "user_bulletin" command displays the messages one screenful at a time. The message "--More--(nn%)" on the last line of the screen indicates how much of the message file has already been displayed. To continue to the next screenful, press the spacebar. To scroll through the screen one line at a time, press [RETURN]. To terminate the display of the messages, press **q**.

The messages are stored in reverse order, that is, the latest message is displayed first. The following types of information will be posted:

- Production Software Changes - Users are notified of modifications to existing production software and new software that is moved into production. Bulletins of this type are the responsibility of the HEIS Software Coordinator.
- Data Growth - The HEIS Database Administrator posts system bulletins to periodically inform users of data volume growth in HEIS subject areas (i.e., the number of records in tables). "Upleveled" groups of data are included in these bulletins; it is the responsibility of users with UPLEVEL privileges to apprise the Database Administrator of upleveled data.
- Production Data Changes - Notices may inform users of changes to production data, including well name changes and correction to basic data fields such as Constituent ID and Lab Code.
- Laboratory Performance - Laboratory performance summary reports are posted periodically by the HEIS Software Coordinator.

Using contact_list

This up-to-date list provides the name, mailing address, cc:Mail address, and Sequent electronic mail address for key HEIS personnel. In the manual set, these persons are identified by title, such as the HEIS Software Coordinator.

The contact_list command functions like the user_bulletin command (see the section above for how to display the contents).

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3.3.2 ELECTRONIC MAIL AND TWO-WAY "TALKING"

INTRODUCTION

The Sequent operating system offers several methods for users to communicate via computer. Users may communicate with other users on the Sequent or with any other computer that is accessible from the Sequent.

MAIL MESSAGES

To use the existing electronic mail system, type **man mail** to receive instructions. A different, more user-friendly (menu-driven) mail system is currently being investigated.

TWO-WAY "TALKING" TO ANOTHER USER

The "talk" command simulates a telephone conversation. To talk to another user who is currently logged on to the Sequent, enter the user name of the receiver with the following command:

```
% talk <user name>
```

The system will notify the recipient of the call. The recipient can then respond by entering the user name of the caller in the same command:

```
% talk <user name>
```

The screen splits in two, and each person sees what the other types. Either user may end the conversation by pressing

[CTRL]c

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3.4 SECURITY CONTROL

LOCKING YOUR ACCESS TO HEIS

If you are logged on to the HEIS Sequent and must leave your keyboard unattended, you must either log out or "lock" your access to HEIS. Your access may be locked for 60 minutes, after which you will be logged off automatically. Keep in mind that you are paying computer charges for connect time while your keyboard is locked. Apply the following steps to lock your keyboard:

1. Get to the system prompt (%).

2. Enter the following command:

   ```
   % lock
   ```

   The following message appears on the screen every minute, showing how much of the 60 min is left:

   ```
   Enter password to unlock keyboard -- timeout in 60 minutes
   ```

3. To unlock your access, enter your password. This ensures that only you can unlock your access and continue using the HEIS Sequent.

   NOTE: This locks only access to the HEIS Sequent. If you are using Windows on a PC or a MacIntosh, you may switch to another task. When you switch back to the HEIS Sequent task, enter your password to unlock the access.

CHANGING YOUR PASSWORD

You may change your password as often as you wish. If your password is ever compromised, you will need to change it immediately.

To change your password, enter the following command:

```
% passwd
```

You will be asked to enter your old password. This will verify that you are the account owner and therefore may change the password.

A list of 5 possible passwords will be displayed on the screen in two columns. The left column is the password; the right column shows the phonetic pronunciation. At the "New Password" prompt, enter the password that you have chosen. If you do not like

any of the 5 possible passwords, press [ENTER] and another list of 5 passwords will be displayed.

3.5 ABORTING A HEIS SEQUENT SESSION

INTRODUCTION

You may find that you have specified a query that has already run for an extended period and that may run for substantial additional time. You may choose to abort the HEIS Sequent session to terminate this query.

If you are connecting to the HEIS Sequent by using a modem, you may find that the data transmission is not clean and your machine (or window, if you are running in a windowed environment) may lock up. You may choose to abort the HEIS Sequent session to regain control over the machine (or window).

ABORTING THE SESSION

Apply the following steps to abort a HEIS Sequent session:

- If you are running in a windowed environment such as MSWindows or a MacIntosh, you may terminate the window.
- If you are running in a non-windowed environment (such as DOS) and the machine is not locked up and you are using a terminal emulator, you may communicate directly with the terminal emulator and break the connection to the HEIS Sequent. The steps are as follows:

  1. Return to your emulator. For Kermit, enter **[ALT]x**.
  2. Terminate the terminal emulator. For Kermit, enter **exit**.

- Otherwise, your only choice is to reboot your personal computer or turn off the power to your terminal.

Terminating the emulator will generally break the connection to the HEIS Sequent. Occasionally the connection to the HEIS Sequent will not be broken. Follow the steps below to verify that your connection to the HEIS Sequent has been broken. REMEMBER THAT YOU ARE CHARGED FOR THE TIME YOU ARE CONNECTED TO THE HEIS Sequent.

1. Log back on to the HEIS Sequent (see Section 3.1).

Figure 3.5-1. Output from "finger".

```
Login    Name              TTY Idle    When          Office
dxxxxx   NAME for xxxxx    *pw         Mon 15:50     office for dxxxxx
dyyyyy   NAME for yyyyy    *px         Mon 16:35     office for dyyyyy
```

2. Check to see that you are not logged on to the HEIS Sequent twice. Type finger. This will list the users who are logged on (see Figure 3.5-1).

   If you see your name only once, then no further action is required. You may log out normally or stay logged on and attempt other queries.

   If you see your name more than once, then your previous session did not terminate normally and you are being charged for the connect time. To "kill" your previous session apply the following steps:

   a. Determine the "TTY" of your previous session. You can determine which entry is your current session and which is the previous session by looking at the "Idle" (minutes idle) and/or "When" (when you logged on).

   b. Type the following command, replacing the "xx" with the two or three letters listed under "TTY" for your previous session:

      ```
      ps -e | fgrep -i xx
      ```

      This will return a list of process entries like those shown in Figure 3.5-2. Each entry will have the TTY letters from your previous session.

   c. You need to "kill" the "csh" processes for your previous session. The list returned by the above command identifies these processes by a process number (the first entry) and process name (the last entry) on each line in Figure 3.5-2. To "kill" a process, type the following command, replacing the "nnnnn" with the numbers listed in the first column of the row that is for the "csh" process:

      ```
      kill -9 nnnnn
      ```

Figure 3.5-2. List of Processes Owned by TTY "px" (results of "ps -e | fgrep -i px" command).

```
3356 ttypx    0:00 sp
3357 ttypx    0:04 csh
3377 ttypx    0:00 ps
3333 ttypx    0:02 telnetd
3378 ttypx    0:00 fgrep
3334 ttypx    0:01 csh
```

d. Type finger again to verify that your previous session has been terminated. Note that it is possible to have more than one "csh" process, so you may need to "kill" these additional processes also.

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4.0 HEIS DATABASE STRUCTURE

4.1 DATA MODELS

OVERVIEW

A data model is a graphical representation of data (known as objects) and relationships between objects. Each object in Figure 4.1-1 is represented by a box surrounding the title for the object. Here, "object" is used in the most general sense, where an object is simply a thing. The data model represents the viewpoint or perspective of its users. For example the data model in Figure 4.1-1 shows that each person has attended at least one school (to be explained below). This is a reasonable perspective for U.S. children today, but it is not an adequate model for children worldwide.

A data model also represents relationships between objects. In Figures 4.1-1 and 4.1-2, these relationships are also represented as titles surrounded by boxes. In Figure 4.1-2, a box represents the relationship between a school and a person, known as "school attendance."

The boxes representing objects are connected by lines. These connections are labelled to indicate their meaning. For clarity, each connection is labelled twice. The arrow associated with the wording indicates the direction to apply the label. To form a sentence describing the connection, follow the direction of the arrow to read the name of the first object, the phrase along the connecting line, and the name of the second object. For example, the connections between "school" and "school attendance" are read "school helps determine school attendance" and "school attendance belongs to school."

To indicate the cardinality of each connection, each end of the connecting line is marked to indicate the minimum and maximum number of that object that participate in the connection. The minimums are zero, one, and many. The maximums are one or many. "Zero" is represented by an open circle, "one" by a short line perpendicular to the connection line, and "many" by a "crow's foot." These are written in minimum/maximum pairs. The legend for Figure 4.1-2 shows all combinations.

Figure 4.1-1. Simple Data Model.

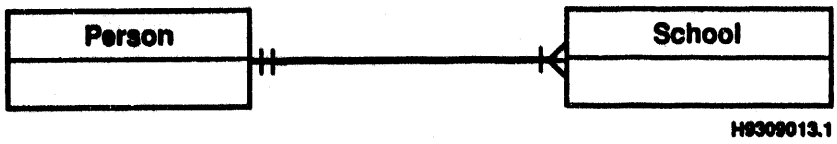
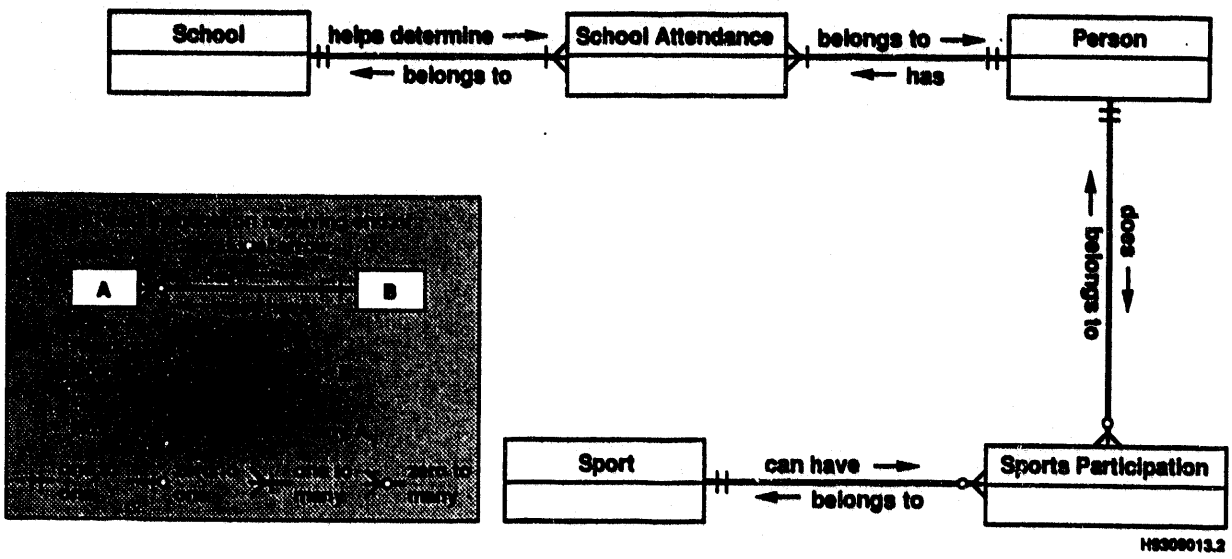


Figure 4.1-2. Data Model with Labelled Connections.



To use a data model for communicating detailed information, more detail must be added to the model. The following items are commonly added:

- The names of the attributes of each object - In Figure 4.1-3, the attributes of "person ID," "name," "ssn" (social security number), and "birthdate" have been added to the "person" object.

- A unique identifier - To facilitate the development of a database described by the model, each object must have an attribute(s) that uniquely identifies every occurrence of the object. In Figure 4.1-3, the attribute of "activity" uniquely identifies the object "sport" (the underline designates the unique identifier[s]). Sometimes a computer-generated attribute must be used to provide a unique identifier. In Figure 4.1-3, the attribute "person ID" is used in the object "person." Another unique attribute of person is the "ssn"; in this case, either attribute could be the unique identifier. An object may require more than one attribute to uniquely identify an occurrence. In Figure 4.1-3, the object "sport participation" needs both the "person ID" and "activity" attributes to form the unique identifier.

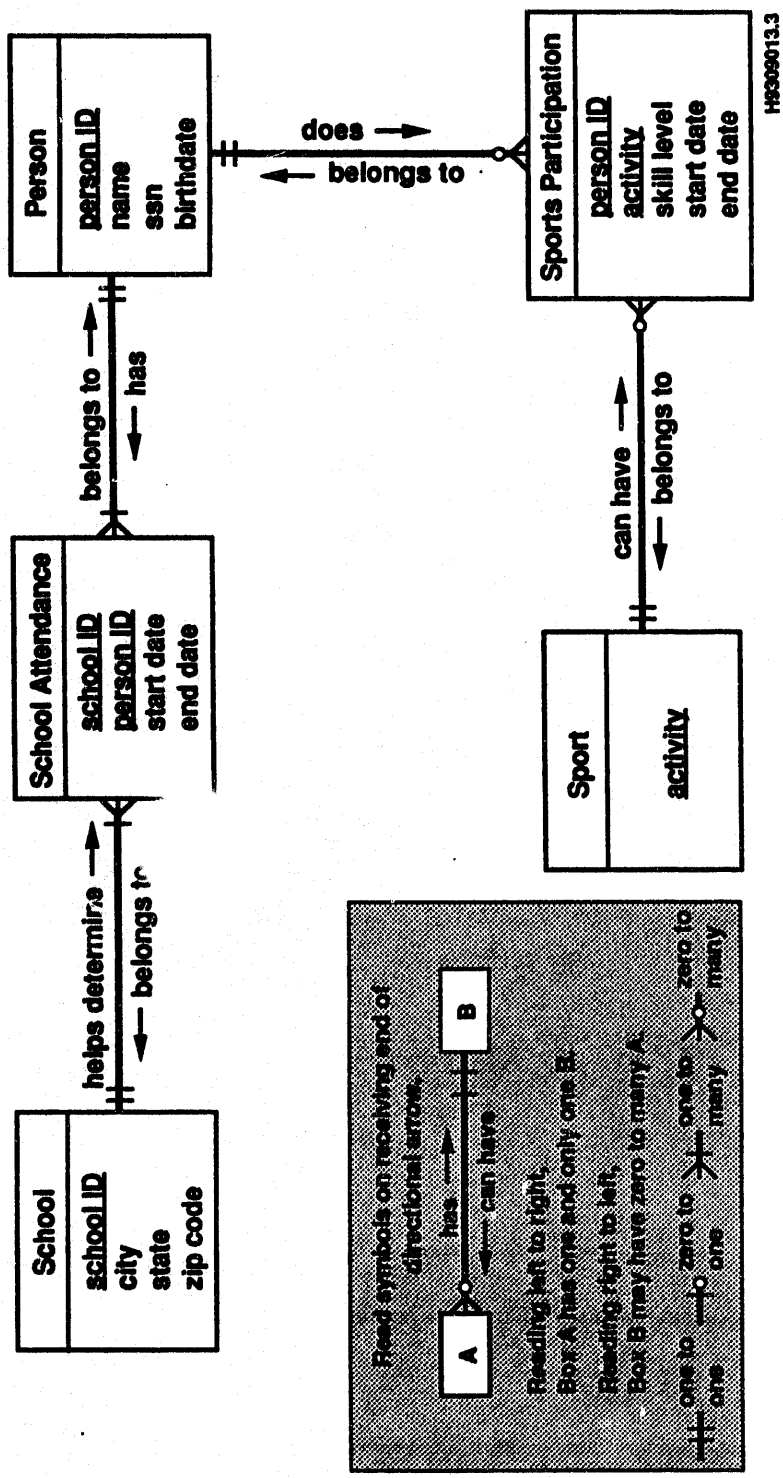
- The type, size, and definition of each attribute - To more completely describe an attribute, its type (e.g., character, number, date) and its size (maximum number of characters) could be added to the model. To clearly communicate an attribute's meaning, a definition is also necessary. Typically, this information is associated with a data model but is not included in the graphical representation of the model.

SUBJECT AREA DATA MODELS

The overview above describes data models in general. The style adopted for the HEIS manuals is slightly different. The data models found in each subject area include the following differences:

- Objects and relationships are represented as titles inside boxes. Elsewhere in the manuals these are called tables (refers to the relational database term "table").

Figure 4.1-3. Data Model with Attributes.



Boxes with square corners are tables in the current subject area. Boxes with rounded corners are tables in another subject area.

- Connections are labelled twice, once to represent each direction of the connection. The labelling includes the minimum and maximum cardinality of each connection.

- Attributes and unique identifiers are not included in the data models. These are included in the section of the manual that describes the appropriate table.

  Attributes are known as fields (or field names) and are included under the subject area section "Form Field Name/Database Field Name." A form field name is the text that identifies this attribute on the forms used in the query-by-form user interface. In other database interfaces such as SQL*Plus or SQR, the database field names are used.

  The unique identifiers for the table are included in the subject area section "Required Fields" and are identified by an asterisk (*).

Types, sizes, and definitions are not included in the data models. These are included in the Data Dictionary (Appendix A of the *HEIS Subject Area Reference Manual* [DOE-RL 1994cj). This dictionary is ordered by the form field name.

COMPREHENSIVE DATA MODEL

The Comprehensive HEIS Data Model provides a complete view of all the tables in HEIS and how they interrelate with each other. This model may be useful to anyone who wants a more detailed understanding of the entire HEIS database structure. A copy of this 3-ft by 5-ft model can be obtained by contacting the HEIS Documentation Coordinator. The data model is accompanied by a written description.

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4.2 HEIS STRUCTURES

The HEIS database contains approximately 200 tables and 1,100 distinct attributes. Within this structure are two underlying organizations.

- By subject area. Figure 4.2-1 shows the subject areas within HEIS and the interconnections between subject areas. Each subject area is described in a chapter in one of the volumes of the HEIS manual set. Section 2.1 of this guide lists where each subject area is located.

  A subject area is a group of tables that, when taken together, describe a complex object. Examples of objects in HEIS are wells and samples, such as biota or ground-water samples. The description of a well includes the construction of the well and its continued maintenance. The description of a sample is represented in two pieces. The basic identification of the sample includes assigning a unique HEIS sample number. The description of a specific type of sample such as a biota sample or a ground-water sample includes details of the sampling and descriptions pertinent to either biology for biota or to water sampling for ground-water.

- By content (see Figure 4.2-2). A major purpose of HEIS is to store data about the samples taken and analyzed to support environmental cleanup of the Hanford Site. Thus, a major structure within HEIS involves storing data about samples and results. These data are stored in appropriate HEIS subject areas, and in each case the structure involves storing data about the following:

  - Samples - Each sample taken is catalogued in the Sample table.

  - Subject Area Sample - Each sample belongs to one of the subject areas identified in Figure 4.2-1. In the subject area the sample is described more completely, including descriptions specific to a single subject area. For instance, biota sample description includes the common name and the portion of the animal or plant that was sampled, while soil sample descriptions indicate the depth at which the sample was collected.

Figure 4.2-1. HEIS Subject Area Organization.

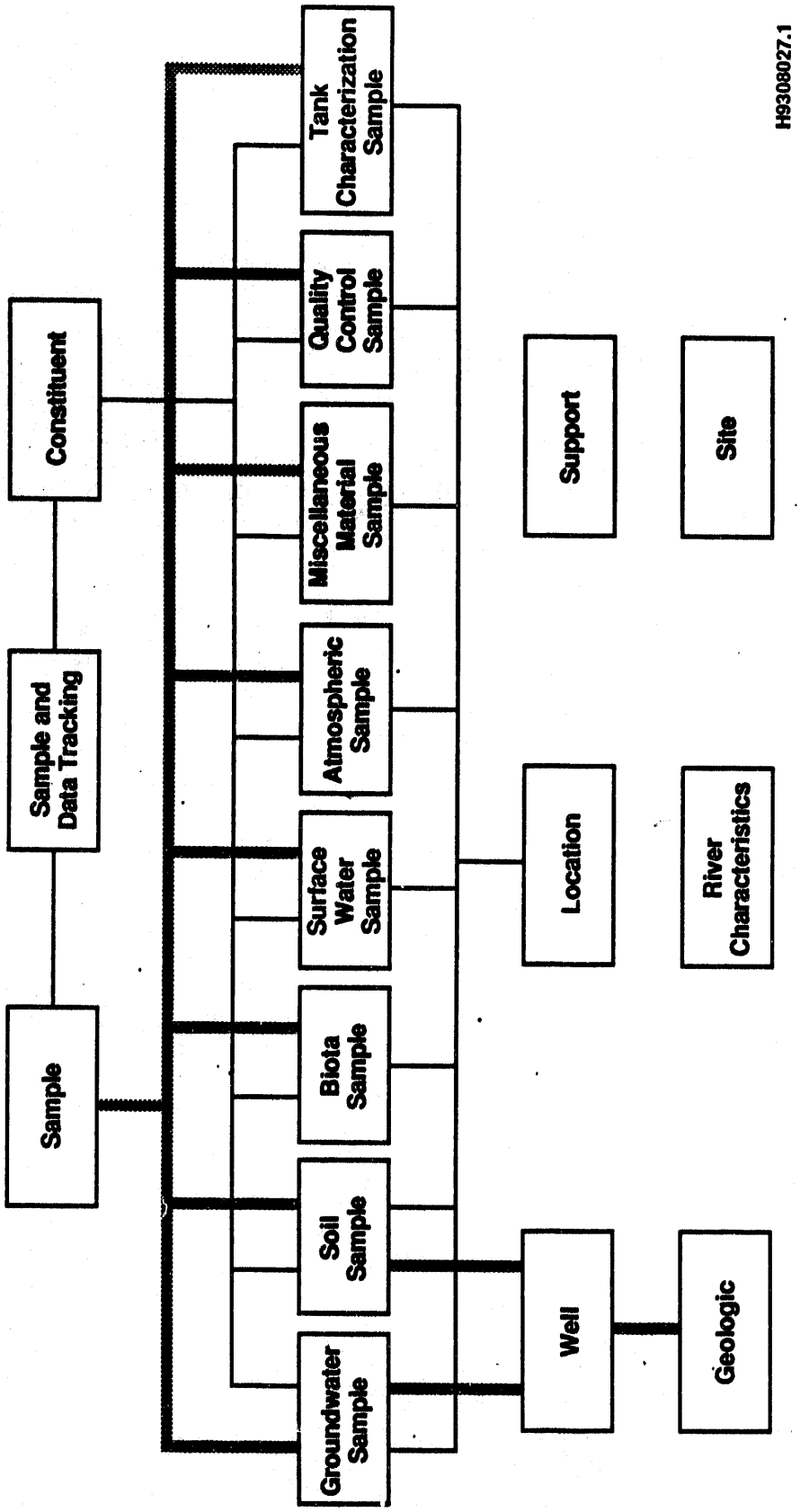
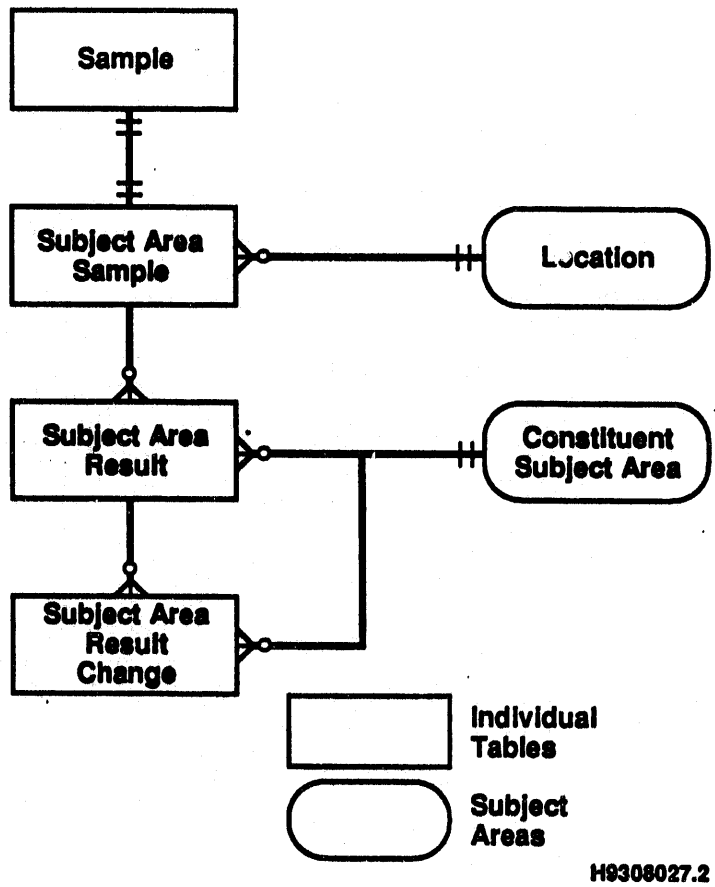


Figure 4.2-2. Organization of a HEIS Subject Area Containing Analytical Results.



-- Subject Area Result - Each sample is analyzed (either field measured or analyzed in a laboratory) and the results, including value reported, associated engineering units, qualifiers, and other pieces of information to describe the quality of the sample and its analysis are stored in the appropriate result table.

-- Subject Area Result Change - Some aspects of the sample results, such as value reported and qualifiers, are subject to change. The result change records provide a time-stamped historical record of changes made to subject area result records. In addition to the value of all fields stored in the result change record, the reason for the change, the change authority and user name, the change code, and the date/time of change also are stored.

-- Location - Each sample can be associated with a location. The actual location can be specified as a pair of values representing the x-y location using one of several coordinate systems, or it can be a textual description of an area where the sample was collected. The style of location data depends on the planned use of the data.

-- Constituent Subject Area - Each analysis is associated with a constituent, an analysis method, and a laboratory. These three pieces of information are stored in the Constituent Subject Area.

There are five additional content areas in HEIS.

- Well - A group of tables that describes the construction of a well, its continued maintenance, and periodic measurement of water levels within the well.

- Sample and Data Tracking - A mechanism for specifying the type of analytical analysis needed for each sample, and monitoring that sample to ensure that the analytical results are entered into HEIS.

- Geologic - A group of tables that contain analyses or estimates of particle sizes from samples taken during well construction, and interpretative geologic summaries.

- Site - A group of tables that describe waste sites and the aggregation of waste sites used in describing the Hanford Site.

- River Characteristics - Historical information on flow rates and temperatures of the Columbia River.

More detailed information about the HEIS data model is found in the beginning of each subject area chapter. There you will see the actual connections between tables, including tables in the subject area and tables outside the subject area. More detailed information such as field names in each table and which field(s) comprise the unique identifier for the record as found in the section describing the specific table. Further detailed information such as a definition, and the type and size of the field are found in the Data Dictionary (see Appendix A of the *HEIS Subject Area Reference Manual*).

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4.3 INFORMATION GENRES

INTRODUCTION

There are several constructs in HEIS that you need to understand before working in the HEIS environment. This section describes these constructs and the records in which they appear.

4.3.1 GENERIC INFORMATION FOR MANY TYPES OF RECORDS

OWNER ID

The Owner ID field identifies which computer project account manages this record. Managing a record includes entering the original record, making any needed modification (including determining if a suggested modification should be made), and deleting the record if necessary. This field is included as a required field in most, but not all, records in the HEIS database. Owner ID is system generated during the insertion of the original record. During modification or deletion, changing this field is not allowed.

Typically, analytical results, well construction, and location records include the Owner ID field. This allows specific instances of these records to be managed by different groups, depending on who did the data entry. Other data, such as the constituent identifiers, the laboratory identifiers, and the sample and data tracking system, are shared resources and thus do not have the Owner ID field in each record.

If you observe a problem with a data record which include the Owner ID field, you must contact the computer project account that owns the data to affect changes in the data or to resolve questions about the data. One way to communicate is to use electronic mail, described in Section 3.3.2. You may send mail directly to the computer project account; that mail can be read by any person who has access to the project account.

ACCESS LEVEL

Each record in HEIS that contains an access level goes through a process to annotate the data with appropriate flags about the quality of the data and/or to correct the data record. The Access Level field stores the state of the record in this process.

If a record's access level is either 1 or 3, as shown in Table 4.3.1-1:

- Processing of that record is not complete
- The record could change.

Decisions should not be based on records with access level of 1 or 3.

If the record's access level is either 7 or 9, the processing of the record is complete (i.e., all anticipated review processes are complete). It is still possible for the record to change as a result of an unanticipated review. For most records that would change based on a review, a change record is generated as part of making the change. Section 4.3.5 describes how the change record process works and how to examine the previous record(s).

NOTE: Even a record with an Access Level of 7 or 9 may not be usable for your purposes. Examine the data quality flags stored in either the Qualifiers or the Review Flags fields to determine if this data record is usable for your purposes.

Determining how information about the quality of the data should be recorded in HEIS is still under consideration. The revised database structures made available in January 1994 provide additional fields to record aspects of data quality. Because these fields have just become available, most do not yet contain data. Major changes in the data will occur as these fields are used by the various programs.

Table 4.3.1-1. Meaning of the Access Level Field.

Access Level	Meaning
1	Raw data: accuracy of data entry has not been checked.
3	Verified: accuracy of data entry has been checked.
7	Data quality determined using historical standards.
9	Data quality determined using current standards.

4.3.2 GENERIC INFORMATION FOR LOCATION RECORDS

Location records store information about the place where samples were taken. To minimize data storage, locations are recorded once for each sampling location rather than once for each sample taken.

The Location subject area stores information about a location in three possible forms. These are (1) N/S and E/W coordinates recorded using the NAD83 or NAD83/91 adjusted standard, (2) a pair of coordinates using another standard, and (3) an area or a point that may or may not have known coordinates but has a descriptive location (e.g., the Smith farm north of Pasco, the Richland water intake). This area or point is known as a sampling site.

The type of location description determines how the locational data are stored. Table 4.3.2-1 lists the types of location records and their storage methods.

Each location is identified by a Point Identifier Type (whether it is a well, atmospheric station, etc.) and the Point Identifier (the unique identifier for that type of structure, e.g., the well name for a well).

Table 4.3.2-1. Types of Locations and Their Storage Methods.

Type of Location	Point Identifier Type	Storage Method
Well	WELL	Identified in the Well table. The location (known coordinates) is stored in the Entity Point Location table using the Well name as the Point Identifier.
Grab Sample	BIOTA_SAMPLE SOIL_SAMPLE SW_SAMPLE	Identified in the appropriate subject area sample record. The location (known coordinates) is stored in either the Entity Point Location or the Other Coordinate Location tables using the Sample Number as the Point Identifier.
Sampling Site	AM_STATION AREA NAMED_POINT	Identified in the Sampling Site table as either an area, a named point, or an atmospheric station. If the sampling site has a point that is representative (chosen by the owner of the sampling site), the location of this point can be entered in the Entity Point Location table using the Sampling Site ID as the Point Identifier. In this case, the point in the Entity Point Location table could be used by the GIS (or other geographical display methods) to display data collected at a Sampling Site.

4.3.3 GENERIC INFORMATION FOR SAMPLE RECORDS

COMPOSITE FLAG and COMPOSITE SAMPLE NUMBER

Overview To reduce the cost of laboratory analysis for samples, multiple samples are combined and the composite sample is sent to the laboratory. For instance, routine monitoring of water fowl involves capturing several animals and compositing to create a single sample that is sent to the laboratory for analysis.

Requirement To create a composite sample, assign a sample number to the composite sample and set the Composite Flag to "Y".

To indicate that a sample was included in a composite, leave the Composite Flag blank and put the sample number of the composite sample in the Composite Sample Number field.

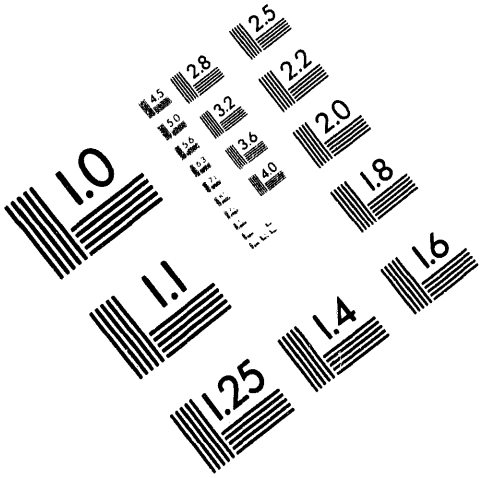
RELATED SAMPLE NUMBER, RELATED SAMPLE TYPE, and MASTER SAMPLE NUMBER

Overview Related samples are often collected. For example, to check the performance of an analysis laboratory, replicate samples could be taken or the sample could be split and the two parts sent to different labs. For tests such as bacteria level, where field contamination may influence the results, replicate samples are often taken. Depending on the well to be sampled, both filtered and unfiltered samples could be necessary to obtain the full spectrum of results. If both filtered and unfiltered samples are taken, they are related by an association between the two samples.

The Related Sample Type describes the relationship between the current sample and the sample identified by the Related Sample Number. The valid related samples types are listed below.

R	Replicate; one of several equivalent samples.
A	Associated; related, but not equivalent to the named sample.
S	Split; sample was split after collection.

The Related Sample Number identifies the sample to which the current one is related. For replicate samples, one sample is chosen as the sample number to which all replicates will be related. For split samples, one sample



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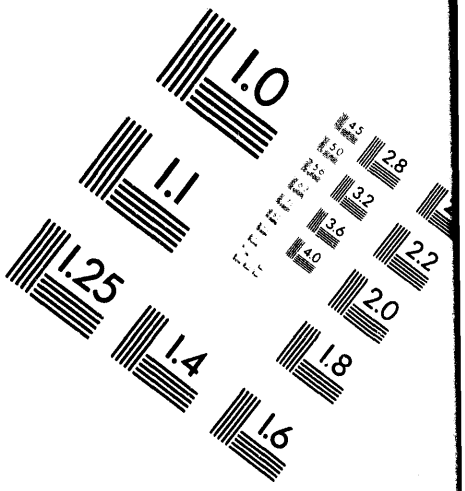

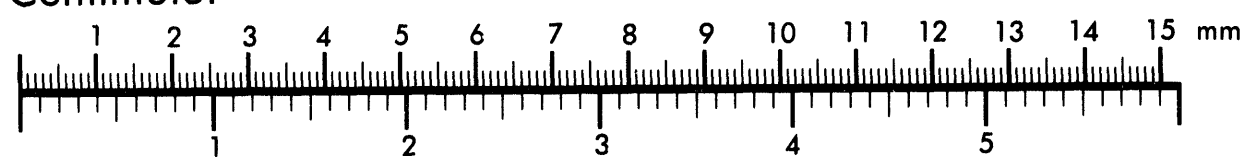

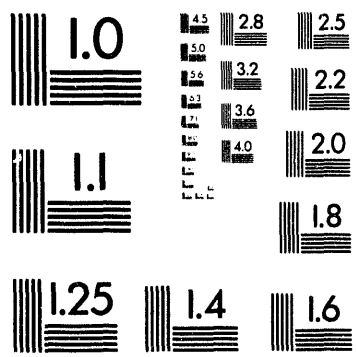

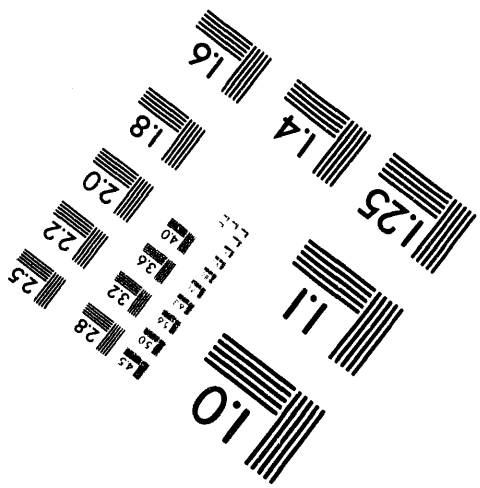

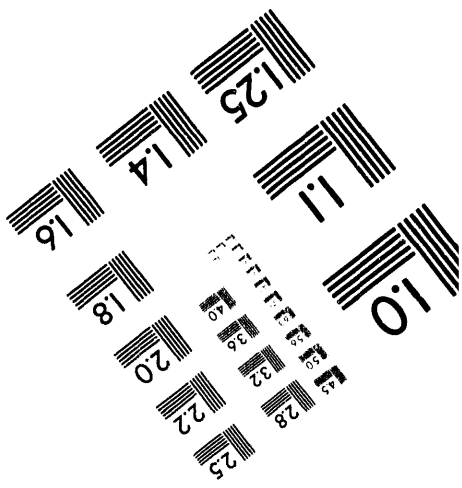

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is chosen as the sample number to which the other split will be related. For associated samples, one sample is chosen and the other sample(s) are associated to it.

The Master Sample Flag identifies the top of the relationship hierarchy. For many cases, such as a simple set of replicates, there is only one relationship, and identification of the top of the hierarchy is obvious (note that it still needs to be recorded in the HEIS database).

It is possible to build a complex tree of related samples. Consider the case where both filtered and unfiltered samples are collected, the unfiltered sampling includes replicates, and the filtered sample is split after collection. There are three relationships to be recorded here: the association of filtered and unfiltered, the replicates, and the split. Figure 4.3.3-1 describes one way to record the relationship. Table 4.3.3-1 shows how to record this organization in the HEIS database. The Master Sample Flag describes the top of this tree (in this example, one of the unfiltered samples).

Figure 4.3.3-1. Related Samples.

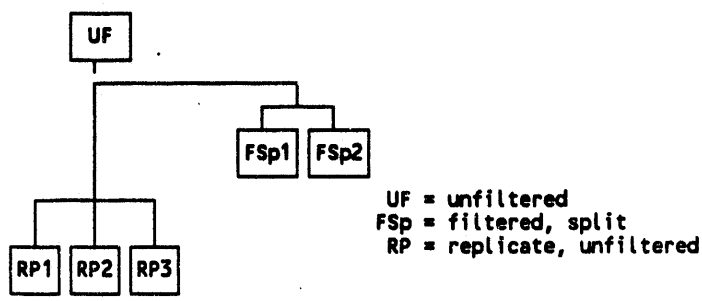


Table 4.3.3-1. Related Samples Organization.

Sample Number	Related Type	Sample Number	Master Sample Flag
UF			Y
RP1	R	UF	
RP2	R	UF	
RP3	R	UF	
FSp1	A	UF	
FSp2	S	FSp1	

Requirements

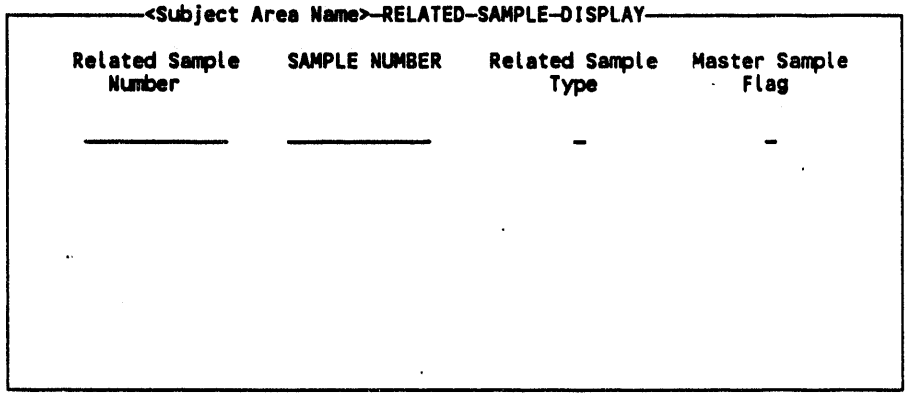
Related Sample Type and Related Sample Number are always paired; record both or leave both blank. The Related Sample Number must exist in the same subject area sample table as the Sample Number (i.e., related samples must represent the same type of sample).

The Master Sample Flag records the top of a hierarchical structure of samples. Specifying a Master Sample Flag requires that both Related Sample Type and Related Sample Number be blank.

Examining Related Samples

In the More Information box at the bottom of the form, each subject area sample form provides access to the Related Sample Display form (see Figure 4.3.3-2). The form queries all samples related to the given sample number (specified in the Sample Number field of the subject area sample form). You may clear the screen and enter a query of your choice.

Figure 4.3.3-2. Related Sample Display Form.



SAMPLE NUMBER

When data for a sample are inserted into HEIS using a subject area Sample form, such as Soil Sample or Biota Sample, the associated Sample record is modified/inserted by some special processing that occurs within the system at the time the record is stored in the database. This processing includes setting or changing the "Status" to "U" for "Used," and the "Media" to the appropriate code for the record being created. In addition, the following special handling is done depending on the type of sample number:

- For system-generated sample numbers provided on the hardcopy form, the software attempts to find the sample number in the Sample table. If the sample number is found and is available for use, the Sample record is modified by copying Owner ID and Access Level from the current screen into the Sample record.

- For non-system generated sample numbers, the software verifies that this sample number has not been entered previously into the Sample table. If the sample number is not found in the Sample table, a new record is entered in the Sample table for this number with the Generation Date set to the current date and Owner ID and Access Level copied from the current form into the Sample record.

- When the sample number has not been provided on the hardcopy forms, the user may cause the form to create a new, unique sample number and insert it into the record currently being entered (e.g., the Soil Sample record). The Assigned By field is filled with the name of the current form (e.g., Ground-Water Sample), and the Assigned To field is filled with the value of the Owner ID field of the current record. The Owner ID and Access Level are copied from the current screen to the Sample record. The Assigned Date and Generation Date are set to the current date.

4.3.4 GENERIC INFORMATION FOR RESULT RECORDS

CONSTITUENT COMMENT

Overview

A Constituent Comment is a coded comment obtained from the analysis laboratory. The comment may apply to the sample (e.g., "improper preservation"), the analysis (e.g., "orange solution formed when adding reagent") or the specific result (e.g., "result is estimated due to interference").

Constituent Comments are multicharacter codes and are specific to the laboratory reporting them. Each comment is delimited by an single ampersand (&), with no leading or trailing blanks.

Requirement

A Constituent Comment(s) may or may not be included in the record. If a single comment is included, the meaning will be translated in the associated translation field. If multiple comments are reported, the phrase "Multiple comments defined" appears in the translation field.

Code Lookup

A code lookup is provided that shows the code, the lab it applies to, and the translation of the code. If you specify a Lab Code, you will see only codes appropriate for that analysis laboratory.

DATE RESTRICTIONS

Overview

Date restrictions are validated by the system when a result record is inserted.

Requirements

For Result tables that have Sample Date/Time On and Sample Date/Time Off fields:

- Sample Date/Time On must be earlier than or equal to ($\leq$) all of the fields shown in Table 4.3.4-1 except for Load Date. Sample Date/Time On must be earlier than Load Date.
- Sample Date/Time Off follows the same restrictions as Sample Date/Time, as shown in Table 4.3.4-1.

Table 4.3.4-1. Date Restrictions in Result Tables.

	Sample Date/ Time	Lab Received Date	Lab Extracted Date	Analysis Date/ Time	Result Received Date	Load Date/ Time
Sample Date/Time	--	<=	<=	<=	<=	<
Lab Received Date	=>	--	<=	<=	<=	<
Lab Extracted Date	=>	=>	--	<=	<=	<
Analysis Date/Time	=>	=>	=>	--	<=	<
Result Received Date	=>	=>	=>	=>	--	<
Load Date/Time	>	>	>	>	>	--

FORMAT TYPE and FORM NUMBER

Overview

Format Type designates the style of data reporting required in the contract between the sampling organization and the analysis laboratory. HEIS currently supports two format types associated with specific electronic data deliverables and a third format type that allows the entry of miscellaneous data (historical records; data collected in the field, such as water temperature; and data for which a specific electronic data deliverable format was not specified in the lab's contract). The format types in current use are listed below.

- Contract Laboratory Program (CLP) - for data analyzed and reported using the U.S. Environmental Protection Agency (EPA) CLP protocol.
- Laboratory Analytical Services (LAS) - for data analyzed and reported under the LAS electronic deliverable format.
- Non-CLP (NCLP) - for entering miscellaneous data (historical data, field data, data reported not using one of the previously specified electronic data deliverable formats).

Currently, each format type is associated with several form numbers (see the online documentation for the most current data). A form number identifies a specific electronic deliverable format related to the type of constituents being reported. For example, there are form numbers for inorganic chemistry, organic chemistry (including the distinction between volatile and semivolatile constituents), and

radiological constituents. The current association between format types and form numbers is listed in Table 4.3.4-2.

Table 4.3.4-2. Format Type/Form Number Association.

Format Type	Form Number
CLP	1A, 1B, 1C, 1D, 1E, 1F, and I
LAS	A, B, C, D, E, F, I and R
NCLP	NA

Requirement

Each result record is required to have both a Format Type and a Form Number, and the pairing must be as described in Table 4.3.4-2.

Code Lookup

If you specify a Format Type and then use the code lookup feature in the Form Number field, you will see only the Form Number(s) appropriate for the specified Format Type. If you do not enter the Format Type and do a code lookup on the Form Number field, you will see all possible Form Numbers.

QUALIFIERS

Overview

One or more data qualifiers can be supplied by the laboratory performing the analysis and/or by the person validating the results (some lab results come back with no qualifiers provided by the lab). Data qualifiers provide additional information about the quality of the analytical result. For example, for CLP data, the "R" qualifier identifies the data as unusable.

Data qualifiers are one- or two-letter codes entered in the Qualifiers field (with no delimiters). Qualifiers supplied by the laboratory can be overwritten by those provided by the validation process. For instance, the definition of the "B" qualifier for organic constituents indicates that it should be replaced by the "J" qualifier during the validation process.

The qualifiers used depend on both the Format Type and Form Number. Generally, each Format Type has its own qualifiers broken into multiple groupings. Typically,

there is a set of qualifiers for organic chemistry, inorganic chemistry, and radiological results. Appendix B of the *HEIS Subject Area Reference Manual* (DOE-RL 1994c) lists the qualifiers for all three Format Types and the associated Form Numbers.

WARNING -- The letters used to identify qualifiers can be used by more than one Format Type and/or Form Number. The meaning of the qualifier under different Format Types and/or Form Numbers may be drastically different. For instance, two definitions for the "B" qualifier are as follows:

- For CLP Organics (forms 1A, 1B, 1C, 1D, 1E, 1F) - The analyte is found in the associated blank as well as in the sample. It indicates possible contamination of the blank and warns the data user to take appropriate action. Should be replaced by a "J" during validation.

- For CLP Inorganics (form I) - The reported value is less than the contract-required quantitation limit but is greater than the instrumentation detection limit. Should be replaced by a "J" during data validation.

A second, less extreme example is the "J" qualifier for CLP Organics versus CLP Inorganics. Refer to appendix B of the *HEIS Subject Area Reference Manual* for the definitions of the "J" qualifiers.

Requirement

A result record may or may not have qualifiers. The only limits on qualifiers are that there are no duplicates and that each qualifier exists in the collective list of valid qualifiers.

Code Lookup

The code lookup currently lists all valid qualifiers independent of the specified Format Type and Form Number.

REVIEW FLAG

Overview

One or more Review Flags can be supplied by the data owners. Review Flags provide additional information about the usability of the analytical result. Typically, the Review Flag signifies information about the result or sample in relation to other significant events related to the sample. Significant events include associated blanks (samples designed to detect

contamination) and events associated with the structure or area to be sampled (e.g., potential contamination during drilling of a well).

Each Review Flag is a one-letter code. Review Flags are entered in the field with no delimiters.

A set of one or more coded values indicate that the quality of the result is or was in question by the validator. Currently the valid codes include the following (see the online documentation for the most up-to-date list):

P A potential problem exists. Some circumstance surrounding the collection or analysis of the sample puts the quality of the value in question (e.g., contamination of the well occurred during installation).

Q Associated quality control sample is out of limits.

H Laboratory holding time was exceeded before the sample was analyzed.

F The result is undergoing further review. A validator or user observed an anomalous value and has submitted a request for further review of the sample. All "F" flags are eventually converted to "G," "R," or "Y" flags.

G Further review of the analysis result indicates that the result is valid.

R Further review of the analysis result indicates that the result is not valid and should not be used for any evaluation.

Y Further review of the analysis result was inconclusive. The result continues to be suspect because the review found insufficient evidence that the result was either valid or invalid.

Z Miscellaneous circumstance exists that is described in the project file associated with the sample.

Requirement

A result record may or may not have Review Flags. The only limits on Review Flags are that there are no duplicates and that each Review Flag exists in the list of valid Review Flags.

In the future, the flags will be checked for inconsistency. For example, when this feature is updated, using "F" with "G," "R," or "Y" will cause an error message to appear.

Code Lookup A simple code lookup listing all codes is provided.

SCIENTIFIC NOTATION

Overview The following fields are displayed in scientific notation (e.g., 1234.567 displays as 1.234567e+03).

- Counting Error
- Min Detectable Activity
- Total Analytical Error
- Total Error
- Uncertainty Value
- Value Reported

Requirement Enter the values in standard floating point (e.g., 1234.567) or in scientific notation. The value will be redisplayed in scientific notation.

4.3.5 GENERIC INFORMATION FOR CHANGE RECORDS

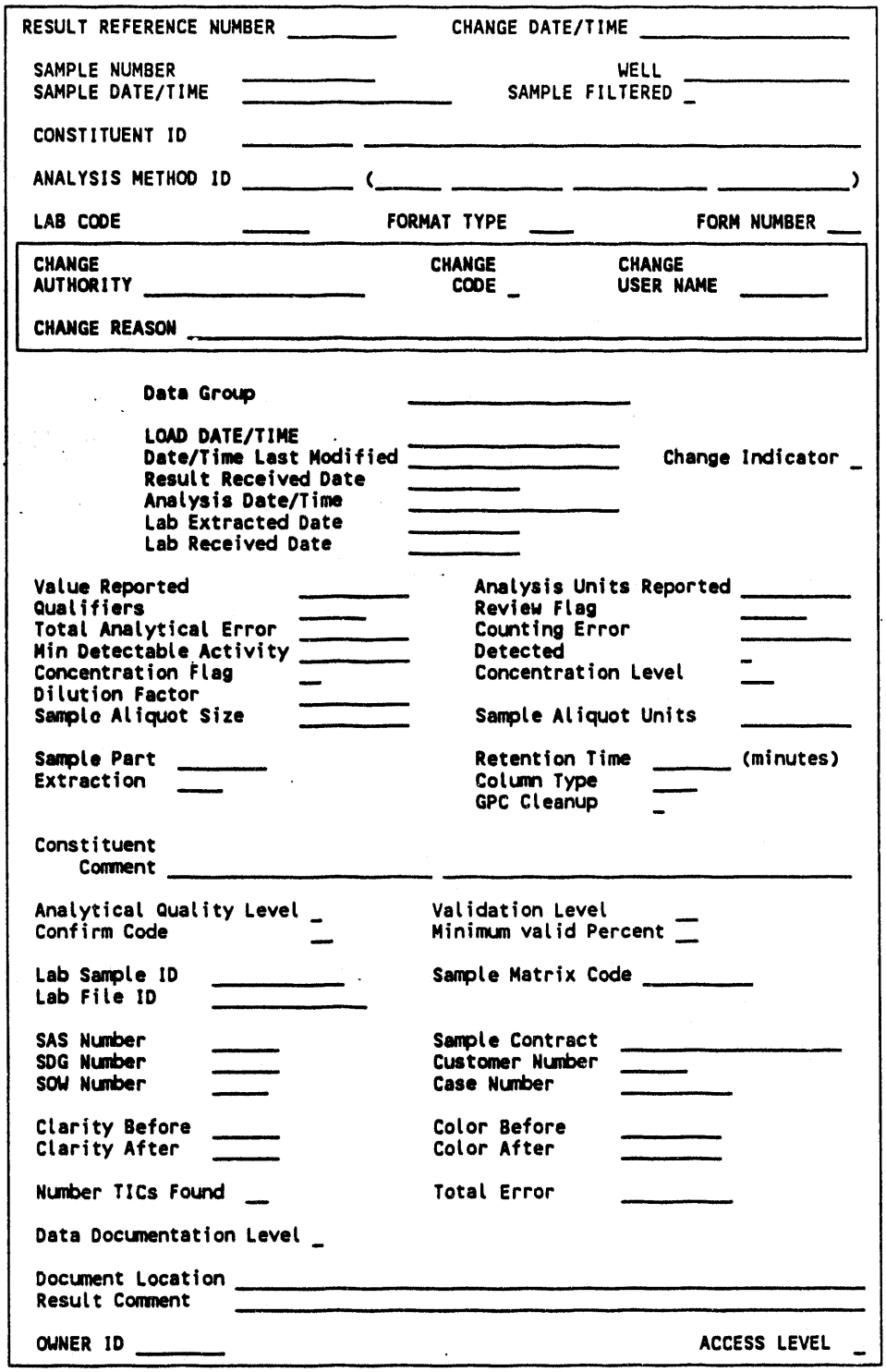
Change records are a time-stamped historical record of changes (both modifications and deletions) made to the associated record. In addition, the reason for the change, the change authority (the computer project account from which the change was made) and user name (who made the change), the change code (modify or delete), and the date/time of change also are stored. Figure 4.3.5-1 is a sample change record form for an analytical result record.

Change records are maintained for the following types of data:

- All result records
- Well and Well Elevation records
- Hydraulic Head records
- Sampling Site and Entity Point Location records.

When a record with an associated change table is modified or deleted, a change record is automatically generated. As part of making the change, the person making the modification is automatically prompted for a Change Reason (required field). For modifications, the Change Indicator field is set to "Y", and if the Date/Time Last Modified field exists, it is set to the current date and time. A blank Change Indicator field indicates a record that has not been changed. Deleted records are no longer visible in the table (e.g., the result table or the Well table), but the state before the deletion is recorded in the associated change record.

Figure 4.3.5-1. Example of a Change Record.



RESULT REFERENCE NUMBER _____ CHANGE DATE/TIME _____

SAMPLE NUMBER _____ WELL _____
SAMPLE DATE/TIME _____ SAMPLE FILTERED _

CONSTITUENT ID _____ _____

ANALYSIS METHOD ID _____ (_____ _____ _____ _____)

LAB CODE _____ FORMAT TYPE ___ FORM NUMBER __

CHANGE AUTHORITY _____ CHANGE CODE _ CHANGE USER NAME _____

CHANGE REASON _____

Data Group _____

LOAD DATE/TIME _____
Date/Time Last Modified _____ Change Indicator _
Result Received Date _____
Analysis Date/Time _____
Lab Extracted Date _____
Lab Received Date _____

Value Reported _____ Analysis Units Reported _____
Qualifiers _____ Review Flag _____
Total Analytical Error _____ Counting Error _____
Min Detectable Activity _____ Detected _
Concentration Flag __ Concentration Level __
Dilution Factor _____
Sample Aliquot Size _____ Sample Aliquot Units _____

Sample Part _____ Retention Time _____ (minutes)
Extraction ___ Column Type ___
GPC Cleanup _

Constituent Comment _____ _____

Analytical Quality Level _ Validation Level __
Confirm Code __ Minimum valid Percent __

Lab Sample ID _____ Sample Matrix Code _____
Lab File ID _____

SAS Number _____ Sample Contract _____
SDG Number _____ Customer Number _____
SOW Number _____ Case Number _____

Clarity Before _____ Color Before _____
Clarity After _____ Color After _____

Number TICs Found __ Total Error _____

Data Documentation Level _

Document Location _____
Result Comment _____

OWNER ID _____ ACCESS LEVEL _

5.0 USING THE HEIS QUERY-BY-FORM INTERFACE

INTRODUCTION

This chapter describes how to use the HEIS query-by-form interface. Instructions are provided for accessing the interface, using the menus to select forms on which to view data, preparing queries, and choosing alternatives for viewing the data. Specifically, the chapter includes the following:

- Using the menus
- Following the linkages between forms
- Form style, standards and structure
- Using basic, key-stroke-by-key-stroke operation of the interface
- Using online assistance, including code lookups and help for fields, forms, tables, and menus
- Developing a query
- Alternatives to displaying selected data on your screen.

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5.1 ACCESSING THE HEIS USER INTERFACE

INTRODUCTION

The steps for using the query-by-form interface are as follows. They are described in detail in Section 3.2.

- Log on to the HEIS Sequent.
- Type **sp** to open the project account.
- Type **keyboard** to establish key mappings.
- Type **heis** to start the query-by-form interface.

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5.2 USING THE HEIS MENUS

INTRODUCTION

Once you have logged on to the HEIS Sequent and started the HEIS interface, the main HEIS menu appears on the screen. It provides access to the major areas of HEIS. An example is shown in Figure 5.2-1. This example might not match the main menu that appears on your screen. Your main menu depends on your project's database access.

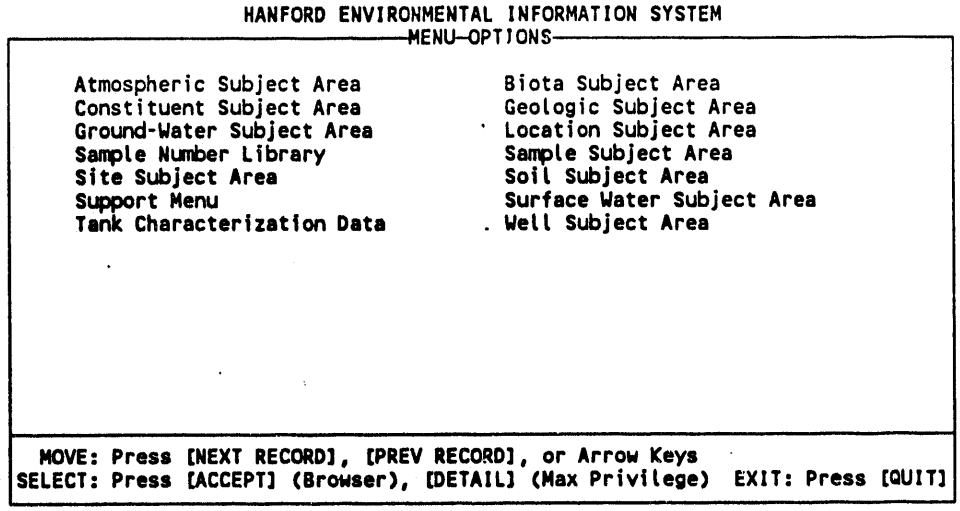
In this menu system, move the cursor to indicate the desired option. Use [NEXT RECORD], [PREVIOUS RECORD] or the arrow keys to do this. To locate the proper keys for your terminal, follow the instructions on the lower right of your screen (for the Kermit emulator this says "[ESC]k for keyboard help"). Section 5.4.2 describes using keyboard help. You may also consult the key associations in Appendix A.

To choose a menu item, press [ACCEPT] ~~or [DETAIL]~~.

To obtain help for the menu item, press [HELP]. See Section 5.4.3 for a detailed description of available help.

To exit the menu press [QUIT].

Figure 5.2-1. HEIS Main Menu.



5.3 ACCESSING HEIS DATA

INTRODUCTION

The HEIS query-by-form interface uses "entry points" to access HEIS data. An entry point is a place in the overall set of forms for a subject area where you can logically enter to perform a desired function.

NAVIGATION

The entry point you choose from the HEIS main menu (see Figure 5.2-1) determines which subject area or form you will be able to access. For some subject areas, a chain of forms encompasses many of the tables shown in that subject area's data model. For example, in the Location subject area, the Sampling Site entry point allows you to access the forms for Sampling Site, Sampling Site Change View, Sampling Site Change Update, Entity Point Location, Entity Point Location Change View, and Entity Point Location Change Update.

The Location menu, presented in Figure 5.3-1, shows all the entry points into the Location forms. Figure 5.3-2 is a diagram of how these and other forms are connected. On this diagram, each labelled box is a form on the Location menu. In general, most, but not all forms are accessible from a subject area's menu. In Figure 5.3-3, which shows the entry points for subject areas containing analytical result tables, such as GW Result or Biota Result, the Related Sample Number Display form is not accessible from the menu.

Starting at any entry point, you may navigate as shown in Figures 5.3-2 and 5.3-3 following the lines (generally this is downward or to the right, but lines with a caret [^] at the top indicate ability to move upward). At any time you may retrace your steps to the entry point where you started. Navigating up from an entry point (following lines not marked with ^) is not available. An entry point with no connecting lines indicates a single form that is accessible only from the menu.

To navigate, examine the labelling on the line.

- "More" -- Move to the More Information box on the bottom of the current form. Move the cursor to the form you want and press [DETAIL]. The new form appears on your screen. Figure 5.3-4 shows the Sampling Site form. Using the More Information box, you can navigate to either the Entity Point Location form or the Sampling Site Change View form.

- Change Reason, Sample Number, or any other field name -- Move the cursor to the named field and press [DETAIL]. The new form appears on your screen.

To navigate back up the path you created, press [QUIT] to return to the previous form.

One additional restriction exists. You may not access the same form twice as you move along your access path. In the entry points shown in Figure 5.3-3, you may access the <media> Result from the <media> Sample, but you may not use [DETAIL] in the Sample Number field to access the <media> Sample form again. If you attempt this access, the system just beeps. Similarly, you may access the <media> Sample from the <media> Result by pressing [DETAIL] in the Sample Number field but if you do, you may not access the <media> Result by using the More Information box choice.

Figure 5.3-1. The Location Menu.

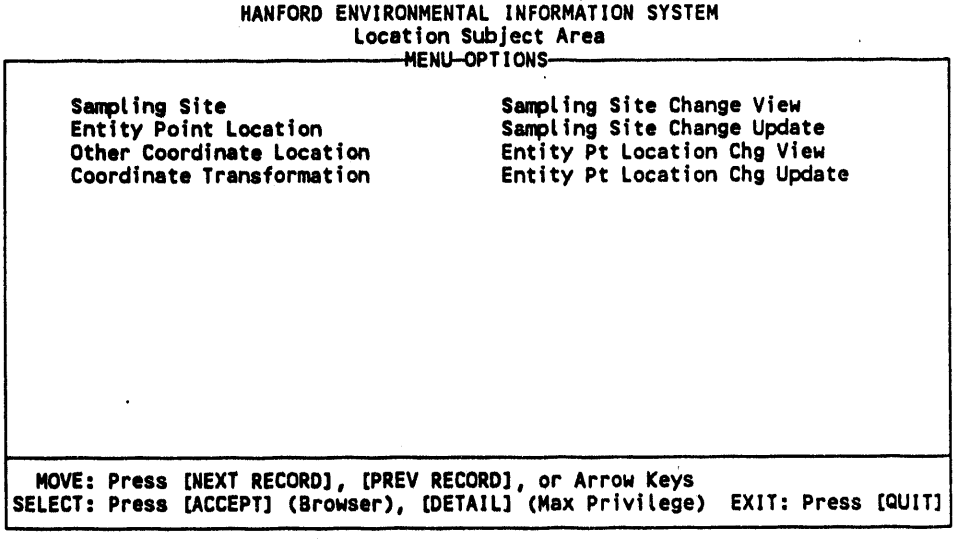


Figure 5.3-2. Map of Location Entry Points.

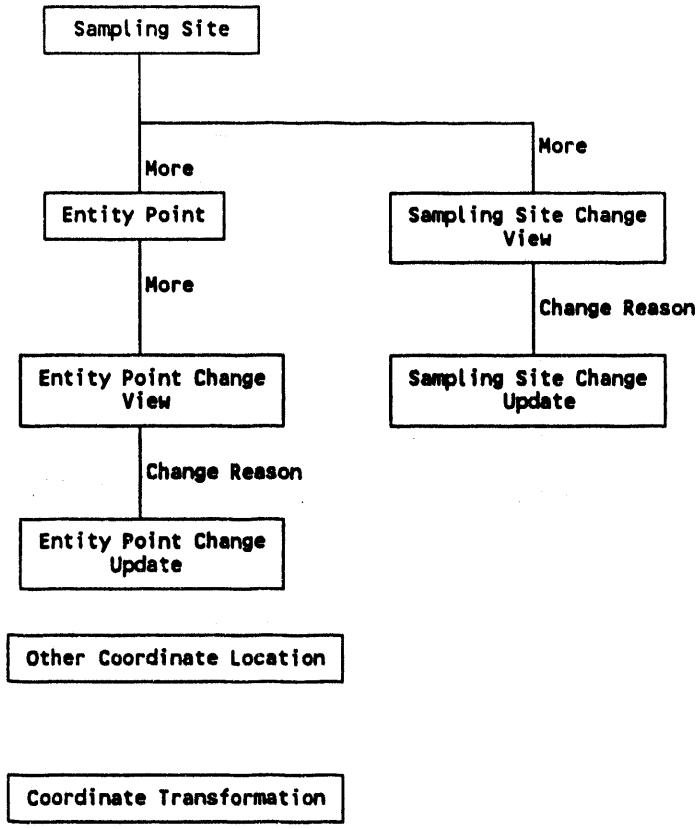


Figure 5.3-3. Sample Entry Point Diagram for a Subject Area Where Loops in Form Access Are Shown.

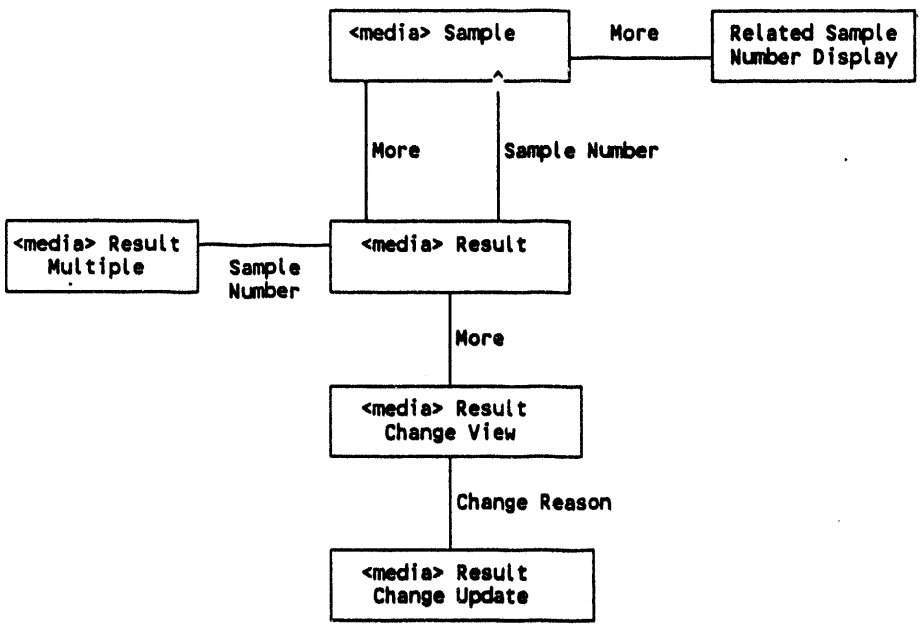
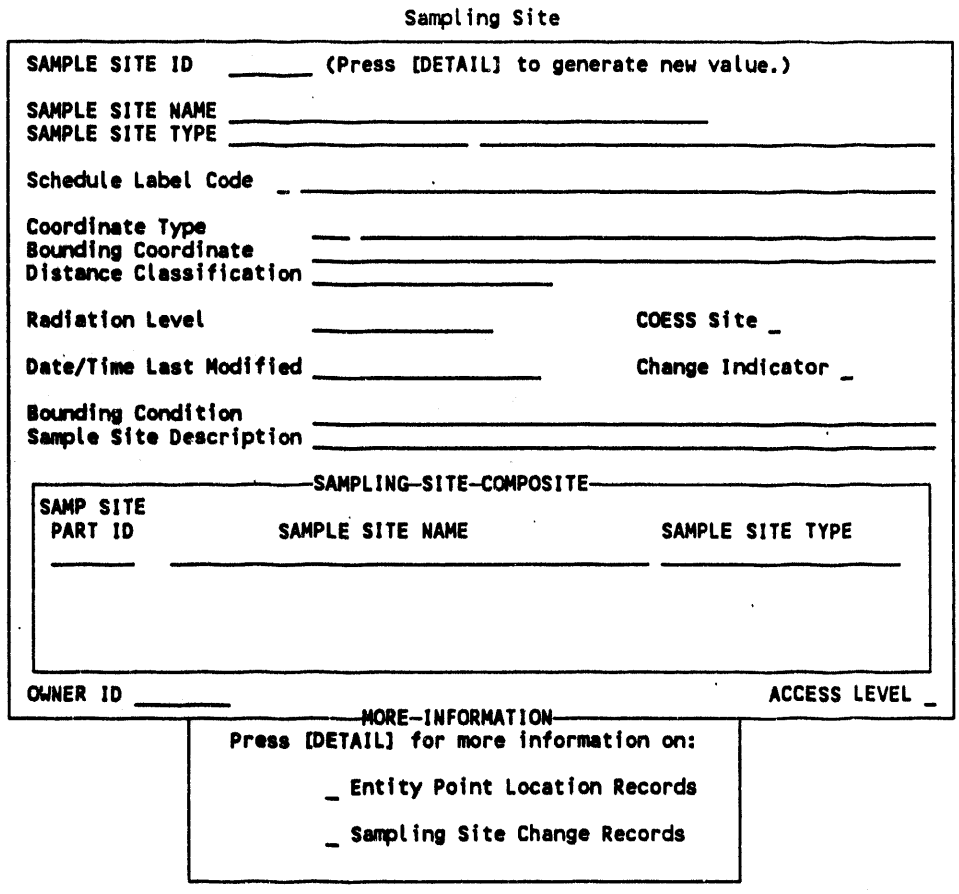


Figure 5.3-4. Form Showing How the More Information Box is Used for Navigating Between Boxes on the Entry Point Diagram.



HOW DATA RETRIEVAL IS HANDLED

As you move from form to form using either the More Information box choices or pressing [DETAIL] in the named fields, data retrieval is treated in one of the following ways:

- If you performed a retrieval on the current form, data in related records are retrieved on the form you are navigating to. For instance, if you are positioned on the Sampling Site form and have done a query, using the More Information box choice for Sampling Site Change records will result in taking the currently visible Sample Site ID, retrieving the Sampling Site Change records for that Sample Site ID, and displaying the first such record on the Sample Site Change View form.

- If you have not performed a query, that is, the screen is blank, the form you navigate to will come up blank also.

At any time, you may clear the form and perform a query of your choice.

As you navigate back up the path you created, the record(s) that were visible as you navigated from the form will reappear.

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5.4 USING THE HEIS FORMS

5.4.1 STYLES, STANDARDS, AND STRUCTURE

FORM STYLES

The HEIS query-by-form interface uses three general form styles.

- One-record-at-a-time forms show all fields for a table when the number of fields is too large to show each field in a columnar arrangement.

  One-record-at-a-time forms show all of the fields for a table and, in addition, may show key information from other related records. The Laboratory Contractual Limit and Regulatory Limit forms in the Constituent subject area are examples. These forms show a full record at the top of the form and, in a display-only box, show the limit begin and end dates for related records.

- Multiple-record forms are used in two contexts:

  - As the primary form if the number of fields is small enough so several copies can fit on a single screen. Several of the forms in the Support subject area are examples.

  - As view-only forms, which show only important information from a table with many more fields. The "xxx Result - Multiple" form described in any analytical results area (e.g., Atmospheric, Biota, Ground-Water, Surface Water, or Soil) is an example.

- Multiple-table forms show data from more than one table. The Sampling Site and Sampling Site Composite form described in the HEIS Location subject area is an example.

FORM STANDARDS

HEIS forms are designed to provide immediate information. The following standards have been used:

- Fields required for data entry are labelled in upper case. Generally, these fields appear at the top of the section for a specific table (if the form contains more than one table).

  The fields at the top of the section are ordered in the following manner:

  - The fields comprising the unique identifier for the record. These fields are in order from the most general to the most specific.

  - Other required field(s).

  The Owner ID and Access Level fields appear at the bottom of the section for the table. These fields are automatically filled.

- Fields on each form have been grouped into logical groups. Groups are separated by blank lines.

- Groups of fields are ordered in descending order of importance. The required fields (except Access Level and Owner ID) are at the top, frequently examined fields next, and so on.

- Fields containing textual comments, such as result comments or documentation location, are at the bottom of the form.

FORM STRUCTURE

The form is composed of 3 parts: the body, the status line, and the interface activity line. Figure 5.4.1-1 is a form showing these parts.

- The body contains the fields that you are entering data into or querying data with.

  - Optionally, a More Information box is provided. Fields in this box allow you to directly display a related form.

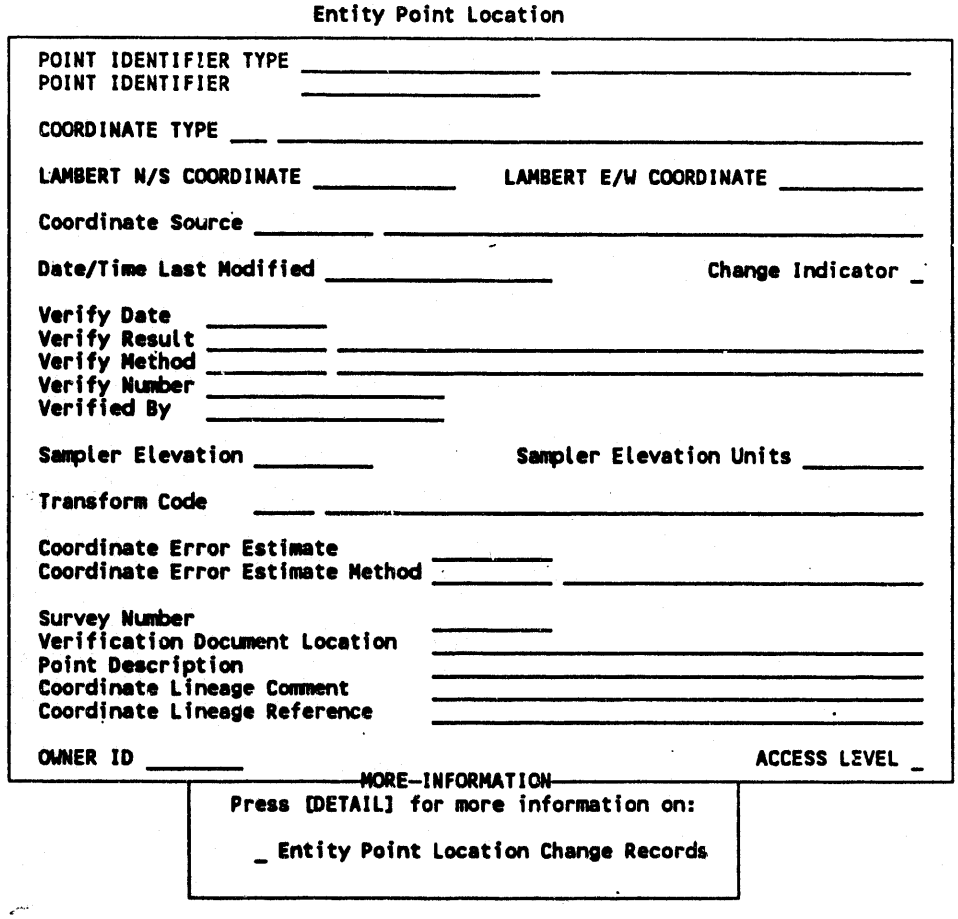
- The status line is the second-to-the-last line and provides three pieces of information. If the HEIS form is longer than the computer screen, the status line will be visible only if you scroll to the bottom of the HEIS form.

  - The "HEIS version: nnn" gives the version number for the HEIS software.

  - The center of the form identifies what privilege you have to the current tables.

  - The right side of the form indicates how to access online help for key bindings. Press xxx for keyboard help (xxx is dependent on the terminal emulator you chose).

Figure 5.4.1-1. Sample HEIS Form Showing Form Structure.



- The interface activity line is the last line of the screen and is always visible. At the beginning of a session, copyright information is displayed there. When you are actively accessing the database (e.g., performing a query or storing records), the "**busy*" flashes at the right end of this line. Any system message is displayed on this line. When the cursor is on this line, you must respond to the message before continuing with the form. Enter your response and press [RETURN].

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5.4.2 BASIC FORM OPERATION

INTRODUCTION

This section discusses key notation, form access, and navigation as well as unique form features such as default values, special characters, and date fields. Key notation and navigation are discussed first; all other items are listed alphabetically.

KEY NOTATIONS

Pressing certain keys will move the cursor, enter and modify data, transmit the data to the HEIS database, or execute commands. These keys are called function keys because they carry out functions of the software.

Because HEIS software runs on many different terminals (or personal computers with terminal emulators), a function such as [PREVIOUS FIELD] may not be represented by the same key on all keyboards. To make HEIS manuals usable from any keyboard, functions are specified as [FUNCTION KEY] (i.e., the name of the function to be accomplished, enclosed in brackets).

See Table 5.4.2-1 for a description of all the function keys. The association between [FUNCTION KEY] and the key for a particular keyboard is provided in Appendix A. Copies of function key templates are also included.

NAVIGATION

Moving the Cursor

The arrow keys move the cursor, which moves through the fields and empty form areas. To move from field to field, use [NEXT FIELD] to move forward and [PREVIOUS FIELD] to move backward. Sometimes, particularly in the required fields for the table, pressing the [PREVIOUS FIELD] key causes the cursor to move back more than one field (this is a feature of the interface and cannot be changed). If this happens, press [NEXT FIELD] to move to the desired field.

The arrow keys move the cursor one line up or down and one character right or left. The "fast" arrows ([GOLD]arrow) move the cursor 8 lines up or down and 8 characters right or left.

Table 5.4.2-1. Function Key Definitions.
(sheet 1 of 3)

Function	Description
[ACCEPT]	Provides several functions that move you up to the next higher level of function. • Exits the current form and saves your changes, returning you to the previous form (or menu). The question "Do you want to save changes (Y(es), N(o), C(ancel))" appears. Answer Y to save the data, N to not save the data, and C to return to the form. • Accepts the current menu choice, providing view-only access to the chosen form. • Exits a zoom window and saves your changes. • Exits a code lookup window and returns the chosen code.
[ADD RECORD]	Makes space on the current form to allow you to enter a new record. On a "multiple-record" form, the row below the cursor position is opened. On a "one-record-at-a-time" form, the form clears. NOTE: Your previous record is still saved; it is simply not visible.
[BACKSPACE]	Removes the character preceding the cursor and moves the cursor back one character.
[CLEAR]	Clears data from all fields on the form. See "Clearing the Form" in this section for an explanation.
[COUNT RECORDS]	Reports the number of records that match the query criteria.
[DELETE CHAR]	Removes the current character.
[DETAIL]	Provides several functions that operate to show the next lower level of fact(s). • Access to a code lookup list • Access to the next form in the series (the map of entry points for the subject area provides documentation for how the forms are connected): - A form for a table below the current one - A form for the same table but with more fields visible - A form for the same table but with the ability to update data (if the original form was view only).
[DOWN ARROW]	Moves the cursor down one line on the form. It does not follow fields; it moves through the form. Trying to move down beyond the bottom of the form results in a beep.
[FAST ARROWS]	"Fast" arrows move the cursor 8 lines up or down and 8 characters right or left (regular arrow keys move the cursor one line up or down and one character right or left).
[HELP]	Displays the definition of the field and makes further help functions available.
[INSERT/ OVERSTRIKE]	Toggles the typing mode from insert to overstrike (overwrite characters). The new mode ("Insert (o)" or "Overstrike") appears on the interface activity line until the next character is typed.
[INSERT RECORD]	Makes space on the current form to allow you to enter a new record. On a "multiple-record" form, the row above the cursor position is opened. On a "one-record-at-a-time" form, the form clears. NOTE: Your previous record is still saved; it is simply not visible.
[KEYBOARD HELP]	Displays the online help for keystrokes.
[LEFT ARROW]	Moves the cursor one character position to the left. It moves through the form. Trying to move left of the first column of the form results in a beep.
[MESSAGE FRAME]	Displays all messages that were generated. To examine, start at the bottom of the message frame.
[NEXT FIELD]	Moves the cursor to the next field in the order established when the form was developed (generally left to right and top to bottom). Attempting to use [NEXT FIELD] to move from the last field on the form causes the terminal to beep.

Table 5.4.2-1. Function Key Definitions.
(sheet 2 of 3)

Function	Description
[NEXT PAGE]	Displays the next page of records. The first use moves the cursor from its current position to the last record on the form. Subsequent use displays the next full form of records.
[NEXT RECORD]	Obtains the next record from the database and displays it on the current form. If the form shows multiple records, the records may scroll.
[PREVIOUS FIELD]	Moves the cursor to the previous field in the order established when the form was developed (generally left to right and top to bottom). Attempting to move out of the first field on the form results in no movement of the cursor. Sometimes, particularly in the required fields for the table, pressing the [PREVIOUS FIELD] key causes the cursor to move back more than one field (this is a feature of the interface and cannot be changed). If this happens, press [NEXT FIELD] to move to the desired field.
[PREVIOUS PAGE]	Displays the previous page of records. The first use moves the cursor from its current position to the first record on the form. Subsequent use displays the previous full form of records.
[PREVIOUS RECORD]	Obtains the previous record from the database and displays it on the current form. If the current form contains multiple records, the records may scroll.
[PRINT]	A copy of the screen or form contents is placed in a file on the HEIS Sequent. The name of the file is generated automatically by the system. The generated name is the name of the form (an abbreviation of the obvious name) with the extension ".pnn" (the extension starts as ".p00" and then ".p01" if multiple print files for a form exist). The file is in the current directory.
[QUIT]	Provides several functions that move you up to the next higher level of function. • Exits the current form but does not save your changes, returning you to the previous form (or menu). The question "Are you sure you want to quit? Changes will be lost! Y(es), N(o))" appears. Answer Y to exit and lose the changes. Answer N to return to the form. • Exits from the current menu returning to the previous menu (or back to the "%" prompt). • Exits a zoom window without saving your changes. • Exits a code lookup window without returning a code.
[REFRESH]	Refreshes the screen. The terminal screen is cleared and the form, including displayed data, is redisplayed.
[REMOVE FIELD]	Erases the contents of the current field.
[REMOVE RECORD]	Indicates the removal of the current record. You will be asked "Are you sure you want to remove this record (Y N)". If you answer Y or y, the record is marked for removal. If you answer N or n, the record is not marked for removal. The actual removal of the record specified is accomplished by pressing [STORE]. This allows you to mark multiple records before committing any changes to the database.
[RETRIEVE]	Uses the values in the field(s) on the form and retrieves records that match the query constructed from the values in the field(s) on the form.
[RETURN]	If used in a field on a form, results in the message "3015 - Line terminators are not allowed." Use [NEXT FIELD], [PREVIOUS FIELD], or an arrow key to leave the current field. [RETURN] must be added to your response to a question displayed on the interface activity line.
[RIGHT ARROW]	Moves the cursor one character position to the right. It does not follow fields; it moves through the form. Trying to move right beyond the visible section of the form results in a beep.

Table 5.4.2-1. Function Key Definitions.
(sheet 3 of 3)

Function	Description
[SAVE TO FILE]	Writes the selected records to a file.
[STORE]	Sends the contents of all record(s) entered, modified, or deleted using this form to the database to insert, modify, or delete. The message "Store successful: k inserted m modified n deleted" reports what types of database actions were taken.
[UP ARROW]	Moves the cursor up one line on the form. It does not follow fields; it moves through the form. Trying to move above the top of the form results in a beep.
[ZOOM]	If the cursor is in a field that is not entirely visible on the form, the [ZOOM] function is used to bring up a window, which allows more of the field to be displayed. [ZOOM] may be used multiple times to increase the window to its maximum size. You may enter data into the field in the zoom window. If you enter data in the zoom window and subsequently decide the data should not be in the field, use [QUIT] to exit the zoom window; no changes are made. To exit the zoom window and save the modification/insertion(s), press [ACCEPT]. The data you entered in the zoom window are now in the current field (although you may not be able to see the entire text).

You may also move to the top left corner of the form using [TOP OF FORM] or to the bottom right corner of the form using [BOTTOM OF FORM]. These two keys position the cursor outside of a field. To move to a field, use [NEXT FIELD], [PREVIOUS FIELD], or the arrow keys as appropriate.

CLEARING A FIELD

Press [REMOVE FIELD] to clear the contents of a field.

CLEARING THE FORM

Press [CLEAR] to clear the form. If you have entered values in preparation for a query, the screen clears and the cursor is in the first field of the form.

If you have executed a query to display data on the screen, the following message will appear: "Control released; data available as default." You may now use the data as part of a query. If you want the screen to clear, press [CLEAR] a second time.

DATE FIELDS

Date fields support a large variety of formats, which are summarized below. These formats may be used when retrieving or inserting records. If dates are specified using only numbers, e.g., 01/17/93, the numbers must be presented in month/day/year order.

VALID FORMATS

You enter	Reprinted when you leave the field	
3/3/92	03/03/1992	
3\3\92	03/03/1992	
3/1/01	03/01/1901	
Jan2392	01/23/1992	
03-23-92	03/23/1992	
03,23,92	03/23/1992	
03.23.92	03/23/1992	
3.23	03/23/1992	
March 23, 1992	03/23/1992	
March 23	03/23/1992	if current year is 1992
March	03/01/1992	if current year is 1992
1	01/01/1992	if current year is 1992
2	02/01/1992	if current year is 1992

INVALID FORMATS

03MAR92
03-MAR-92
23/03/92 (dd/mm/yy)
92/03/23 (yy/mm/dd)

DEFAULT VALUES

A few forms have fields that have default values, which are visible in the fields on the form when the form is initially displayed.

- To accept the default value, either do not enter the field at all, or use [NEXT FIELD] or the arrow keys to exit the field without changing it.
- To change a default value, simply type over it (if your entry contains fewer characters than the default, be sure to enter blanks to remove the unwanted characters), or erase the field and enter the correct value. Which of these operations you do depends on the insert/overwrite setting currently being used. The default is insert.
- You may also clear all the default values on the form at once by using [CLEAR].

[DETAIL] KEY

The [DETAIL] key provides several functions that operate to show the next lower level of fact(s). See "Key Notations" and Table 5.4.2-1, which describes all the function keys. See Appendix A for a listing of keyboard associations.

DISPLAY-ONLY FIELDS

These are typically fields that show a translation of a coded field or display additional information (e.g., data related to the current record but stored in another table). If you use [NEXT FIELD] and [PREVIOUS FIELD] to move the cursor, the cursor will never enter one of these fields. If you move into one of these fields by using the arrow keys and then attempt to enter characters, an error message will appear: "3013 Display only; modifications not allowed." Use [NEXT FIELD] or [PREVIOUS FIELD] to move out of this field.

A translation field is generally used immediately following the coded field that it translates. Thus, the existence of two fields with no labelling between generally identifies a translation field.

Fields that display additional information from other records are housed inside a box labelled "Display Only."

Values in display-only fields are generated by the system when a record is retrieved and shown on the form.

EXITING THE FORM

Press [QUIT] to exit the form. You return to the previous form or menu.

LONG TEXT FIELDS

HEIS provides space for textual comments and descriptions. In most cases these are limited to 240 characters, but in a few cases the comments may be up to 32,000 characters in length.

Viewing Long Text Fields

To view more of a long text field, position the cursor in the field and press [ZOOM]. The field expands to occupy several lines on the screen. If the text is still not completely visible, press [ZOOM] again and the number of visible lines increases again. Repeated use of [ZOOM] results in the field occupying the full screen.

If the full text is still not visible, use the arrow keys, [NEXT PAGE], or [PREVIOUS PAGE] to view the text one section at a time.

NOTE: Pressing [ZOOM] several times makes it easier to view text fields that are displayed on the screen in multiple lines, such as the help text. For fields displayed as a single line, zooming simply increases the line length. You may use the arrow and fast arrow keys to view the text or extract the field into a file and examine the file.

When you have finished viewing the text, press [QUIT]. The form reappears and the field is its default size.

Extracting Long Text Fields

Data may be conveniently copied from a field and placed in a disk file on the Sequent. One use might be to extract a comment from HEIS to be included in a report.

To copy data to a disk file, move to the desired field, press [BLURP], and at the "3019 - Specify output file name:", enter the name of the disk file. The content of the field is copied to the named file. In the file, this text appears as a single line and can be easily transferred to a word processing program such as WordPerfect.

QUERY-ONLY FIELDS

These are typically fields that show a system-generated value from the same table. An example is the Well form. Like display-only fields, these fields are generated by the system when a record is retrieved and shown on the form.

SPECIAL CHARACTERS IN FIELDS

Apostrophes and parentheses may be used in character fields with no difficulty.

The following characters cannot be searched for (because these are the query profile characters) in any field.

!, *, <, <=, !=, +, >=, >, &, ¦, and ?

UNIQUE IDENTIFIERS

When you complete the unique identifier for the record, the interface checks the database to see if a matching record exists (watch for the "*busy*" indicator in the lower right corner of the screen). If a match is found, the message "2006 - Illegal duplicate key" is displayed. Since the interface does not know whether you are inserting a record or doing a query, it assumes you are inserting. You will not be allowed to leave the final field of the primary key until it does NOT match an existing record. If you are actually doing a query, press the [RETRIEVE] key without attempting to leave the final field of the primary key.

The HEIS subject area manuals describe each table in the database. In the description of each table is the "Required Fields" section, which uses an asterisk (*) to identify the field(s) in the unique identifier.

5.4.3 ONLINE ASSISTANCE

INTRODUCTION

This section describes the online information that can be helpful in using the query-by-form interface to access specific data in HEIS. Code lookups can be used to learn about allowable values for specific fields. Help provides access to most of the text available in the subject area chapters of this manual set.

CODE LOOKUPS

After positioning your cursor to the appropriate field, apply the following steps for using a code lookup list:

1. Press [DETAIL] to bring up a code lookup list. The form automatically queries when it comes up (see Figure 5.4.3-1 for a sample code lookup list). For the code lookups on the Constituent ID, Analysis Method ID, and Well fields, the automatic query does NOT occur because of the large number of records; rather, the code lookup window prompts you with the message, "Enter a query and press [RETRIEVE]." A sample code lookup window for this type of field is shown in Figure 5.4.3-2.

2. Use the arrow keys, [NEXT RECORD], and [PREVIOUS RECORD] to move the cursor to the desired choice.

3. Press [ACCEPT] to return the currently selected choice to the previous form. Use [QUIT] to simply return to the previous form.

The code lookup window performs or allows you to perform any of the following:

- The [HELP] key is available in each field.

- Clear the window and retrieve data (with or without a query specification). The system retrieves only records fitting the limitation(s) that you specify.

Alternatively, put a query pattern in the field on the original form and press [DETAIL]; the codes listed are only those matching the pattern. NOTE: In this case, you are not allowed to carry a value back to the original form.

Figure 5.4.3-1. Sample Code Lookup List.

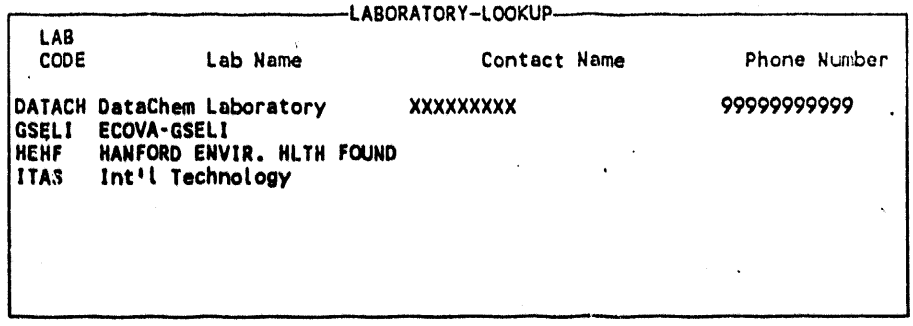
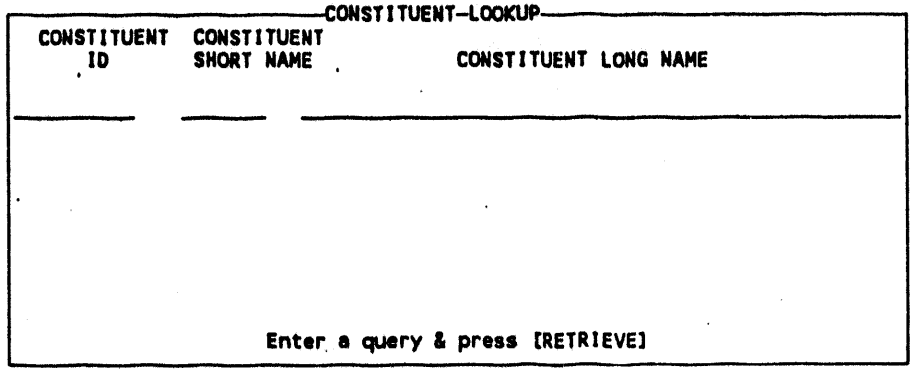


Figure 5.4.3-2. Sample Code Lookup Window for Fields with Many Values.



If you pick a code and press [ACCEPT], you are returned to the original form, but the value for the current field is not changed (your query pattern is still visible) and you receive the message, 'Please clear "field name" field before updating.' Either replace the query profile with the correct value, or clear the field and press [CODE LOOKUP] again.

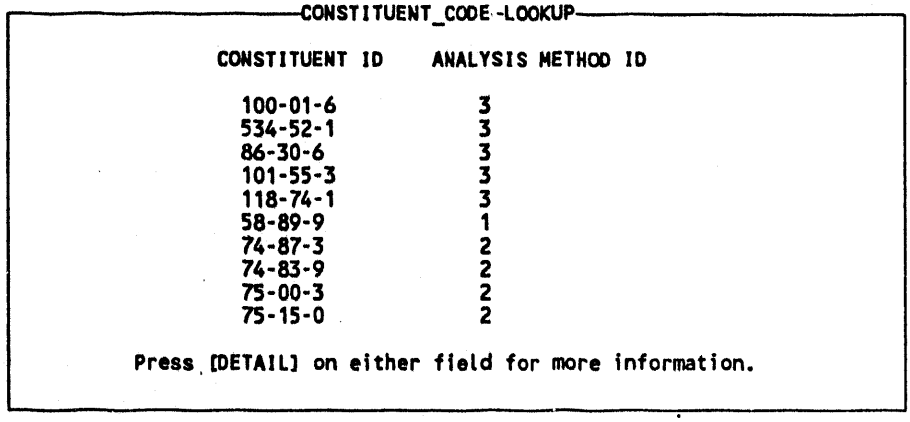
Special Code Lookups

There are two special code lookup windows: the Constituent ID and Analysis Method ID, and the Common Name and Species Name.

- **Constituent ID and Analysis Method ID.** These lookups access the window for the Constituent Code lookup. This joint lookup of Constituent ID and Analysis Method ID is designed to assist you in specifying an appropriate pairing of Constituent ID and Analysis Method

ID (a requirement for correct data). Figure 5.4.3-3 is a sample of this lookup window. When you choose an entry from this lookup window and press [ACCEPT] to return your choice, both the Constituent ID and Analysis Method ID are returned.

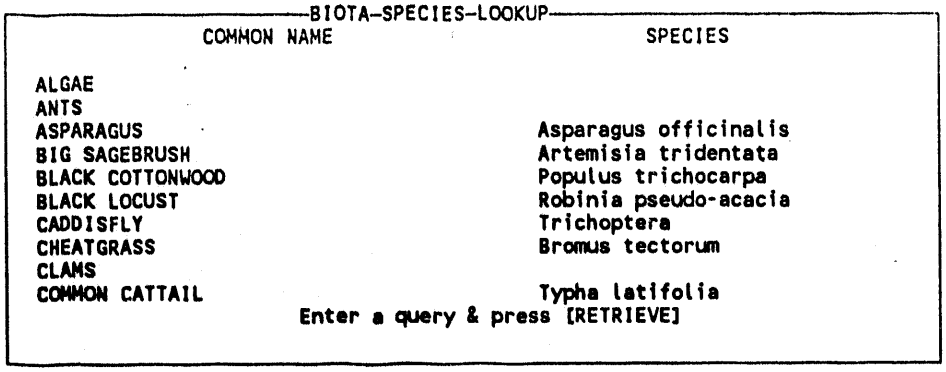
Figure 5.4.3-3. Sample of the Constituent Code Lookup Window (displayed when you choose [CODE LOOKUP] from the Constituent ID or Analysis Method ID fields).



You can also clear the window and use [CODE LOOKUP] in either field to access the code lookup for only just that field. Figure 5.4.3-2 is the window for the Constituent ID field.

- **Common Name and Species.** This lookup is triggered in the Common Name field of the Biota Sample form. The code lookup list (see Figure 5.4.3-4) shows both the Common Name and Species. When you select an entry in the code lookup list and press [ACCEPT], the Common Name is returned. When you leave the Common Name field, the Species is displayed.

Figure 5.4.3-4. Sample of the Biota Species Lookup Window.



HELP

Field, form, table, menu, and keyboard help are currently available. As of January 24, 1994 the field and keyboard help are available and the table, menu, and form help are being loaded.

Field Help

Field help provides a definition of the field, which includes the size and type of the field and any special processing (e.g., format or ranges) required for that field. For help with a field, position the cursor to that field and press [HELP]. A sample field help window is shown in Figure 5.4.3-5.

From this window you can also access the form, table, or keyboard help. Position the cursor to the desired help and press [DETAIL]. See the sections below that describe these other forms of help.

"Code Lookups" allows you to view the codes for this field.

Form Help

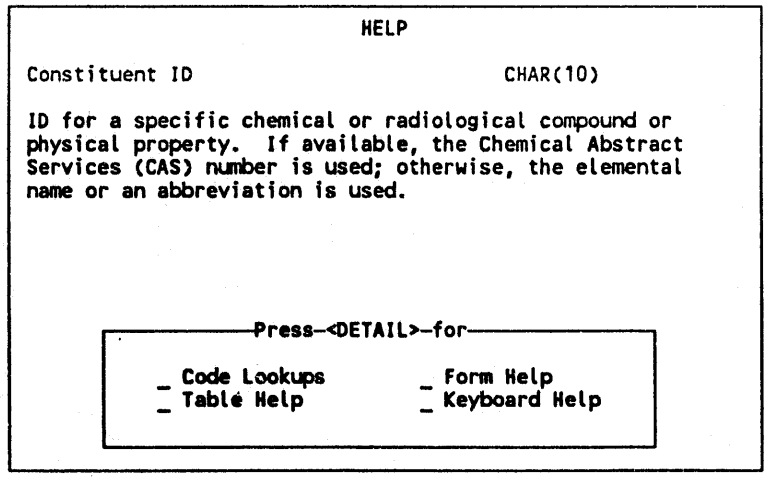
Form help describes the current form.

Keyboard Help

Keyboard help provides descriptions of function keys and is accessed in two ways. See Table 5.4.2-1 for descriptions of the function keys and Appendix A for keyboard associations.

- Press [DETAIL] in the appropriate box at the bottom of the field help window.
- Use the keystroke(s) specified in the "xxx for keyboard help" message displayed on the right side of the status line. The keystroke(s) may be

Figure 5.4.3-5. Sample Field Help.



different for different keyboards. Alternatively, use Appendix A to obtain the proper keystroke for [KEYBOARD HELP].

Menu Help

Menu help provides help about the menu entry. Choose this help by pressing [HELP] with the cursor positioned to the appropriate menu entry. If the object is a form you receive form help, see the description above. If the object is a submenu, you will receive help about that area. Figure 5.4.3-6 shows the menu help window. The Purpose, Scope, Users, and Menu System entries are the same as those in Section X.0 of each subject area chapter. The Miscellaneous Menu Information is currently not being used.

Table Help

Table help provides details about the database table that contains the current field. Choose this help by pressing [DETAIL] in the appropriate box at the bottom of the field help window. Figure 5.4.3-7 shows the table help window. The seven help items are the same as the entries in the appropriate table descriptions in Volume 3 and beyond of the HEIS manual set.

Figure 5.4.3-6. Sample Menu Help.

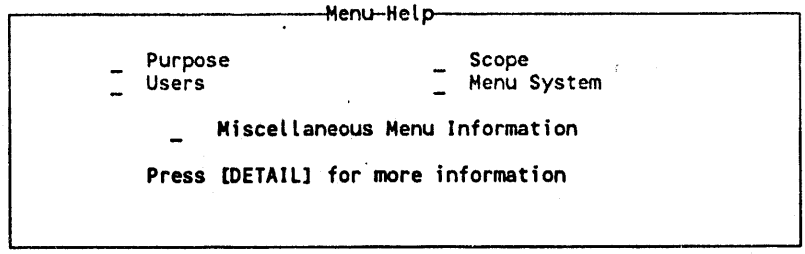
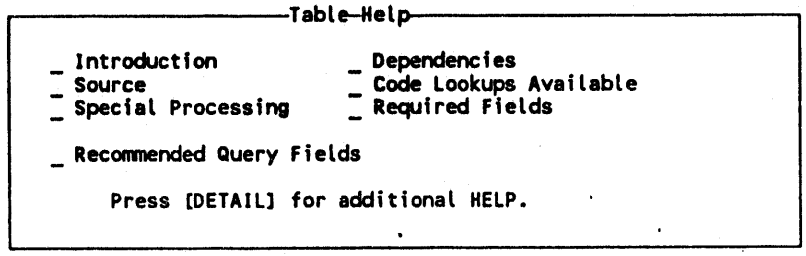


Figure 5.4.3-7. Sample Table Help.



5.4.4 DATA ACCEPTABILITY AND MESSAGES

INTRODUCTION

This section discusses how data are checked for acceptability by the query-by-form interface and how and when messages related to this acceptability are provided.

ACCEPTABILITY OF DATA

Data are acceptable when they meet the validation criteria established for the field. The following are typical criteria.

- For a coded field, the code entered must be in the list of valid codes. Press [DETAIL] to see the list of codes.
- For a numeric field, the value entered must be within the range established for valid data. Press [HELP] to see the definition of the field and the range limits.
- For fields that link the current record to records in other tables, an appropriate record must exist in the other table. For example, when entering a Ground-Water Result record, a Ground-Water Sample Record for the Sample Number must already exist.
- For fields that are related, the relationship must be correct. For example, in the Regulatory Limit table, the Limit Begin Date must be earlier than the Limit End Date. Many of these relationships are part of the field definition and thus available by pressing [HELP].

The subject area chapters in the HEIS manuals describe the acceptability criteria for each table. The "Special Processing" section describes any special handling on a field-by-field basis. The "Dependencies" section describes the criteria for the existence of other records. The data dictionary in Appendix A of the *HEIS Subject Area Reference Manual* (DOE-RL 1994c) provides definitions. These sections of the manual are available online; simply press [HELP].

The acceptability of the data in a field is checked at the following times.

- When the contents of a field are changed, the acceptability of the new value is checked when you press [NEXT FIELD], [PREVIOUS FIELD], or any arrow key to move out of the field.

  If there is an error, an error message appears on the interface activity line, and the cursor remains in the field.

- The acceptability of combinations of fields on the form is checked when you exit the current record. For "single-record" forms, this happens when you press [STORE], [ADD RECORD], or [INSERT RECORD]. For "multiple-record" forms, this happens when the cursor moves into a new record (you press [NEXT RECORD] or [PREVIOUS RECORD]).

  An example of checking combinations of fields is the comparison of two dates.

  If any combination of fields in the record is not acceptable, the cursor moves to the first field and an error message appears on the interface activity line. Correct the error and continue with your work (e.g., press [STORE] or move to the next record).

- Acceptability is checked when the contents of the record are displayed on the form (when you press [RETRIEVE] or [NEXT RECORD] to query a record or see the next queried record).

  If any field is not acceptable, an error message appears on the interface activity line.

- Acceptability is checked when you exit the current record or press [STORE] after you have modified a record on the form. As part of the modification, you must also correct the source of any displayed error found during the acceptability checking.

MESSAGES

When you query a collection of records and proceed to view them, you may receive error messages. These messages are displayed only the first time you view this record. If you use [NEXT RECORD](s) followed by [PREVIOUS RECORD](s), you will not see the message again. If you requery the record, the error message(s) will appear again.

Some error messages require an acknowledgement. If the current message requires an acknowledgement, the cursor will be on the interface activity line. Typically, you need to respond to a question (e.g., "Are you sure...Y(es), N(o))." Provide the response and press [RETURN].

Information messages do not require any action. The next keystroke you type clears the message.

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5.5 SPECIFYING QUERIES AND VIEWING THE SELECTED RECORDS

5.5.1 QUERIES

QUERIES FOR DIFFERENT FORM STYLES

The HEIS query-by-form interface supports three general form styles. The different styles vary slightly for how to specify a query.

- One-record-at-a-time forms -- Enter the query in any of the fields shown on the form except those marked "Display Only."
- Multiple-record forms -- Enter the query in the first repeat of the multiple records. Depending on the form, this is either the top row or the lefthand column on the form. If you clear a multiple-record form, only the first repeat is shown using the reverse video boxes.
- Multiple-table forms -- You may query only on the primary (i.e., the first identified) form. For example, in the Sampling Site form, you may query for a Sampling Site record but not for a Sampling Site Composite record.

STEPS FOR VIEWING SELECTED DATA

This section describes how to view data using simple selection techniques. To perform a query, apply the following steps:

1. Select the form to be used. See Sections 5.2 and 5.3.
2. You may want to use [CLEAR] to clear the contents of all fields before you begin the query. If you do <u>not</u> clear the form, each field with a value becomes part of the query specification. Unless only a few fields have values, you are unlikely to retrieve any records.
3. Enter the query criteria. Use [NEXT FIELD], [PREVIOUS FIELD], and the arrow keys to move the cursor to the field in which you wish to enter a value.

   Enter the value you want to be matched. Repeat this step until you have query criteria in as many fields as you want to use. If you are using a multiple-record form, enter the query criteria in

the fields for the first record displayed on the form. If you have cleared the form, only the first record is shown as containing the reverse video boxes that are the fields on the form.

If you specify a value in one field, all records matching that field will be displayed for viewing. If you specify values in two or more fields, all records that match all specified fields will be returned (this result is what is known as the logical "AND" between the matches on the individual fields).

4. To cancel a query before pressing [RETRIEVE] (which will process the query), press [CLEAR]. The fields of the form will clear.

5. Press [RETRIEVE] to process the query. If you are using a one-record-at-a-time form, the first record that matches the criteria specified will be displayed on your screen. If you are using a multiple-record form, as many records as the form allows will be displayed. If there are no records, the message "No record(s) found." will appear.

   When a record is displayed on the form, each field in the record is checked against the validation criteria for that field. For a coded field, the code entered must be in the list of valid codes.

   If the data in the field(s) fail the validation, a message(s) specific to the error(s) is displayed. You are not required to do anything to correct the error; rather, the message is simply notification that an error exists in the record(s) displayed. If you receive multiple messages, individual messages can be examined by pressing [MESSAGE FRAME].

6. Use [NEXT RECORD] to view additional records. If you are using a one-record-at-a-time form, the next record that matches the criteria specified will be displayed on your screen. If you are using a multiple-record form, the cursor moves into the first field of the next record. If necessary, the data scroll on the form. When no

more records are available, the message "0149 - Last occurrence" appears on the interface activity line.

7. Use [PREVIOUS RECORD] to reexamine records. If you are using a one-record-at-a-time form, the previous record that matches the criteria specified is displayed on the screen. If you are using a multiple-record form, the cursor moves into the first field of the previous record. If necessary, the data scroll on the form. When the first record of the set is displayed, the message "0148 - First occurrence" appears on the interface activity line.

8. To stop viewing the selected records, simply start a new function (e.g., exit the form, or clear the form and enter a new query).

HOW A QUERY IS PROCESSED

When you complete your query criteria and press [RETRIEVE], the records matching your query are retrieved in blocks of 10 records. The data are displayed on the form in one of two ways:

- If the form displays only one record, the first record is displayed and the remaining 9 are available for immediate display using [NEXT RECORD]. Accessing the eleventh record requires that the next set of 10 records matching the query be retrieved.

- If the form displays multiple records, the first 10 records are displayed and, if necessary to complete the data visible on the form, the query for the next 10 records is started. The remainder of the last block of 10 records are available for immediate display using [NEXT RECORD].

Depending on the complexity of the query and how it is being processed (i.e., are recommended query fields being used), there may be a delay as each set of 10 records is retrieved.

The retrieval of only 10 records matching the query effectively limits the time to perform a query. Note that it is still possible to generate a query that takes a long time to complete. For instance, it is possible to generate a complex query that does not use any recommended query field and that finds only a few matching records (or no matching records). If this type of query is applied to a database table containing

a significant number of records, the response to the initial pressing of the [RETRIEVE] key will be very slow.

ORDER OF RECORDS RETURNED

By default, records are retrieved in random order. In the future, a user-specified sort order will be available for choosing a sorting order.

TYPES OF QUERIES

Each section below describes how to enter a type of query criteria in one or more fields on the form. It is possible, even desirable, to use one type of query criteria in one field and another type in subsequent fields. For example, to retrieve all the analysis result data from a particular site with a Dilution Factor greater than 1.0, you would use an exact match for the Site ID but a comparison match for the Dilution Factor.

The types of query criteria described in this section include the following:

- All data
- Exact match
- Comparison operator
- Pattern match
- Logical AND in a field
- Logical OR in a field
- Field is null
- Field is not null.

All Data

You may query the database to view all data from a table. To examine all data, simply do not specify any query criteria. Rather, press [RETRIEVE] to process the query.

Exact Match

To examine records that match exactly in one or more fields, use [NEXT FIELD], [PREVIOUS FIELD], and the arrow keys to move the cursor to the field in which you want to enter a value. Enter the value you want to be matched. Repeat this step until you have query criteria in as many fields as you want to use. Press [RETRIEVE] to process the query.

Comparison Operator

Often a query using an exact match does not display the data you desire. You may want to compare the value in all records to a value you specify by means of a comparison operator (e.g., if you want to find all records for samples collected after a specified date). Table 5.5.1-1 lists the available comparison operators and their definitions.

NOTE: Currently you cannot use comparison operators in a scientific notation field. This functionality is missing in the current version of Uniface. It will be available (and fully functional) after a Uniface upgrade.

To examine records using a comparison operator, use [NEXT FIELD], [PREVIOUS FIELD], and the arrow keys to move the cursor to the field of interest. To make a comparison other than equal (i.e., an exact match), include the operator and the value in the field. For example, to search for all records where Dilution Factor is greater than or equal to 2.0, enter >=2.0 in that field. To find all the records with Load Date after January 1, 1990, enter >1/1/90 in that field (you may also use >01/01/90). Table 5.5.1-2 describes how these comparison operators are handled for numbers, character strings, and dates. Table 5.5.1-3 shows the order for character strings.

When you enter a comparison operator, the message "3033 - Profile seen; ignore numeric and max. size check" appears on the interface activity line (the message vanishes when the next character is typed).

When you reach the end of the field on the form, the characters scroll left to allow you to add another character. Press [ZOOM] to display the field in a larger window that will enable you to see the characters you enter. Press [ACCEPT] to save the contents of the zoomed field. Press [QUIT] to not save the contents.

Repeat this step until you have query criteria in as many fields as you want to use. Press [RETRIEVE] to process the query.

Remember that you can use more than one type of query criteria. For example, to find all records for a particular site and a particular constituent with a dilution factor greater than or equal to 2.0, enter the Site ID and Constituent ID as exact matches and use the > operator for the dilution factor (enter >=2.0 for the dilution factor).

Table 5.5.1-1. Comparison Operators.

Operator	Definition
!=	not equal
>	greater than
>=	greater than or equal to
<	less than
<=	less than or equal to

Table 5.5.1-2. Query Operator Function by Field Type.

Query Operator	Numbers*	Characters	Dates
Exact Match	Treated as numbers; i.e., 1 is equivalent to 1.0.	Case sensitive.	Treated as dates; i.e., 2/2/90 is equivalent to 02/02/90.
Comparison	Treated as numbers; i.e., 1 < 1.1 < 10 < 100.	Case sensitive, uses order shown in Table 5.5.1-3.	Treated as dates; i.e., 1/1/90>12/31/89. Enter with no blanks, (i.e., ">1/1/90").
Pattern Match	Not available	Case sensitive.	Not applicable, use range specification instead.

*Currently, fields displayed in scientific notation cannot be searched using comparison operators. Scientific notation will be fully functional after a Uniface upgrade.

Table 5.5.1-3. Order for Character Fields.

Order	Order (con't)
(blank)	: (colon)
!	; (semicolon)
"	<
#	=
$	>
%	?
&	@
'	A to Z (upper case alphabet)
(	[
)	\
*	]
+	^ (circumflex)
,	_ (underscore)
- (dash or minus)	`
. (period)	a to z (lower case alphabet)
/	{
0-9 (digits)	|
	}
	~ (tilde)

Pattern Match

You may not know the exact value of a field, and comparison operators such as > and < may not retrieve the desired set of records. Often you can express the criteria as a pattern; for example, all the names that begin with "abc" or all the names that contain "water."

A pattern cannot be used in a date or a numeric field. Use the range specification instead.

To select all records that match a pattern, use [NEXT FIELD], [PREVIOUS FIELD], and the arrow keys to move the cursor to the field of interest. To match a pattern, enter a pattern that matches the entire contents of the field. If necessary, add wild card character(s) to the pattern so that it will match the entire contents of the field. Table 5.5.1-4 shows the wild card characters.

Table 5.5.1-4. Pattern Match Wild Card Characters.

Wild Card Char	Matches
*	0 to many characters
?	1 character

Examples include the following:

- abcd* matches any string starting with "abcd". The match is case sensitive. Thus abcd* will not match a record containing "Abcd..." or "aBCd...".
- ?abc* matches any string that has "abc" as its second, third and fourth letters.
- *abc* matches any string that contains the substring "abc". For example, it matches "abcdef", "ddabcdef", "eeabc".

Logical AND in a field

In many cases, it is desirable to link two comparisons in a single field to create a range specification or to search for text containing occurrences of both patterns. Using either comparison operators or patterns (as described previously), place two phrases in a single field and connect them with the AND operator (&).

Limitations: It is important to not include blanks in this specification unless you intend the blanks to be part of the query. You may use only one & in each field used in the query specification.

Examples include the following:

- >=1/1/90&<=12/31/90 selects dates that are in the year 1990.
- *dilution*&*blank* matches any record for which this field contains both the words "dilution" and "blank".

Logical OR in a field

It is often desirable to find records that are outside of an acceptable range or record where the comment text contains one of two key words. Using either comparison operators or patterns (as described previously), place two phrases in a single field and connect them with the OR operator (¦).

Limitations: It is important to not include blanks in this specification unless you intend the blanks to be part of the query. You may use only one ¦ in each field used in the query specification.

Examples include the following:

- <1/1/90¦>12/31/90 selects dates that are not in the year 1990.
- *blank*¦*spike* matches any record for which this field contains either the word "blank" or "spike".

Field is null

You may want to search for records that have no value in the selected field. Enter the string "=" in the field. For example:

- = in the Lab Extracted Date field returns any record that did not have a lab extracted date reported.

Field is not null

You may want to search for records that have a value (any value) in the selected field. Enter the string "!=" in the field. For example:

- != in the Lab Extracted Date field returns any record that has a not-null lab extracted date.

5.5.2 OTHER COMMANDS

INTRODUCTION

There are other operations that use the query criteria as a means of selecting the subset of data you are interested in. This section describes these other commands.

5.5.2.1 Count of Records Matching Query

At times you may want to know how many records match your query criteria. To get a count of the records apply the following steps:

1. Enter the query criteria as described in Section 5.5.1, Queries.

2. Press [COUNT RECORDS] (instead of [STORE]). The message "Number of records found for xxx is nn." will appear on the interface activity line (xxx is a table name; nn is a number). The name of the table is the HEIS Database Table Name (identified below the section heading for each section describing a table). Generally, you will recognize this name as either a direct copy of the table name shown on the form or as an abbreviation of that name. For example, ANALYSIS_METHOD is the Analysis Method table, and COORD_TRANSFORM is the Coordinate Transformation table.

   If more than one table is shown on the form, then the count reflects the records in the primary table only (i.e., generally, the table shown at the top of the form). The name of the table is included in the message to clarify which records were counted.

RESTRICTIONS

As of January 1994, only records in the primary table on a form can be counted.

5.5.2.2 Saving the Selected Data to a File

INTRODUCTION

Often it is desirable to be able to receive a tabular output of some data from the HEIS database. Using the HEIS forms, you can produce a file in a delimited format that can be conveniently loaded using other programs.

The file name is automatically assigned based on the table from which you are selecting data. The format contains several lines of identifying data plus one line for each record in the selected subset of data.

EXTRACTION STEPS

To create a delimited file of a set of data, follow these steps:

1. Prepare the query criteria to obtain the set of records you desire in the delimited file.

2. Press [SAVE TO FILE] instead of [STORE] to cause this set of records to be written to a file. The following message appears: "Field content is written to file xxx.dat" where xxx is the HEIS Database Table Name (identified below the section heading for each section describing a table).

FORMAT OF THE FILE

The data file contains three types of lines. Figure 5.5.2.2-1 shows a sample file from the Analysis Method table.

- The first line identifies the table from which the data were selected.

- The next lines identify the fields in the table that are being saved to the file. The database field names are used (see the list of "Form Field Names/Database Field Names" in the appropriate subject area chapter).

- The remaining lines are the data for the query criteria you specified. The fields are delimited by a question mark (?). If the value for a specific field is null (i.e., no data), then the line contains a "??" indicating that the field did not contain any value.

Figure 5.5.2.2-1. Sample File Written by the [SAVE TO FILE] Command.

```
TABLE:  ANALYSIS_METHOD
FIELDS:
ANAL_PROTOCOL,ANAL_CLASS,ANAL_TECHNIQUE,ANAL_TEST_PROC,ANAL_MTHD_NAME,
ANAL_MTHD_DESC,ANAL_MTHD_ID
TEST?INORG?NA?NA?testing?testing desc?1005?
TEST?NA?Z?NA?testing?testing 1022?1022?
TEST?UNKNOWN?70-IC?743?? testing method...?55?
```

RESTRICTIONS

As of January 1994, data can be dumped from only the primary table on a form. All data from the primary table is dumped. This may be more data than what is shown on the form used to select the data.

5.5.2.3 Printing Screens/Forms

INTRODUCTION

You may find it helpful to print a copy of a screen or a form. A screen or form may be printed with or without the data that you have queried.

To print a screen or form do the following:

1. Display the form that you want to print from. If you want to have data printed also, query the desired data first. If you choose to print a screen or form and want to see specific data, be sure to display the data on the form before doing the printing.

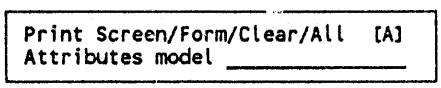
2. Press [PRINT] to start the printing process. The window shown in Figure 5.5.2.3-1 appears. Answer the questions.

   a. Choose to print the screen (S), the form (F), or all (A). To print just what is visible on your screen, enter S to print the screen. To print the whole form with only the visible data record(s) (a form may be longer than your screen), enter F. Enter A to choose All if you want to have all the data you queried printed. Option Clear (C) is not needed by interactive HEIS users.

   b. Enter SCREEN_PRINT as the attribute model. This specifies an attribute model compatible with a PC.

   c. Press [ACCEPT] to cause the printing to occur or [QUIT] to terminate this window without printing anything.

Figure 5.5.2.3-1. The Print Window.



3. Your request is written to a file named after the form. For example, the Constituent form is

written to the file "constituent.p00". Subsequent uses of [PRINT SCREEN] will result in incrementing the ".p00" to ".p01", ".p02", etc.

Figure 5.5.4.2-2 shows the Constituent form with no data selected. Figure 5.5.4.2-3 shows the Constituent form with 2 data records selected.

4. Route this file to the printer of your choice. Because SCREEN PRINT was chosen for the Attributes model, this file can be transferred to a PC and printed.

Figure 5.5.4.2-2. Printing from the Constituent Form Using Either the S or F Options. NOTE: No data were queried before pressing [PRINT].

Constituent

CONSTITUENT ID _____

SHORT NAME _____

LONG NAME _____

Description _____

Molecular Formula _____

HEIS Version Number: 2.0 DEITY [ESC]k for keyboard help

Figure 5.5.2.3-3. Printing from the Constituent form using the A option. NOTE: A query that returned two records was executed before pressing [PRINT].

Constituent

CONSTITUENT ID 100-01-6

SHORT NAME NITRAN

LONG NAME 4-Nitroaniline

Description

Molecular Formula

CONSTITUENT ID 100-02-7

SHORT NAME NITPHEN

LONG NAME 4-Nitrophenol

Constituent

Description

Molecular Formula

HEIS Version Number: 2.0 DEITY [ESC]k for keyboard help

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6.0 REPORTING

INTRODUCTION

Several report procedures have been developed and are available to users. Users who have some programming skills can also generate their own report procedures to meet their specific needs by using one of the reporting packages available on the HEIS Sequent. The SQL*Plus package is described in Section 8.6, and *Structured Query Report Writer* (SQR) (SQ Software 1990) is described in Section 8.7.

PREDEFINED REPORTS

Most HEIS reports use SQR, a reporting package that runs on the HEIS Sequent. Data for the reports generated by SQR may come either from a single table or from multiple tables. Normally, the rows of the report correspond to records. However, there is a special type of report, called a "matrix report," that reorganizes the data so that significant data from several records are displayed as a series of columns on the report. For example, analytical results are stored in the database with a result for each constituent in a separate record. A matrix report for analytical results contains one record for each sample with results for different constituents in separate columns on the same line.

When the user invokes the report, the report procedure prompts for information used to limit the amount of data included on the report. The type of information prompted for varies from report to report and is documented for each report.

RUNNING A REPORT

Each of these reports is described in a subject area chapter. In that section you will find

- A description of the report
- How to run the report, including the questions you will need to answer to specify the data to be included in the report
- A figure showing a sample report.

Because the text for the report will be stored in a file, generally you will be asked to indicate a file name as part of the specifications you provide. After the report is generated, you can print this report or copy it to a different location.

PRINTING REPORTS

Reports may be printed by directing the report to the printer from either the HEIS Sequent or from your personal computer (PC). The generic steps for printing a report are described in the steps below. The specific commands depend on printer access and are described in succeeding sections.

1. Determine the proper orientation. The documentation for each report provides the proper print orientation for that report.

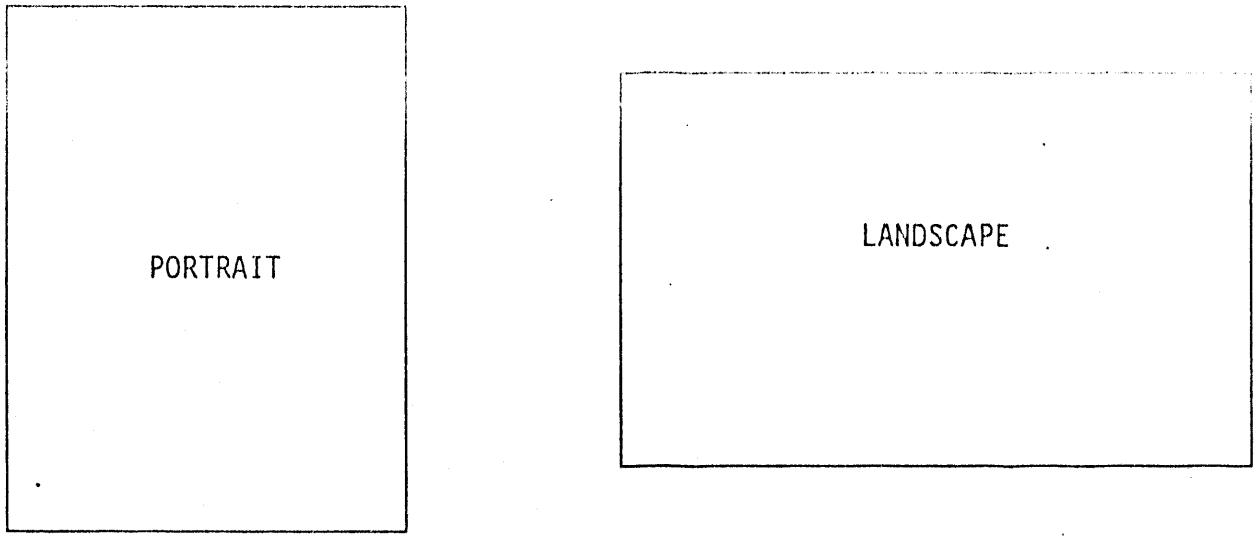
   A landscape page is wider than it is tall (11 in. wide x 8.5 in. tall); a portrait page is taller than it is wide (8.5 in. wide x 11 in. tall). Figure 6.0-1 shows print orientation examples.

2. Issue the command to specify the printer. The specific command depends on how you access your printer. The options are described in the sections below.

   Note that this command needs to be entered only once for each time you set project to a new project account (issue the "sp" command").

3. Print the file. The specific command depends on how you access your printer. The options are described in the sections below.

Figure 6.0-1. Print Orientation Examples.



Using a PNL-Local Area Network or Hanford Local Area Network Printer

If you can access your printer from the HEIS Sequent (i.e., the printer is on the PNL local area network [LAN] or the Hanford LAN [HLAN]) you can print your reportfile as follows:

1. Identify which printer you want to use. The general format of the command is as follows:

   % setenv PRINTER <printer-name>

   where <printer-name> is the name of the printer. The <printer-name> encodes the print orientation (i.e., landscape or portrait) and may include either "ASCII" or "ANSI" to indicate that the files sent to that printer are text not graphics. The printer name can be obtained by contacting your computer information service center.

   Note that this command needs to be entered only once for each time you set project to a new project account (issue the "sp" command").

2. Issue the command to route the file to the printer. The general format of the command is as follows:

   % lpr <filename>

   where <filename> is the name of the file you specified when you generated the report.

Using a Non-Local Area Network Printer

If you cannot access your printer from the HEIS Sequent, you can print this file as follows:

1. Copy the file from the HEIS Sequent to your local machine. Use the procedures for the [illegible] file described in Section 8.4.

2. Route the file that now resides on your system to your local (or LAN) printer.

Using PCPRINT

Downloading the file and then printing it is cumbersome. If you are using an IBM-PC or an IBM-PC-compatible computer, or if your terminal supports automatic printer pass-through, you may be able to use a program called "pcprint" to print reports on a local or network printer. Currently, "pcprint" supports only Hewlett Packard Laser Jet printers.

- To print a report with landscape orientation, enter the following:

  ```
  % pcprint <filename>
  ```

  where <filename> is the name of the file or report to be printed.

- To print a report with portrait orientation, type in the following:

  ```
  % pcprint -p <filename>
  ```

  where <filename> is the name of the file or report to be printed.

7.0 GRAPHICS

To be issued.

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8.0 OTHER AVAILABLE SOFTWARE

INTRODUCTION This chapter describes additional facilities available on the HEIS Sequent. It has three divisions.

- Sections 8.1 - 8.3 describe the UNIX operating system, including tutorials, commonly used commands, text editors, and a correspondence list between UNIX and VMS commands.
- Sections 8.4 and 8.5 describe moving data between the Sequent and a PC and techniques for running background jobs on the HEIS Sequent.
- Sections 8.6 - 8.8 describe tools used to query the HEIS database.

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8.1 UNIX TUTORIAL

INTRODUCTION

The HEIS Sequent is a UNIX platform. This section describes the online tutorial facilities and several UNIX commands helpful to completing HEIS tasks.

TUTORIALS

A set of tutorials is available on the HEIS Sequent. These tutorials are designed to help those with little or no experience with the UNIX operating system. The tutorials are fairly extensive and cover various topics such as basic file information and manipulation, text editors, advanced file manipulation, and writing "C" programs. As you use the tutorials, you will read a description of a command and then can practice that command.

To access these tutorials, enter the following command from either your user or project account:

```
% ucb learn
```

You will receive the following response:

```
These are the available courses -
        files
        editor
        vi
        morefiles
        macros
        eqn
        C
```

If you want more information about the courses, or if you have never used learn before, press [RETURN]; otherwise type the name of the course you want, followed by [RETURN].

NOTE: You may see the following message:

```
db home:  Command not found
ORACLE_HOME = [ ] ?
```

Press [RETURN] to continue. This will not affect learn.

COMMONLY USED COMMANDS

This section describes simple usage of commonly used UNIX commands. Further information on these and other UNIX commands is available using the learn or man commands. Each description shows the basic command followed by examples.

cat

Displays a text file(s) on your screen. The command is short for concatenate; in reality it concatenates the specified file(s) to the standard output file associated with your screen. No paging of the output on you screen occurs. If your file contains more lines than your screen, use the **more** command.

% cat <filename1>...<filenameN>	For multiple files
% cat <myfile.c>	For a single file called <myfile.c>.
% cat <myfile.c> <another.c>	For two files.

cp

Copies one file to another.

% cp <filename1> <filename2>

- If <filename2> exits, it is overwritten.
- If <filename2> is a directory name, a copy of <filename1> is placed in the specified directory under the same file name.

% cp <myfile.c> <myfile.sav>	Creates file <myfile.sav>.
% cp <myfile.c> <savdir>	Creates file <savdir/ myfile.c>.
% cp <myfile.c> <savdir/myfile.sav>	Creates file <savdir/ myfile.sav>.

chmod

Changes the file protection on a file or directory. This allows you to share files with users not already accessing the same project account or to make a script file executable (see Section 8.5).

% chmod <mode> <file>

The mode can be set two ways. The first method specifies the mode in two parts: identification of which group(s), and what privilege(s).

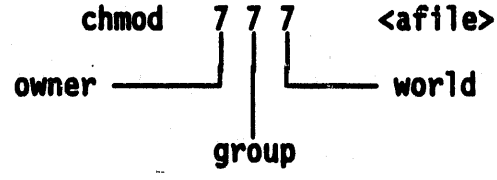
- Groups:
  u = user
  g = group
  o = other.

- Privileges:

  r = read
  w = write
  x = execute.

% chmod go=w <file1>	Gives write-only priviledges to group and other.
% chmod u=rwx,g=rx,o=rx <file2>	Sets permissions as indicated.

The second method uses an octal (base 8) system. You specify group by place, and priviledge by a number.



7 = read, write, execute
6 = read, write
5 = read, execute
4 = read
2 = write
1 = execute

example
% chmode 755 <afile>
Gives owner all, and group/others read-execute.

grep

Searches files for lines that include the given pattern. Each matched line is displayed on the screen unless an option specifies otherwise. If multiple files are given as arguments, the lines are prefixed with the file name containing the matching line.

% grep <options> <pattern> <files>

Options

-l Lists only the names of files that contain matching patterns.

-i Ignores whether its uppercase or lowercase.

Examples

% grep brm *.sql	Searches for the exact string "brm" in all files in the current directory ending in .sql and lists the names of the files and the lines in which the string exists.
% grep -l brm *.sql	Searches for the exact string "brm" in all files in the current directory ending in .sql and lists only the names of the files in which the string exists.
% grep -il brm *.sql	Searches for any combination of upper and lower case "brm" in all files in the current directory ending in .sql and lists only the names of the files in which the string exists.

ls

Lists the contents of a directory. By default, the output is sorted alphabetically. When no argument is given, the current directory is listed.

% ls	Lists contents of current directory.
% ls -l	Lists contents of current directory in long form (size, permissions, etc.).
% ls <mysubdir>	Lists contents of <mysubdir>.

man

Accesses the online UNIX manual. This includes a description of the command, and any options and their usage. MAN pages are displayed using more.

```
% man <command>

% man ls        Brings up the manual pages on the
                ls command.
```

more

Displays the specified file(s) one screen at a time.

```
% more <filename>
```

You can manipulate the display using the following commands:

[ENTER]	Advance 1 line.
#[ENTER]	Advance # more lines.
[SPACEBAR]	Advance one full screen.
[q]	Quit from more without displaying the rest of the file(s).

```
% more <myfile.sql>
                Displays file <myfile.sql>.

% more *.sql    Displays all files ending in
                .sql. The full file name is
                displayed before each file is
                displayed.
```

mv

Moves or renames files and directories.

```
% mv <target1> <target2>
```

If targets are both files or both directories, move renames the first target. (If <target2> already exists, it is overwritten when <target1> is renamed). If <target1> is a file and <target2> is a directory, the specified file is moved to the directory with its original file name.

```
% mv <myfile.sav> <myfile.c>     Renames
                                 <myfile.sav>.

% mv <savdir> <newdir>    Renames <savdir>.

% mv *.c ~/d30000/data    Moves *.c files to data
                          directory.
```

rm

Removes (deletes) the entries of one or more files from a directory. Removal of a file requires write permission on the directory, but neither read nor write permission on the file (you must own th efile to delete it. If the file has no write permissions, the program prompts for a "y" to confirm deletion.

```
% rm <target>
```

% rm <somefile.o>	Removes the file <somefile.o> from current directory.
% rm *.sql	Removes all files ending in .sql in current directory.
% rm *	Removes all files in current directory.

sqlrun

Runs the specified SQL program. By default, the program is run in batch mode. You may optionally specify a starting time.

```
sqlrun <-i> <file name> <sql parameter> <spoolfile> <time> <-u>
```

where

<-i> - optional. Job runs interactive, not in background.

<file name> - required. SQL program to be run.

<sql parameter> - optional. Oracle substitution and variables.
<spoolfile> - optional. File where output will be placed. Spoolfile will not work if you have "spool <file name>" in the SQL job. Spoolfile is not a substitution variable and will not work in cases of "Spool &SPOOL_FILE."

<time> - optional. Time and day to run job.Format is "hhmm mon day"; month and day are optional. Hhmm is a 24-hour clock or can be followed by an am or pm. Examples: "8pm jan 1" or "2200 jan 1."

<-u> - optional. If included, query will run with no time limit. The normal limit is four hours.

8.2 TEXT EDITORS AND EDITOR TUTORIALS

INTRODUCTION

The HEIS Sequent has several different text editing packages. The most commonly used are two screen oriented editors, "vi" and "gemacs." ["Vi" is available as part of UNIX, and "gemacs" is the local name assigned to GNU EMACS (Stallman 1987).] Text editors are used to modify files that contain software source code or commands.

"Vi" Editor

For further information on "vi," see the learn utility described in "Tutorials."

"GNU EMACS" Editor

"Gemacs" has its own on-line tutorial. The following instructions access the tutorial:

1. At the "%" prompt, enter the following command:

   % gemacs

2. Hold down [CTRL] while typing a lowercase h. Release both keys, then type a lowercase t.

   [CTRL]h t

You should now be in the "gemacs" tutorial.

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8.3 VMS TO UNIX CROSS REFERENCE

INTRODUCTION

Table 8.3-1 lists the VMS (the operating system used on VAX computers) commands and their equivalent UNIX commands. This table is of interest to VMS users who are learning to use the Sequent.

- The first column contains the VMS command.
- The second column contains the equivalent UNIX command.
- The final column contains any noteworthy comments about the command. For example, the comment "BSD only" means you must preface the command with "ucb".[1] Therefore, to execute the UNIX command "talk" (VMS "PHONE"), you would need to enter the following:

```
% ucb talk
```

By default, you are using "System V." Thus, you may only directly execute commands labelled System V.

By default, you are using the C-shell (denoted by "%" for the prompt). Thus, you may directly execute commands labelled C-shell. If the comment is "Bourne shell," you must enter the command from the "$" prompt. To get to the "$" prompt from the "%" prompt, enter the following command:

```
% sh
```

To return to the "%" prompt, enter the following command:

```
$ exit
```

Table 8.3-2 lists the commands specific to Pacific Northwest Laboratory (PNL) computer systems (VAX commands) and their UNIX replacements.

[1] In this comment, "BSD" is Berkeley Software Distribution, and "ucb" is the University of California at Berkeley.

Table 8.3-1. VMS to UNIX Cross Reference. (sheet 1 of 4)

VMS COMMAND	UNIX COMMAND	COMMENTS
ANALYZE/RMS_FILE	file od	
APPEND	cat >>	
BACKUP	tar	
	dd	
	dump	Only does whole file systems
	cpio	System V only
CALENDAR	calendar	
CANCEL	kill	
CSI	learn	
CONNECT	telnet	
CONTINUE	bg	C-shell
	fg	C-shell
COPY	cp	
CREATE	cat >	
	touch	
/DIRECTORY	mkdir	
DEBUG	dbx	
	pdbx	Sequent parallel debugger
	sdb	
DEFINE	set	C-shell
	export	Bourne-shell
	setenv	C-shell
DELETE	rm	
	rmdir	
/ENTRY	kill	
DIFFERENCES	diff	
DIR	ls	
DIRE	ls -l	
DUMP	od	
EDIT	vi	
	gemacs	
/RECOVER	vi -r	
ENCRYPT	crypt	
EXAMINE	--	

Table 8.3-1. VMS to UNIX Cross Reference. (sheet 2 of 4)

VMS COMMAND	UNIX COMMAND	COMMENTS
EXIT	exit	Both shells, script only
GOTO	goto	C-shell
HELP	man	
IF	if	Both shells
THEN	then	Both shells
INQUIRE	read	Bourne-shell
	set shell_var = ($<)	C-shell
LOCK	lock	
LOGIN	login	
LOGOUT	logout	C-shell
	<ctrl>-d	Bourne-shell (works in C-shell unless ignoreeof is set)
	exit	Bourne-shell (works in C-shell unless ignoreeof is set)
MAIL	mail	
MERGE	sort	
MESSAGE	msgs	
MONITOR	ps /usr/etc/monitor pstat	
PHONE	talk	BSD only
PRINT	lpr	BSD only
	lp	System V only
	lpstat	System V only
/PARAMETERS=	--	
/QUEUE=	lpr -P	
PURGE	--	
QUEUE	/usr/etc/lpc	
QUIT	<ctrl>-\	Both shells
READ	<	
	read	Bourne-shell
	set shell_var = ($<)	C-shell
RECALL	!command	C-shell
	!command_#	C-shell
/ALL	history	C-shell
RENAME	mv	
REPLY	write	

Table 8.3-1. VMS to UNIX Cross Reference. (sheet 3 of 4)

VMS COMMAND	UNIX COMMAND	COMMENTS
REQUEST	write	
RETURN	exit	Script only
RUN	exec	Replaces current process with following command (does not return)
	.	Bourne-shell script (executes in current process rather than forking process)
	source	C-shell script (executes in current process rather than forking process)
RUNOFF	troff	
SEARCH	grep	
SET	set	C-shell
DEFAULT	cd	Both shells
DIRECTORY	cd	Both shells
HOST	telnet	
PASSWORD	passwd	
PROJECT	sp	
PROTECTION=	chmod	
TERMINAL	set term=	C-shell
	TERM= ;export TERM	Bourne-shell
/NOTAB	stty -tabs	
/LOCK	lock	
/WIDTH =	stty columns	
SHOW		
DEFAULT	pwd	Both shells
PROCESS	ps	Qualifiers depend on BSD or System V
PROJECT	shop [-u]	
PROJECT	echo $USER	
PROJECT	pwd	Both shells
QUEUE	lpq	BSD only
SYSTEM	ps -aux	BSD only
	ps -dl	System V only
/BATCH	aq	
SORT	sort	
SPAWN	&	Both shells
	nohup	
	bg	C-shell
	.	C-shell
/NOWAIT	job &	Both shells

Table 8.3-1. VMS to UNIX Cross Reference. (sheet 4 of 4)

VMS COMMAND	UNIX COMMAND	COMMENTS
START	./	
STOP	<ctrl>-z	
PROCESS/ID=	kill	
SUBMIT	at	
/AFTER=	at date	
/NOPRINT	--	
/NOTIFY	--	
SYNCHRONIZE	wait	
TALK	write	
TYPE	cat	
	pr	
/PAGE	more	
	pg	System V only
WAIT	sleep	
WHO	who	
	w	BSD only
	finger	BSD only
WRITE	echo	
$	%	C-shell
	$	Bourne-shell
$!	#	Both shells
*	*	C-shell
=	=	Bourne-shell
	set	C-shell
@	.	Bourne-shell
	source	C-shell
%	?	C-shell
:=	=	Bourne-shell
	set	C-shell
	alias	C-shell
- (dash)	\	
_ (underscore)		

Table 8.3-2. Local Commands: VAX to UNIX Cross Reference.

VAX COMMAND	UNIX COMMAND	COMMENTS
COST	cost	
IAP	iap	Oracle
	runform	Oracle
KERMIT	kermit	
LOCATE	locate	
MYTAPE	dd	
NOTICE	notice	
/CURRENT	notice -c	
RATES	rates	
SETDB	--	
SQL	sqlplus	Oracle
VAXPC	--	Use Kermit

8.4 UPLOADING AND DOWNLOADING DATA TO THE HEIS SEQUENT COMPUTER

INTRODUCTION

To transfer data between the HEIS Sequent computer and your personal computer (PC) or workstation, use a terminal emulation package and connect to the HEIS Sequent computer as described in Section 3.1, Logging On and Off the HEIS Sequent Computer.

Although you may use any package that you are familiar with, the following examples explain the use of the SmarTerm #240 (ST240) and Kermit terminal emulation packages, which use the Kermit data transfer protocol. Kermit is a public domain data transfer protocol that is resident on the HEIS Sequent. The advantage of the Kermit data transfer protocol is that it provides an error-checked transmission of the file between your PC and the HEIS Sequent.

There are two primary means of accessing the Kermit package: server mode (preferred) and command mode.

SERVER MODE

Server mode is the easier and more efficient method of using the Kermit data transfer. It involves setting HEIS to be it server and using your PC as a Kermit cli access your HEIS directory.

Starting the Process

1. Log on to HEIS from your PC (see Section 3.1, Logging On and Off the HEIS Sequent Computer).

2. Start the Kermit server process on HEIS by entering the following command:

   ```
   % kermit -x
   ```

   HEIS will display a message informing you that the server mode has been initiated and your commands are awaited.

3. Return to Kermit on your PC by entering one of the following:

   [ALT]y - for ST240
   [ALT]x - for Kermit

   Your PC will return to the Command Entry screen (for ST240) or the "MS-Kermit>" prompt (for Kermit).

Uploading Data

To send a file to the HEIS Sequent computer from your PC:

1. From your terminal emulator, enter the following command:

   send <disk_name>:\<subdirectory_name>\<filename.ext>

   where

   <disk_name> is the name of the disk where the file is located.

   <subdirectory_name> is the name of the subdirectory where the file is located.

   The file will be put in your current directory on HEIS as <filename.ext>.

   The terminal emulation package then transfers the data. Both ST240 and Kermit display information that reports the progress of the data transfer.

   When the data transfer is complete, the following message appears:

   - For ST240

     Press any key to return to Kermit Command Entry

   - For Kermit: The "MS-Kermit>" prompt appears at the bottom of the screen.

2. For ST240, press any key. For Kermit, no action is required.

3. To exit Kermit server mode in your terminal emulator enter the following command:

   finish

4. To return to HEIS, do one of the following:

   Press [ALT]y for ST240
   Type Connect for Kermit.

   Or, to log off of HEIS and exit Kermit enter the following command:

   bye

Downloading Data

To receive a file from the HEIS Sequent computer on your PC:

1. In your terminal emulator, enter the following:

   - For ST240

     get
     <oldfilename><disk_name:>\<subdirectory_name>\<filename.ext>

     where

     <oldfilename> is the name of the file on HEIS to be downloaded (remember that UNIX is case sensitive).

     <disk_name>:\<subdirectory_name>\<filename.ext> is the location for the file on your PC.

     <disk_name> is the disk, <subdirectory_name> is the directory, and <filename.ext> is the local name.

   - For Kermit:

     Type get [RETURN]

     Remote Soruce File: <oldfilename>

     Load Destination File: <disk>:\<subdir>\<file>

   The terminal emulation package then transfers the data. Both ST240 and Kermit display information that reports the progress of the data transfer.

   When the data transfer is complete, the following message appears:

   - For ST240: Press any key to return to Kermit Command Entry
   - For Kermit: The "MS-Kermit>" prompt appears at the bottom of the screen.

2. For ST240, press any key. For Kermit, no action is required.

3. To exit Kermit server mode, in your terminal emulator, enter the following command:

   finish

4. To return to your PC's terminal mode, do one of the following:

   Press [ALT]y for ST240
   Type Connect for Kermit.

   Or, to log off of HEIS and exit Kermit, enter the following command:

   bye

COMMAND MODE

Command mode is a less efficient method of transferring files with the Kermit data transfer. It is slightly redundant and involves more work.

Starting the Process

1. Log on to HEIS from your PC (see Section 3.1, Logging On and Off the HEIS Sequent Computer).

2. Start the Kermit command process on HEIS by entering the following command:

   % kermit

Uploading Data

To send a file to the HEIS Sequent computer from your PC.

1. At the "C-Kermit>" prompt on HEIS, enter the following command:

   C-Kermit> receive <filename.ext>

   where

   <filename.ext> is the name that you want the file to have after it is uploaded onto the HEIS Sequent computer. After the transfer, the file will exist in your current directory on the Sequent.

2. Return to your PC by entering the following:

   [ALT]y - for ST240
   [ALT]x - for Kermit

   Your PC responds with the Command Entry screen (for ST240) or the "MS-Kermit>" prompt (for Kermit).

3. To send the file, enter the following command:

   send<disk_name>:\<subdirectory_name>\<filename.ext>

   where

   <disk name> is the name of the disk where the file is located.

   <subdirectory name> is the name of the subdirectory where the file is located.

   The terminal emulation package then transfers the data. Both ST240 and Kermit display information that reports the progress of the data transfer.

   When the data transfer is complete, the following message appears:

   - For ST240:

     Press any key to return to Kermit Command Entry

   - For Kermit: The "MS-Kermit>" prompt appears at the bottom of the screen.

2. For ST240, press any key. For Kermit, no action is required.

3. To return to HEIS, do one of the following:

   Press [ALT]y for ST240
   Type Connect for Kermit.

4. At the "C-Kermit>" prompt on HEIS, enter the following command:

   C-Kermit> exit

Downloading Data

To receive a file from the HEIS Sequent computer on your PC.

1. At the "C-Kermit>" prompt on HEIS, enter the following command:

   C-Kermit> send <filename.ext>

   The <filename.ext> is the HEIS file that you want to download.

2. To connect to your personal computer, enter one of the following:

   [ALT]y - for ST240
   [ALT]x - for Kermit

   The system responds with the Command Entry screen (for ST240) or with the "MS-Kermit>" prompt (for Kermit).

3. To save the file to a subdirectory and/or change the file name, type the following command. If you do not specify a new subdirectory, the file will be saved in the current subdirectory.

   receive <disk_name>:\<subdirectory_name>\<filename.ext>

   The terminal emulation package then transfers the data. Both ST240 and Kermit display information that reports the progress of the data transfer.

   When the data transfer is complete, the following message appears:

   - For ST240

     Press any key to return to Kermit Command Entry

   - For Kermit: The "MS-Kermit>" prompt appears at the bottom of the screen.

2. For ST240, press any key. For Kermit, no action is required.

3. To exit Kermit server mode, in your terminal emulator, enter the following:

   finish

4. To return to the Sequent, do one of the following:

   Press [ALT]y for ST240
   Type Connect for Kermit.

5. At the "C-Kermit>" prompt on HEIS, enter the following command:

   C-Kermit> exit

8.5 BACKGROUND PROCESSING

INTRODUCTION

Background processing, also known as batch processing, allows you to run a program without tying up the terminal while the program is running. Background processing is suitable for most reports and programs. It cannot be used for up/downloading data, generating plots from the graphics program, or using the HEIS query-by-form viewing screens described in the *HEIS User's Guide* and in the subject area volumes.

This section contains a series of steps:

- How to create a script file to specify the desired task
- Four alternate ways of submitting the job for execution at the current time and one method for specifying execution at some future time
- How to check the status of your background job.

STARTING A PROCESS AND TRANSFERRING IT TO THE BACKGROUND

Start a process as you normally would and then execute the following commands to transfer processing to the background. For example:

```
% ucb compress
[CTRL]Z                 (You type)
Stopped                 (System)
% bg                    (you type)
```

This is similar to method 2 under "Execute Now." Use this method for programs that need interactive input at the beginning and then process without any further action on your part.

CREATING A SCRIPT

For all background processing methods, it is best to use a script to execute the file. With a script, you can be sure you are using the right commands, and it provides a "transcript" of the commands you have executed if it becomes necessary to track your processing.

1. To create a script, start your editor and enter the following command as the first line:

```
#!/bin/csh -f
```

2. On the next line, type in the command(s) you want to run, including all parameters, input files, and output files. After saving the file and exiting the editor, you will need to make the script executable. On the command line, enter the following:

```
% chmod 744 <your_script_name>
```

3. To run your script, enter the name of the file:

```
% <your_script_name>
```

For example, to get a listing of all current users on HEIS, you would put the following lines into a file called "who_is_on":

```
#!/bin/csh -f
finger >& who_file
```

NOTE: Always use >& when specifying an output file. ">" means write to the specified output file what is normally written to the screen; the file overwrites any existing ones. "&" means to put output & error messages in the file.

4. Save the file, and then make it executable:

```
% chmod 744 who_is_on
```

5. Run the program:

```
% who_is_on
```

The results will be stored in the file "who_file".

EXECUTE NOW

Four methods are available that allow programs to be run in background mode.

1. Run SQL queries in background mode to retrieve or update data. This option applies only to using SQL*Plus.

2. Start the program in the normal way, entering all input as prompted, then transfer execution to the background. NOTE: This method will not work for SQR (use either method 3 or 4) or SQL*Plus (use method 1).

3. For programs requiring no user input, start the program in the background immediately.

4. Start the program in the background, with user input in a separate file.

Method 1 -- for SQL*Plus Only

To begin running an SQL query in background mode, put the following command in a script file:

```
sqlrun <filename parameter1,parameter2,... outputfile>
```

(NOTE: sqlrun executes non-interactively. See Section 8.1, UNIX Tutorial, for help with sqlrun parameters.)

where

<filename> is the SQL program name

<parameter1,parameter2,...>
are the user values substituted into the program. To determine whether or not parameters are necessary, enter the more command:

% more <filename>

Comments on the first screen should describe any necessary parameters. Parameters are denoted by & or &&.

<outputfile> is any file name that the output will be sent to. This is used only if the program does not include a spool command. Spoolfile is NOT a substitution variable and will not work in cases of "Spool & SPOOL_FILE". Use quotation marks ("") if no parameters exist and a spool command is not included in the file.

Example

1. The following command demonstrates a program that no spool command are in the SQL script.

```
% sqlrun  irm_demo.sql brm.datkey_1=37990
```

2. The following command demonstrates the use of "" when no parameters are needed and no spool commands are in the SQL script.

```
% sqlrun somefile.sql ""  somefile.log
```

NOTE: Queries run for a maximum of 4 hours (by default) unless you use the '-u" option. See sqirun in Section 8.1 for further details.

Method 2

To start a program in normal mode and then transfer it to background, use the following instructions. (The first example is a loader program, the second is compressing a file.) NOTE: Do not log out until the process is finished. It will kill the execution of the program.

1. Run the program. If appropriate, respond to all prompts.

   clp_loader <filename>

2. When all information has been entered, press [CTRL]Z.

   The program responds with the following:

   Stopped

   This means that the program has halted temporarily.

3. To restart it in background mode, enter the following:

   % bg

   where

   bg is "background." The following message appears on the screen:

   [1] clp_loader <filename>

   This means that the program has been restarted successfully in background mode. All messages generated by the program are written to the terminal. When the program is completed, the following message appears on the screen:

   [1] Done clp_loader <filename>

Example

For example, to compress a file in background mode, enter the following command:

create the script "run_compress"

```
#!/bin/csh -f
ucb compress <filename>
```

```
% run_compress
[CTRL]Z

Stopped

% bg
```

Method 3

For programs that require no user input, you can start the program directly in background mode. Create the script as described previously, and enter the script name in the following format:

```
% <scriptname> >& /dev/null &
```

This automatically starts the script in background mode. For example:

```
% run_compress >& /dev/null &
```

NOTE: Do not log out until the process is finished.

Method 4

The following is the command used to begin running a program in background mode at the current time:

```
% nohup <scriptname> < input >& output &
```

where

nohup	stands for "no hangup" and instructs the computer to disregard any input from the controlling terminal.
<scriptname>	is the name of the file containing the commands to be executed.
<	is required if the program is to use input from a file.
input	is the name of the file containing any input the program requires as it runs. Each item of input required by the program should be placed on a separate line in the file. Input files may be created on a PC and then uploaded to the

HEIS Sequent. They also may be created using a text editor on the HEIS Sequent. See Section 8.2 for more information on text editors. If no input is required, remove "< input" from the command line.

>&	is required
output	is the name of a file to contain any informational or error messages the program writes to the terminal as it runs. Always use a log file for possible error messages.
&	instructs the computer to ignore any interrupt signals (such as pressing [CTRL]c).

Example

For example, to run your script executing the Constituent ID report described in Section 1.4.1 (DOE-RL 1994c) in background mode, enter the following:

```
% nohup run_con_id < inputfile >& outputfile &
```

EXECUTION AT SOME FUTURE TIME

The command used to run a program in the background mode at some time in the future is as follows:

```
% at <time> <scriptname>
```

where

<time>	is the time when the program should be run. The time is specified as a one-to-four-digit integer. One- and two-digit numbers specify hours. Three- and four-digit numbers specify hours and minutes. This integer optionally may be followed by "a" for AM, "p" for PM, "n" for noon, or "m" for midnight. If no letter follows the integer, the time is assumed to be specified from a 24-hour clock.

The time also may be followed by a date descriptor (optional). The date descriptor may be a month name followed by a day number or a day of the week. Month and day names may be recognizable abbreviated.
The following are examples of legitimate time/date values:

- 205p — means the program will run today at 2:05 pm
- 1405 — also means the program will run today at 2:05 pm
- 603a sep 30 — means the program will run September 30 at 6:03 am
- 1200m mon — means the program will run Monday at midnight.

<scriptname> contains the commands to be executed. See "Creating a Script" at the beginning of this section.

Example

For example, to run the Constituent ID report at 10:00 pm, the following command could be placed in a file called "run_con_id":

```
#!/bin/csh -f
rpt con_id < inputfile >& outputfile
```

After you have saved the file and exited the editor, you need to make the file executable.

```
% chmod 744 run_con_id
```

To queue the "run_con_id" program to run at 10:00 pm, enter the following command:

```
% at 1000p run_con_id
```

CHECKING BATCH JOBS

To determine if you have a batch job running, type the following command:

```
% jobs
```

You will see a message containing a job ID number, the status of the job, and the command being executed. The **jobs** command returns only jobs started during the current session on HEIS and using the methods outlined in "Execute Now."

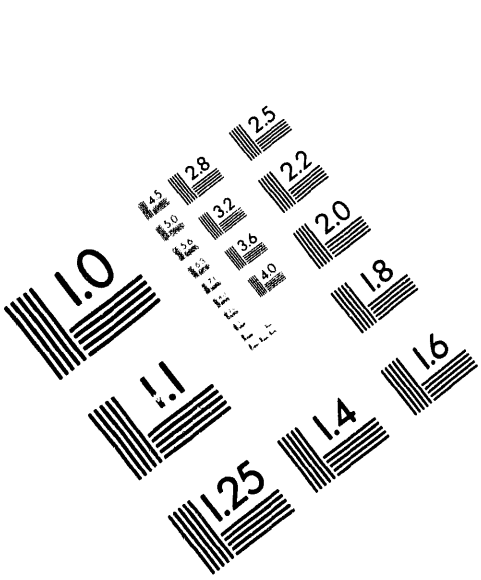
To check if you have an "at" job scheduled (or if it has been run), change directory (cd) to /usr/spool/at. Type the following:

```
ls -l
```

This will list all jobs in the queue by the format <year>.<day of the year>.<time>.<sequential num>. For example:

```
-rw-r--r- d30000 594 Sep 1 15:26 93.243.2000.36
```

Your jobs will have your login name in the owner column, such as d30000. If your job is not listed, it has been executed. If you did not specify an output file in your script, any error messages will be lost.



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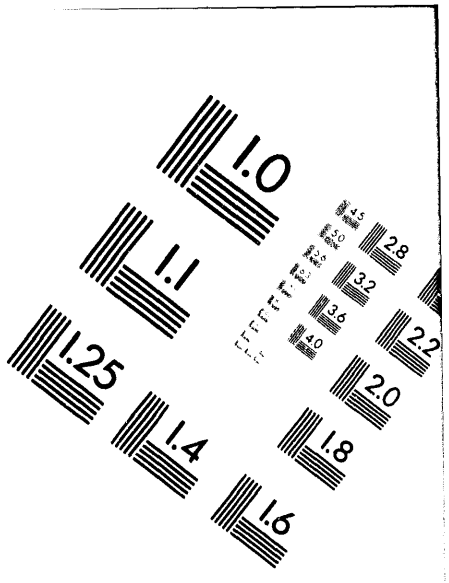
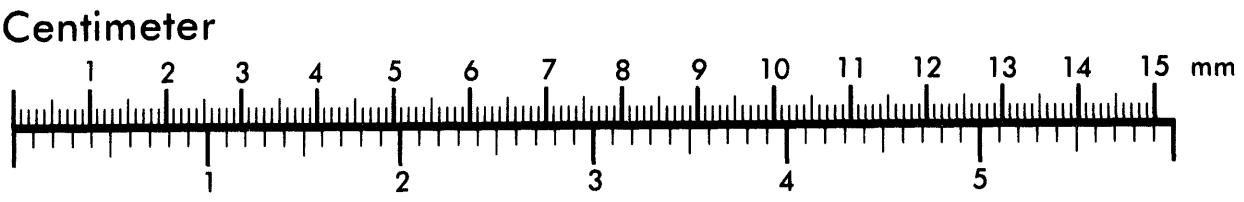
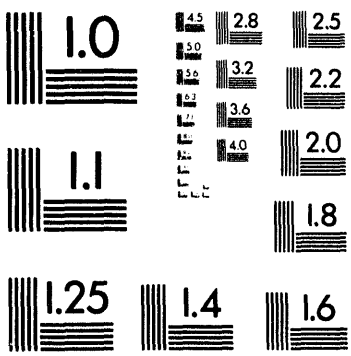
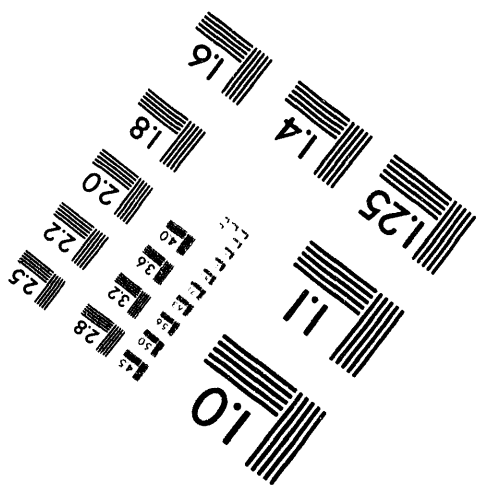
Silver Spring, Maryland 20910

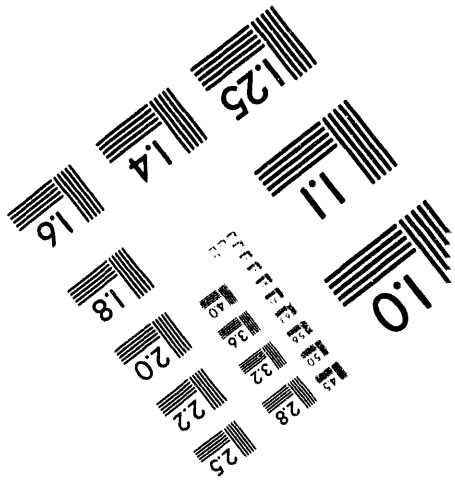
301/587-8202











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3 of 3

8.6 USING SQL*PLUS

INTRODUCTION

The HEIS screens and reports provide access to much of the data within the HEIS. At some point you will want to gain access to the data in a different format or have the data grouped in a different way. To do this, you will need to use a different software tool to access the HEIS database.

SQL*Plus is an ORACLE product that allows you to use Structured Query Language (SQL) to access the HEIS database. Using SQL you may specify the fields you want to see and the selection criteria you want to apply to select the data. You will have a limited ability to print reports using the data you selected.

For example, you can write an SQL*PLUS Query to find out how many unique data qualifers exist and count how many of each are in the table(s).

Users have view-only access to the data; no user is permitted to insert, modify, or delete data while using SQL*Plus.

WHY CHOOSE SQL*PLUS

Two tools exist to access the HEIS database: SQL*Plus and Structured Query Report Writer [(SQR) SQ Software 1987 (see Section 8.7)]. Both tools provide the same capabilities for selecting the data you want because both tools use SQL to access the database. Choose SQL*PLus if the reporting you need to do is relatively simple and because SQL*Plus is an easy-to-learn tool.

SOURCES OF INFORMATION

SQL*Plus is fully described in the *SQL*Plus User's Guide*, Version 2.0 (Oracle Corporation 1987). Many other books are available that describe either SQL*Plus or the industry standard, SQL. One good book is *How to Use ORACLE SQL*PLUS* (Sayles 1990).

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8.7 USING STRUCTURED QUERY REPORT WRITER (SQR)

INTRODUCTION

The HEIS screens and reports provide access to much of the data within the HEIS. At some point you will want to gain access to the data in a different format or have the data grouped in a different way. To do this, you will need to use a different software tool to access the HEIS database.

Structured Query Report Writer (SQR) (SQ Software 1990) is a product from SQ Software that allows you to use Structured Query Language (SQL) to access the HEIS database and provides an easy way to generate non-trivial reports. Using SQR, you may specify the fields you want to use and the selection criteria you want to apply to select the data. In addition, you can specify how you want the report formatted. The built-in functions such as page headers, page footers, totals and subtotals, report break points, and others, make it easy to generate reports.

It is relatively easy to generate complex reports with SQR. A simple example would be to report information about a ground-water sample followed by reporting data about the analytical results for the sample. A more complex example would be to report information about the well followed by information about the latest ground-water sample taken from that well followed by the analytical results associated with this sample.

Users have view-only access to the data; no user is permitted to insert, modify or delete data while using SQR.

WHY CHOOSE SQR

Two tools exist to access the HEIS database. You may use SQR or SQL*Plus (see Section 4.3). Both tools provide the same capabilities for selecting the data you want to use because both tools use SQL to access the database. Choose SQR if the reporting you need to do is complex. Because SQR is a programming language, you must be willing to invest the time to learn to use it.

SOURCES OF INFORMATION

SQR is fully described in the *Structured Query Report Writer User's Guide*, Version 2 (SQ Software 1990).

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REFERENCES

HEIS MANUALS

DOE-RL, 1994a, *Hanford Environmental Information System (HEIS): Volume 1 User's Guide*, DOE/RL-93-24-1, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994b, *Hanford Environmental Information System (HEIS): Volume 2 Operator's Guide*, DOE/RL-93-24-2, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994c, *Hanford Environmental Information System (HEIS): Volume 3 Subject Area Reference Manual*, DOE/RL-93-24-3, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994d, *Hanford Environmental Information System (HEIS): Volume 4 Well-based Subject Areas*, DOE/RL-93-24-4, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994e, *Hanford Environmental Information System (HEIS): Volume 5 Surface-based Subject Areas*, DOE/RL-93-24-5, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994f, *Hanford Environmental Information System (HEIS): Volume 6 Soil Subject Area*, DOE/RL-93-24-6, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994g, *Hanford Environmental Information System (HEIS): Volume 7 Sample and Data Tracking Subject Area*, DOE/RL-93-24-7, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994h, *Hanford Environmental Information System (HEIS): Volume 8 Tank Characterization Data Subject Area*, DOE/RL-93-24-8, U.S. Department of Energy, Richland Operations Office, Richland, WA.

DOE-RL, 1994i, *Hanford Environmental Information System (HEIS): Volume 9 Field Quality Control Subject Area*, DOE/RL-93-24-9, U.S. Department of Energy, Richland Operations Office, Richland, WA.

TEXT AND TABLE REFERENCES

Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 USC 9601 et seq.

Ecology, EPA, and DOE, 1992, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., as amended, Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington.

Oracle Corporation, 1987, *SQL*Plus User's Guide*, Version 2.0, Oracle Corporation, Belmont, California.

Resource Conservation and Recovery Act of 1976, 42 USC 6901 et seq.

Sayles, Jonathan S., 1990, *How to Use ORACLE SQL*PLUS*, QED Information Sciences, Inc., Wellesley, Massachusettes.

SQ Software, 1990, *SQR: Structured Query Report Writer User Guide, Version 2*, SQL Solutions, Inc., Burlington, Massachusettes.

Stallman, 1987, *GNU Emacs Manual*, Sixth Edition, Emacs Version 18 for Unix Users, Free Software Foundation, Inc., Cambridge, Massachusetts.

APPENDIX A

QUERY-BY-FORM INTERFACE KEY USAGE

CONTENTS

FIGURES

Query-by-Form Interface Key Usage. (sheet 1 of 3)

Function	Key Name[1]	Universal Keystrokes	Kermit Keystrokes [GOLD] = [ESC]	MacTelnet Keystrokes[2] [GOLD] = [NUM LOCK/CLEAR]	VT220 and VT240 Keystrokes[2] [GOLD] = [PF1]
Request Help					
View keyboard	KEYBOARD HELP	[GOLD]k	[ESC]k	[GOLD]k	[GOLD]k
Request on-line help	HELP	[GOLD]d	[SHIFT][F1]	[GOLD]d	[GOLD]d
Navigate Menus					
Move to next menu item	NEXT RECORD	[GOLD][SPACE]no	[F9]	[F9] or [Keypad 4] [Keypad 7]	[Keypad 4][Keypad 7]
Move to previous menu item	PREV RECORD	[GOLD][SPACE]po	[SHIFT][F9]	[F11] or [Keypad 5] [Keypad 7]	[Keypad 5][Keypad 7]
Access screen in view-only/browse mode	ACCEPT	[GOLD]a	[F6]	[F6]	[GOLD]a
Access screen in update mode	DETAIL	[GOLD]d	[F1]	[F1]	[GOLD]d
Move to previous menu	QUIT	[GOLD]q	[F8] or [SHIFT][F8]	[F8]	[GOLD]q
Move Around					
Move forward to next field	NEXT FIELD	[GOLD][SPACE]nf	[TAB]	[TAB]	[TAB]
Move back to previous field	PREV FIELD	[GOLD][SPACE]pf	[ESC][TAB]	[GOLD][TAB]	[GOLD][TAB]
Move up 1 character	UP ARROW	[UP ARROW]	[UP ARROW]	[UP ARROW]	[UP ARROW]
Move down 1 character	DOWN ARROW	[DOWN ARROW]	[DOWN ARROW]	[DOWN ARROW]	[DOWN ARROW]
Move right 1 character	RIGHT ARROW	[RIGHT ARROW]	[RIGHT ARROW]	[RIGHT ARROW]	[RIGHT ARROW]
Move left 1 character	LEFT ARROW	[LEFT ARROW]	[LEFT ARROW]	[LEFT ARROW]	[LEFT ARROW]
Move up 8 lines	FAST ARROW	[GOLD][UP ARROW]	[ESC][UP ARROW]	[GOLD][UP ARROW]	[GOLD][UP ARROW]
Move down 8 lines	FAST ARROW	[GOLD][DOWN ARROW]	[ESC][DOWN ARROW]	[GOLD][DOWN ARROW]	[GOLD][DOWN ARROW]
Move right 8 characters	FAST ARROW	[GOLD][RIGHT ARROW]	[ESC][RIGHT ARROW]	[GOLD][RIGHT ARROW]	[GOLD][RIGHT ARROW]
Move left 8 characters	FAST ARROW	[GOLD][LEFT ARROW]	[ESC][LEFT ARROW]	[GOLD][LEFT ARROW]	[GOLD][LEFT ARROW]
Move to top of form	TOP OF FORM	[GOLD][SPACE]ts	[ESC]t	[GOLD][SPACE]ts	[GOLD][SPACE]ts
Move to bottom of form	BOTTOM OF FORM	[GOLD][SPACE]bs	[ESC]b	[GOLD][SPACE]bs	[GOLD][SPACE]bs
Move to previous page	PREV PAGE	[GOLD][SPACE]pe	[SHIFT][F3]	[Keypad 5][GOLD] [Keypad 7]	[Keypad 5][GOLD] [Keypad 7]
Move to next page	NEXT PAGE	[GOLD][SPACE]ne	[F3]	[Keypad 4][GOLD] [Keypad 7]	[Keypad 4][GOLD] [Keypad 7]
Move to previous record	PREV RECORD	[GOLD][SPACE]po	[SHIFT][F9]	[F11] or [Keypad 5] [Keypad 7]	[Keypad 5][Keypad 7]
Move to next record	NEXT RECORD	[GOLD][SPACE]no	[F9]	[F9] or [Keypad 4] [Keypad 7]	[Keypad 4][Keypad 7]
Leave current form/back up a form	QUIT	[GOLD]q	[F8] or [SHIFT][F8]	[F8]	[GOLD]q

Query-by-Form Interface Key Usage. (sheet 2 of 3)

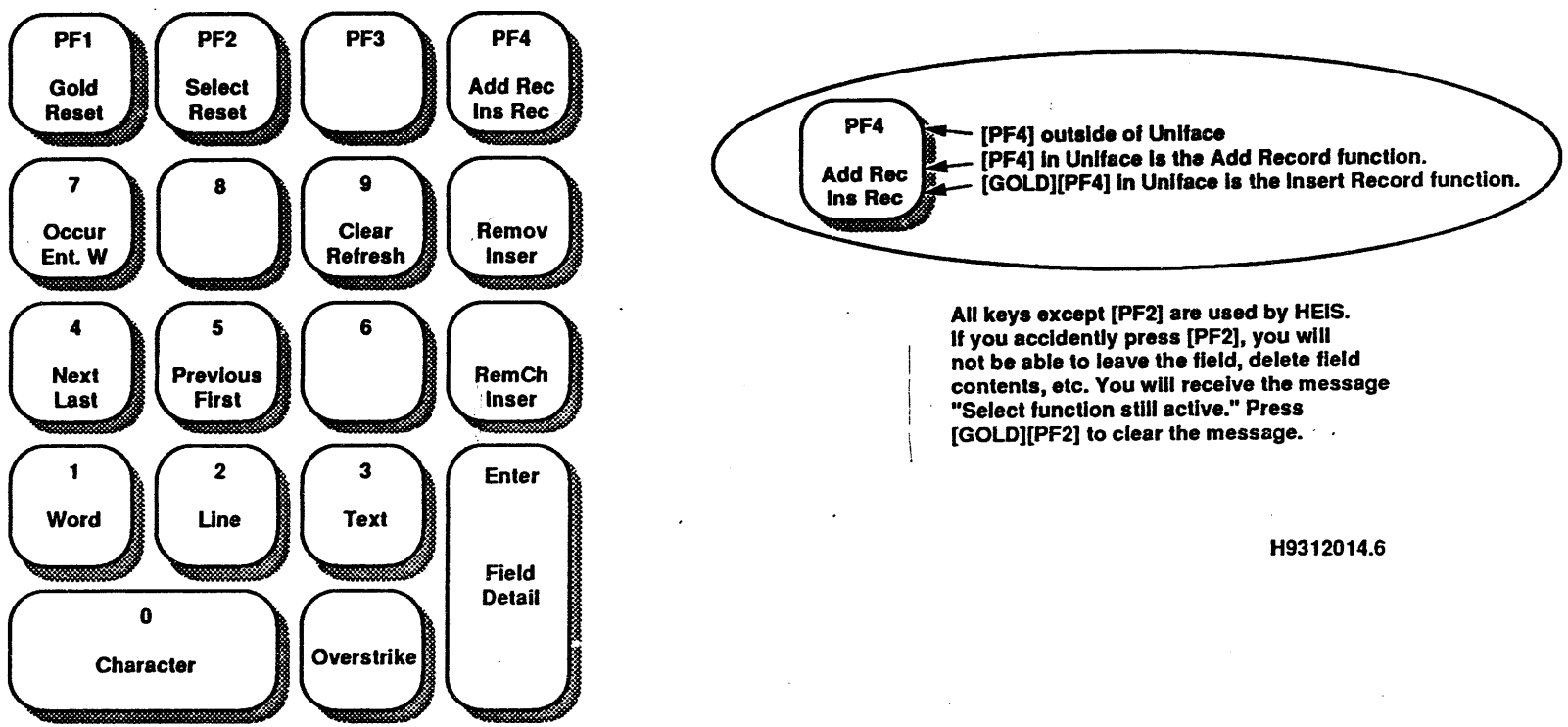
Function	Key Name[1]	Universal Keystrokes	Kermit Keystrokes [GOLD] = [ESC]	MacTelnet Keystrokes[2] [GOLD] = [NUM LOCK/CLEAR]	VT220 and VT240 Keystrokes[2] [GOLD] = [PF1]
Manipulate Data in Fields					
Overwrite data in field	INSERT/ OVERWRITE	[GOLD]o	[INSERT]	[Keypad ·]	[Keypad ·]
Remove character preceding cursor	BACKSPACE	[BACKSPACE]	[BACKSPACE]	[BACKSPACE]	[BACKSPACE]
Remove field from record	REMOVE FIELD	[GOLD][SPACE]rf	[SHIFT][F4]	[GOLD][SPACE]rf or [Keypad REMOVE] [Keypad ENTER]	[Keypad REMOVE] [Keypad ENTER]
Use Code Lists					
Request code list	DETAIL	[GOLD]d	[F1]	[F1]	[GOLD]d
Choose a code value	ACCEPT	[GOLD]a	[F6] or [SHIFT][F6]	[F6]	[GOLD]a
Return to screen without a value	QUIT	[GOLD]q	[F8] or [SHIFT][F8]	[F8]	[GOLD]q
Request/View/Print/Clear Data					
Retrieve records meeting criteria	RETRIEVE	[GOLD]r	[F5]	[F5]	[GOLD]r
View data in field	ZOOM	[GOLD]z	[SHIFT][F5]	[GOLD]z	[GOLD]z
Clear data from current form	CLEAR	[GOLD]g	[F7] or [SHIFT][F7]	[F7] or [Keypad 9]	[Keypad 9]
Save field to file	BLURP	[GOLD][SPACE]rx	[ESC][SPACE]rx	[GOLD][SPACE]rx	[GOLD][SPACE]rx
Save records to file	SAVE TO FILE	[GOLD][GOLD]f	[ESC][ESC]f	[GOLD][GOLD]f	Not available
Count records matching query	COUNT RECORDS	[GOLD][GOLD]c	[ESC][ESC]c	[GOLD][GOLD]c	Not available
Print screen/form/data	PRINT	[GOLD]p	[ESC]p	[GOLD]p	[GOLD]p
Add/Change/Delete Records					
Insert record in list before cursor	INSERT RECORD	[GOLD][SPACE]io	[SHIFT][F2]	[GOLD][Keypad 4]	[GOLD][PF4]
Add record to list below cursor	ADD RECORD	[GOLD][SPACE]ao	[F2]	[F2] or [Keypad 4]	[PF4]
Remove record from HEIS	REMOVE RECORD	[GOLD][SPACE]ro	[F4]	[F4]	[Keypad REMOVE] [Keypad 7]
Control released; data available as default[3]	CLEAR	[GOLD]g	[F7] or [SHIFT][F7]	[F7] or [Keypad 9]	[Keypad 9]
Commit changes to HEIS	STORE	[GOLD]s	[F10] or [SHIFT][F10]	[F10]	[GOLD]s
Text Processing					
Move to previous word		[GOLD][SPACE]pw	[ESC][SPACE]pw	[GOLD][SPACE]pw	[GOLD][SPACE]pw
Move to next word		[GOLD][SPACE]nw	[ESC][SPACE]nw	[GOLD][SPACE]nw	[GOLD][SPACE]nw
Remove character		[GOLD][SPACE]rc	[ESC][SPACE]rc	[GOLD][SPACE]rc	[GOLD][SPACE]rc
Remove word		[GOLD][SPACE]rw	[ESC][SPACE]rw	[GOLD][SPACE]rw	[GOLD][SPACE]rw
Remove to end of line		[GOLD][SPACE]rl	[ESC][SPACE]rl	[GOLD][SPACE]rl	[GOLD][SPACE]rl
Include contents of file	SLURP	[GOLD][SPACE]ix	[ESC][SPACE]ix	[GOLD][SPACE]ix	[GOLD][SPACE]ix

Query-by-Form Interface Key Usage. (sheet 3 of 3)

Function	Key Name[1]	Universal Keystrokes	Kermit Keystrokes [GOLD] = [ESC]	MacTelnet Keystrokes[2] [GOLD] = [NUM LOCK/CLEAR]	VT220 and VT240 Keystrokes[2] [GOLD] = [PF1]
Miscellaneous					
Refresh screen	REFRESH	[GOLD] [SPACE]* or [CTRL]a	[ESC] [SPACE]* or [CTRL]a	[GOLD] [SPACE]* or [CTRL]a	[GOLD] [Keypad 9]
Examine message frame	MESSAGE FRAME	[GOLD]m	[ESC]m	[GOLD]m	[GOLD]m
Cancel current operation	RESET	[GOLD] [GOLD]	[ESC] [ESC]	[GOLD] [GOLD]	[GOLD] [GOLD]

[1]Key Name - Name of the key as used in the HEIS manuals. The Key for online help is written as [HELP] in the manuals.
[2]Keypad (numeric keypad) is active. The keypad in Figure A-1 shows active keys.
[3]To clear, press [CLEAR] twice.
*This is the asterisk above the 8 on the regular keyboard (not the [*] key on the keypad).

Figure A-1. Active Keypad Keys for MacTelnet, VT220, and VT240.



TEMPLATES Laminated templates are available. Contact the HEIS Software Coordinator. Copies are included in Figures A-2 and A-3 for your convenience.

Figure A-2. Kermit Template.

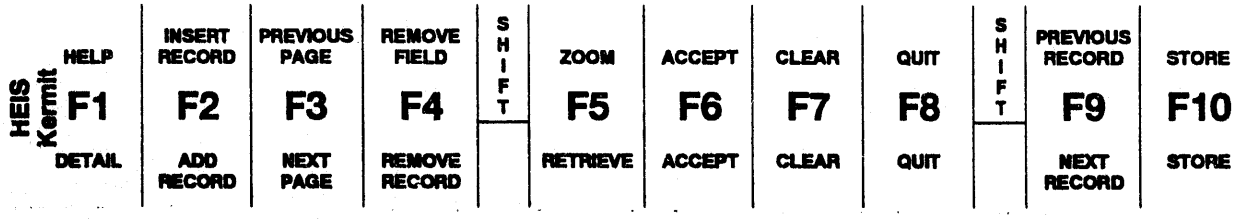
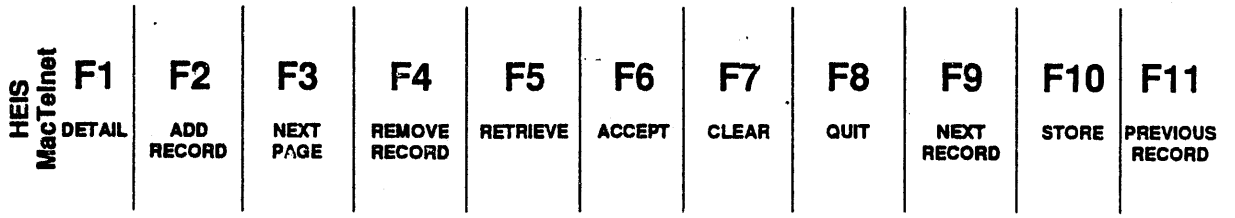


Figure A-3. MacTelnet Template.



APPENDIX B

GENERAL ERROR MESSAGES

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GENERAL ERROR MESSAGES

INTRODUCTION

The list of error messages in Table B-1 is not complete. It is intended to help you understand some of the nonspecific messages issued by the interface.

Table B-1. General Error Messages, Causes, and Resolutions.

Error Message	Cause	Resolution
0105 - Not allowed to change primary candidate key field.	You are attempting to modify a field that is a required part of the record.	To enter a value in this field for query purposes, you must clear the screen and enter your query field(s). Attempting to form a query on top of the existing record will not work.
2006 - Illegal duplicate key.	You have entered a value(s) that represents the unique ID for the record and then attempted to use [NEXT FIELD] to leave the field.	To do your desired retrieval, use [RETRIEVE] instead of [NEXT FIELD].

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GLOSSARY

Access Privilege — Ability(ies), or privilege(s), set for each table in the database when a project account is created. You may receive the privilege to (1) only view data, (2) insert and modify data, or (3) insert, modify, and delete data.

All-blank — A field in which the user has stored one or more blanks. This is not the same as a null field. In the HEIS forms, it is not possible to determine whether a field is null or contains one or more blanks. In general, if the field appears to be empty when displayed on a form, the value is a null. Using SQL*Plus or Structured Query Report Writer (SQR) (SQ Software 1987), it is possible to search for a field that is null or a field that contains only blanks.

Applicant — A person applying for a HEIS computer user account or a project account.

Audit — For the purposes of sampling activities, audits are considered to be systematic checks to verify the quality of operation of one or more elements of the total measurement system. In this sense, audits may be of two types: (1) performance audits, in which quantitative data are independently obtained for comparison with data routinely obtained in a measurement system or (2) system audits, involving a qualitative onsite evaluation of laboratories or other organizational elements of the measurement system for compliance with established quality assurance program and procedure requirements. For environmental investigations at the Hanford Site, performance audit requirements are fulfilled by periodic submittal of blind samples to the primary laboratory or the analysis of split samples by an independent laboratory. System audit requirements are implemented through the use of standard surveillance procedures.

Authorized Security Point of Contact — A person within the U.S. Department of Energy (DOE), Richland Operations Office or the applicant's institution, approved by the PNL Computer Protection Program Manager (CPPM), who has the authority to verify that security requirements have been met.

Biota Media — Identifies what class of organism was sampled, such as vegetation, wildlife, and commercial foodstuff.

Borehole	A hole in the ground that has considerable depth and was created with a drilling rig.
Browser Mode	The mode for queries. It allows you to view data but not modify, insert, or delete.
Code Lookup Window	A window that lists the possible codes and their translations for a field.
Common Name	Identifies the exact biota organism that was sampled. For many organisms, the common name can be associated with the equivalent species, the latin binomial. Some common names, such as algae, represent more than one species.
Computer Protection Program Manager (CPPM)	The person (or authorized designee) for each RL contractor who is responsible for ensuring that computer security requirements are met, in accordance with DOE Order 1360.2A (DOE 1988). A CPPM can also sign as an Authorized Security Point of Contact.
Computer User	A person who has a HEIS computer user account.
Computer User Account	An area on the HEIS Sequent where one person may store information or execute software; no database access is associated with a computer user account.
Cursor	The highlighted underscore or box that moves around the screen in response to the keys you press.
Customer Service Center	The office in PNL Information Systems and Services (IS&S) that is responsible for maintaining HEIS computer accounts. For more information, see the contact list in the front of this manual.
Data Entry (automated)	Using a computer program to process data received on magnetic media. "Process" means to insert, modify, or delete the information on the magnetic media in the HEIS database as specified by the computer program processing the information.
Data Entry (manual)	The process of inserting, modifying, or deleting records by using the HEIS data entry forms.
Data Entry Form	An online form on which the user enters or modifies data. See **Form (software)**.
Denormalized Table	A table that contains attributes already stored in another table.

Duplicate/Replicate Sample — Field duplicate or replicate samples are samples retrieved from the same sampling location at the same time using the same equipment and sampling technique and analyzed independently. Laboratory duplicates/replicates are multiple lab samples taken from the same client sample using the same sampling technique. These samples receive identical processing in the laboratory. Duplicate/replicate samples generally are used to verify the repeatability or reproduceability of analytical data.

Field — Field has two definitions, one for a HEIS form and one for the HEIS database. A field in a form is one or more character positions for entering or displaying one piece of information. In the database, a field is the smallest unit of information. A record is made up of multiple fields.

Field/Equipment Blanks — A blank consists of pure deionized, distilled water drawn through decontaminated sampling equipment and taken as a sample. Blanks are used to verify the adequacy of sampling equipment decontamination procedures and are used to check for possible contamination originating with the sampling environment.

Floating Point Notation — Numbers as we normally write them. The format is <sign><digits>.<digits>. Examples are 0.00001 and -12345670007. Integer is a special case of floating point notation; the decimal point and the digits after the decimal point are not used. See also **Scientific Notation**.

Foreign Key — An attribute whose value is obtained from another table.

Form (hardcopy) — (1) Means for recording data; provided to HEIS data entry personnel for inserting records into the HEIS database. (2) Means for requesting changes to HEIS records, software, procedures, or documentation. (3) Means of applying for access to the HEIS database and to HEIS project accounts.

Form (software) — The "fill-in-the-blank" area on the computer screen that provides space(s) to enter queries and examine data. A form can be longer than the physical computer screen; if so, the form will appear to scroll upward as you move the cursor down its length.

HEIS Database Administrator (DBA) — The individual responsible for managing and granting access to the HEIS database.

Interim Sample Number	Any series of numbers and alphabetic characters that do not conform to the pattern used for HEIS-generated sample numbers.
Keyfield Project Account	The computer project account that provides access to software that allows modification of standardized fields for all records in the HEIS database (affects data owned by all project accounts).
Land Surface Elevation	A value generally computed by measuring from the ground to a point at which the elevation is known and subtracting that from the known elevation.
Logical AND	Used when you need to specify more than one query criteria. **AND** means that to be selected for display, the data must meet all of the specified criteria. Using HEIS query-by-form, multiple query criteria are connected automatically with the word **AND** (see Section 5.5.1 for details on using **AND**). In SQL*Plus or SQR, enter the **AND** as part of the SQL statement.
Logical OR	Used when you need to specify more than one query criteria while wanting to display records that meet "any" of the specified criteria. **OR** means that to be selected for display, the data must meet at least one of the specified criteria. Using HEIS query-by-form, this is accomplished by using the word **OR** in your query criteria (see Section 5.5.1 for details on using **OR**). In SQL*Plus or SQR, enter the word **OR** as part of the SQL statement.
Matrix Spiked Samples	Matrix spiked samples are a type of laboratory quality control sample; the samples are prepared by splitting a sample received from the field into two homogeneous aliquots (i.e., replicate samples), and adding a known quantity of a representative analyte of interest to one aliquot in order to calculate percentage of recovery.
Not-null	Describes a field that is not empty. On the HEIS forms, a non-null value appears as a field with one or more non-blank characters. Thus "A" or "0" are non-null fields.
Null	The absence of a value for a given HEIS field. A null value means only that nothing is known about the value. A null character field is not the same as an all-blank field. A null numeric field is not the same as a numeric field whose value is zero.

Parent/Child Relationship	A relationship between two tables where one table (the child) is dependent on the other (the parent). This dependence is denoted in the database structure by having the child table include the unique identifier of the parent table.
Password	A private code word intended to prevent access to the HEIS computer user account by anyone except the computer user.
Project Account	An area on the HEIS Sequent where one or more HEIS users may access the same information or execute software; database access is associated with a HEIS project account.
Project Account Manager	The individual who applies for and is responsible for a HEIS project account. The project manager can use the SPMGR software to grant user access to the project.
Quality Assurance (QA)	For the purposes of sampling activities, QA refers to the total integrated quality planning, quality control, quality assessment, and corrective action activities that collectively ensure that the data from monitoring and analysis meets all end user requirements and/or the intended end use of the data.
Quality Control (QC)	For the purposes of sampling activities, QC refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.
Qualifier	One or more codes that provide restrictions on the use of analytical results reported by the laboratories. Code definitions may differ for the dissimilar classes of chemical analyses. Qualifiers are provided by the analytical laboratory, data validators, or both.
Query	Any inquiry presented to the HEIS database. The query may be posed by using one of the following: HEIS query-by-form, SQL*Plus, SQR, or one of the HEIS graphics programs. If the query is posed using HEIS query-by-form, the records matching the criteria specified will be displayed on the form. If the query is posed using a graphics program, the selected records will be used to create the graph. For SQL*Plus and SQR, you must also specify what you want to happen with the data.
Query-by-Form	Using one of the HEIS forms to enter a query by placing query criteria in one or more fields of the form.

Query Criteria	The rule that specifies how a single field will be used to select the records from the HEIS database. See also **Query Specification**.
Query Specification	The full specification of the query to be performed. This query specification is composed of a collection of query criteria connected by **AND** or **OR**. A query specification may use multiple fields to select the records from the HEIS database. See also **Logical AND** and **Logical OR**.
Record	A unit of information within the HEIS database. Each record is made up of multiple fields. All records of the same type are stored in the same table in the HEIS database.
Reference Elevation	A known point on the well casing that has been physically surveyed.
Reference Samples	Reference samples are a type of laboratory quality control sample prepared from an independent, traceable standard at a concentration other than that used for analytical equipment calibration, but within the calibration range.
Replicate Sample	See **Duplicate/Replicate Sample**.
Representativeness	For the purposes of sampling activities, representativeness may be interpreted as the degree to which data accurately and precisely represent a characteristic of a population parameter, variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter which is most concerned with the proper design of a sampling program.
Sample Number	Unique number used within HEIS to identify a sample.
Sample Number Library	Tracks the status of sample numbers assigned to samples taken in the field. The Sample Number Library performs three major functions: (1) generates new sample numbers, (2) allows sample numbers to be checked out to individuals, teams, or projects for their use, and (3) enables unused sample numbers to be returned.
Sampled Portion	Identifies the portion of the organism that was included in the biota sample. HEIS choices include whole organism, stems and leaves, bone, liver, muscle, and animal habitat.

Scientific Notation Scientific notation represents a signed number as a value between -10 and +10 and a multiplicative factor. On the HEIS forms, the value 1234566778 would be displayed as 1.234566778e+09, and 0.001 would be displayed as 1.0E-03. See also **Floating Point Notation.**

Screen The computer monitor. Screen displays forms; a form can be larger than a screen, i.e., have several pages. See **Form (software).**

SmartCard A security device required for offsite HEIS users; it is shaped like a credit card and generates random numbers that are matched with computer-generated random numbers at the time of computer access.

Split Sample A split sample is produced through homogenizing a field sample and separating the sample material into two equal aliquots. Field split samples usually are routed to separate laboratories for independent analysis, generally for the purposes of auditing the performance of the primary laboratory relative to a particular sample matrix and analytical method (see the glossary entry for audit). In the laboratory, samples generally are split to create matrix spiked samples (see the glossary entry matrix spiked samples).

Standardization Group The group of HEIS users who have access to the Keyfield project account. Decisions about standardized fields and associated database modifications are made by this group. These changes affect records owned by all data owners.

Standardized Field A structurally significant database field. These fields form the basis for organizing the records in HEIS and, thus, are used by end users in identifying comparable data. Examples of standardized fields are Analysis Method ID, Constituent ID, Lab Code, Well, and engineering units.

Subject Area A portion of the HEIS database. The tables in a subject area are grouped together because they related to a common feature. For example, data about wells are stored in the tables in the Well Subject Area.

Surface Control Datum A survey point near the well, chosen because it is least likely to be moved, damaged, or destroyed.

Surface Sample	A geologic sample collected without using a drilling rig. It may be collected from the surface by using hand tools. It may be collected using equipment such as a backhoe and, thus, would represent an interval (may be recorded in the Interval Top and Interval Bottom fields). See also **Vadose Borehole** and **Well**.
Table	A unit of storage within the HEIS database. Each table contains multiple records.
Unique Identifier	A combination of one or more attributes that uniquely identifies a specific occurrence of an object in a database. No other occurrence will have values for this group of attributes that are the same as any other occurrence of the given object.
Username	The name that uniquely identifies a user's HEIS computer account.
Vadose Borehole	A borehole that does not penetrate the water table. This borehole may have a casing installed and thus be used for further vadose monitoring. It then can be called a vadose zone monitoring borehole. It may be used for only the samples collected during the drilling of the borehole and then be completed in a manner that will allow it to be safely abandoned. See also **Surface Sample** and **Well**.
Vadose Zone	The region between the land surface and the water table.
Validation	For the purposes of sampling activities, validation refers to a systematic process of reviewing a body of data against a set of criteria to provide assurance that the data are acceptable for their intended use.
Verification	For the purposes of sampling activities, verification refers to the process of determining whether procedures, processes, data, or documentation conform to specified requirements. Verification activities may include inspections, audits, surveillances, or technical review.
View Form	A form on which the HEIS user views data but may not enter new or modify existing data (see **Browser Mode**).
Well	A borehole that penetrates the water table. The well is completed by installing casings and is used in monitoring the ground-water. See also **Surface Sample** and **Vadose Borehole**.

Window	A pop-up form that displays additional data, such as code look ups. You can page up and down. Use other similar functions in a window.
Zoom	Provides a window that allows you to view the entire contents of a field when all the data do not fit on the form.

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