
Human-System Interface Design Review Guideline

Review Software and User's Guide

Final Report

Manuscript Completed: March 1996
Date Published: June 1996

Division of Systems Technology
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001



AVAILABILITY NOTICE

Availability of Reference Materials Cited in NRC Publications

Most documents cited in NRC publications will be available from one of the following sources:

1. The NRC Public Document Room, 2120 L Street, NW., Lower Level, Washington, DC 20555-0001
2. The Superintendent of Documents, U.S. Government Printing Office, P. O. Box 37082, Washington, DC 20402-9328
3. The National Technical Information Service, Springfield, VA 22161-0002

Although the listing that follows represents the majority of documents cited in NRC publications, it is not intended to be exhaustive.

Referenced documents available for inspection and copying for a fee from the NRC Public Document Room include NRC correspondence and internal NRC memoranda; NRC bulletins, circulars, information notices, inspection and investigation notices; licensee event reports; vendor reports and correspondence; Commission papers; and applicant and licensee documents and correspondence.

The following documents in the NUREG series are available for purchase from the Government Printing Office: formal NRC staff and contractor reports, NRC-sponsored conference proceedings, international agreement reports, grantee reports, and NRC booklets and brochures. Also available are regulatory guides, NRC regulations in the *Code of Federal Regulations*, and *Nuclear Regulatory Commission Issuances*.

Documents available from the National Technical Information Service include NUREG-series reports and technical reports prepared by other Federal agencies and reports prepared by the Atomic Energy Commission, forerunner agency to the Nuclear Regulatory Commission.

Documents available from public and special technical libraries include all open literature items, such as books, journal articles, and transactions. *Federal Register* notices, Federal and State legislation, and congressional reports can usually be obtained from these libraries.

Documents such as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings are available for purchase from the organization sponsoring the publication cited.

Single copies of NRC draft reports are available free, to the extent of supply, upon written request to the Office of Administration, Distribution and Mail Services Section, U.S. Nuclear Regulatory Commission, Washington DC 20555-0001.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at the NRC Library, Two White Flint North, 11545 Rockville Pike, Rockville, MD 20852-2738, for use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from the American National Standards Institute, 1430 Broadway, New York, NY 10018-3308.

ABSTRACT

NUREG-0700, Revision 1, provides human factors engineering (HFE) guidance to the U.S. Nuclear Regulatory Commission staff for its: (1) review of the human system interface (HSI) design submittals prepared by licensees or applicants for a license or design certification of commercial nuclear power plants, and (2) performance of HSI reviews that could be undertaken as part of an inspection or other type of regulatory review involving HSI design or incidents involving human performance. The guidance consists of a review process and HFE guidelines. The document describes those aspects of the HSI design review process that are important to the identification and resolution of human engineering discrepancies that could adversely affect plant safety. Guidance is provided that could be used by the staff to review an applicant's HSI design review process or to guide the development of an HSI design review plan, e.g., as part of an inspection activity. The document also provides detailed HFE guidelines for the assessment of HSI design implementations. NUREG-0700, Revision 1, consists of three stand-alone volumes. Volume 1, Human System Interface Design Review Guideline: Process and Guidelines, is the principal technical document and provides a detailed discussion of both the review procedures and HFE guidelines. Volume 2, Human System Interface Design Review Guideline: Reviewer's Checklist, provides the HFE guidelines in a checklist format. Volume 3, Human System Interface Design Review Guideline: Review Software and User's Guide, contains an interactive software application to support design reviews.

CONTENTS

	<u>Page</u>
ABSTRACT	iii
LIST OF FIGURES	vii
PREFACE	ix
1 INTRODUCTION	1
2 INSTALLING THE DRG SOFTWARE	3
2.1 System Requirements	3
2.2 Software Installation	3
3 CREATING AND MODIFYING EVALUATION FILES	5
4 CONDUCTING AN EVALUATION	9
4.1 Opening Existing Evaluation Files	9
4.2 Viewing the Guidelines	9
4.3 Evaluation Functions	10
4.4 Navigation and Search Functions	12
5 PREPARING A REPORT AND REPORT FILE	15
5.1 Preparing a Report	15
5.2 Printing a Report	16
5.3 Saving a Report to a File	16
6 ON-LINE HELP	19
7 TUTORIAL	21
7.1 Creating a Sample Evaluation File	21
7.2 Modifying the Sample Evaluation File	22
7.3 Conducting a Practice Review	22
7.4 Generating a Sample Report	25
GLOSSARY	27
INDEX	33
SUGGESTIONS/COMMENTS	35

LIST OF FIGURES

		<u>Page</u>
1	DRG window	4
2	List of guidelines sections	5
3	Browse window	6
4	Window to modify sections in an existing evaluation	7
5	Main HSI review window	9
6	Glossary window	11
7	Reasons for returning to guideline	11
8	Select a section to jump to window	12
9	Search dialog box	13
10	Context index window	14
11	Report specification window	15
12	Report summary screen	16
13	Help window	20

PREFACE

NUREG-0700, Revision 1, consists of three volumes. The contents of each are briefly described below.

Volume 1 - Human System Interface Design Review Guideline: Process and Guidelines

Volume 1 consists of two major parts. Part 1 describes those aspects of the review process of the human system interface (HSI) design that are important to identifying and resolving human engineering discrepancies (HEDs). Guidance is provided that could be used by the staff to review an applicant's or licensee's HSI design review process. Part 1 could also be used by the staff to assist with developing an HSI design review plan that might be used, for example, as part of an inspection activity. Part 2 of Volume 1 contains detailed guidelines for a human factors engineering (HFE) review which identify criteria for assessing the implementation of an applicant's or licensee's HSI design.

Volume 2 - Human System Interface Design Review Guideline: Reviewer's Checklist

Volume 2 is a complete set of the guidelines contained in Volume 1, Part 2, but in a checklist format that can be used by reviewers to assemble sets of individual guidelines for use in specific design reviews. The checklist provides space for reviewers to enter guidelines evaluations and comments.

Volume 3 - Human System Interface Design Review Guideline: Review Software and User's Guide

Volume 3 contains an interactive software application of the NUREG-0700, Revision 1 guidance and a user's guide for this software. The software supports reviewers during review preparation, evaluation design using the HFE guidelines, and in report preparation. The user's guide provides system requirements and installation instructions, detailed explanations of the software's functions and features, and a tutorial on using the software.

1 INTRODUCTION

This User's Guide describes the use and function of the Design Review Guideline (DRG), a software application that supports evaluations conducted using the process described in Volume 1 of this report. That volume also contains a comprehensive set of human factors guidelines arranged into a hierarchy of topics. The DRG software allows the set of guidelines to be customized to the requirements of a specific review. Once a custom evaluation file is created, functions are provided for recording the evaluations and compiling the results in report form. The DRG also provides a complete glossary of terms, an index, and a word-search function.

Note that the User's Guide and DRG software do not contain all of the procedures necessary for conducting human-system interface (HSI) design reviews; that information is contained in Volume 1. As noted above, this software supports the design review process by facilitating the selection, evaluation, and analysis of human factors engineering (HFE) guidelines.

The User's Guide includes installation procedures, operating instructions, and reference information. It is divided into the following sections.

- Section 2, Installing the DRG Software (page 3), identifies the minimum system requirements and step-by-step installation procedures.
- Section 3, Creating and Modifying Evaluation Files (page 5), describes how to get started in developing a sample file to be used in a DRG review.
- Section 4, Conducting an Evaluation (page 9), discusses the DRG software's features and functions for evaluating a design.
- Section 5, Preparing a Report and Report File (page 15), details how to print and save an evaluation.
- Section 6, On-Line Help (page 19), describes how to access the DRG's user-support information.
- Section 7, Tutorial (page 21), is a step-by-step demonstration of the features and functions of the DRG software.

In addition, a Glossary (page 27) lists and defines the functions, commands, and buttons used in the DRG. An Index (page 33) is also provided.

Note on Version Numbers

Versions of this software are numbered using an X.Y format, where:

- X = the number corresponding to the Revision of NUREG-0700 (e.g., 1 means the HFE guidelines in the software are those contained in NUREG-0700, Revision 1); and
- Y = the revision number of the software interfaces and functions.

Therefore, the version number of this initial release of the DRG software is 1.0. If the interface and software functions are modified, but the HFE guidelines remain the same, further releases of the software will be numbered 1.1, 1.2, and so forth. If the guidance in NUREG-0700 is modified and a Revision 2 is published, the HFE guidance in the software will be modified and a Version 2.Y will be released.

The following conventions are used throughout this Guide:

- All window labels and dialog box labels are shown in quotations for ease of locating them within the electronic document.
- Button labels and menu labels are shown in boldface type.
- The term "mouse" is used to include any type of pointing device, such as a trackball.
- All instructions are given with the click of a mouse button; however, the underlined letter of a button label can be pressed, in conjunction with the **Alt** key, to access the function.

In consulting this User's Guide, a basic familiarity is assumed with either Windows or a Windows-type environment, as well as Windows interface structures.

2 INSTALLING THE DRG SOFTWARE

2.1 System Requirements

The DRG requires the following hardware and software:

- IBM compatible computer with a 386 CPU
- pointing device (mouse or trackball)
- Windows Version 3.1 or later
- 4 megabytes RAM (minimum)
- hard disk drive with 30 megabytes of free space (minimum)*
- 3.5-inch or 5.25-inch high-density floppy drive
- VGA or Super VGA video and monitor
- DRG Software Installation Disks
- printer (optional - for hardcopy reports)

*the program itself uses about 30 megabytes of space, while a review containing all the guidelines uses about 100 kilobytes

2.2 Software Installation

The DRG software is included in the installation disks provided. The DRG program has an install routine that automatically creates the DRG directory and a program icon. The DRG is installed as follows:

- Select **File** in the menu bar of the **File Manager** in Windows, then choose **Run**.
- Insert the DRG Disk 1 in the appropriate floppy drive (for example, drive a).
- At the command line, type **a:setup**.
- Follow the prompts.

When completed, a message will be displayed to indicate that the DRG software was successfully installed. An icon labeled "DRG" appears in the main window. Double click on the icon to run the DRG. The main "DRG" window will appear, displaying the NRC logo and the version number of the DRG software (see Figure 1). All DRG functions are accessed via this screen.

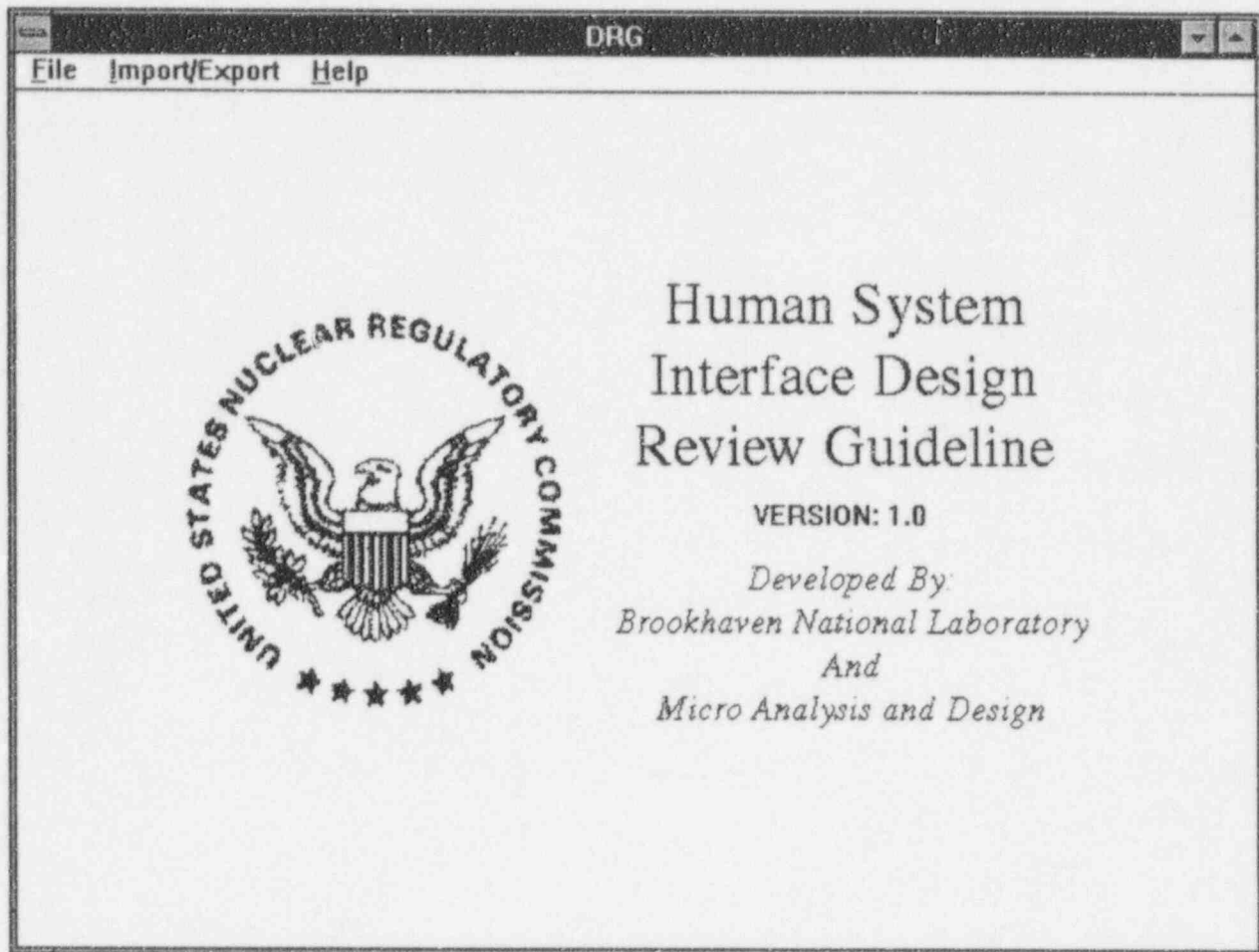


Figure 1 DRG window

The **Import/Export** menu of the DRG is a feature for use by system administrators and is discussed in a separate document, the "Human System Interface Design Review Guideline: NUREG-0700 Software Administrator's Guide." This information is available by contacting the address listed in the SUGGESTIONS/COMMENTS page at the end of this document (page 35).

3 CREATING AND MODIFYING EVALUATION FILES

The first step in using the software is to create a unique file and tailor the guidance to the requirements of the specific review. To create a unique evaluation file, choose **New** from the **File** menu on the main "DRG" window (see Figure 1). The file contains all the guidelines in a database. The table of contents of the database is displayed in the large window labeled "Identify sections for new evaluation" (see Figure 2). The numbers shown in parentheses after the section titles indicate the number of individual guidelines contained in that section.

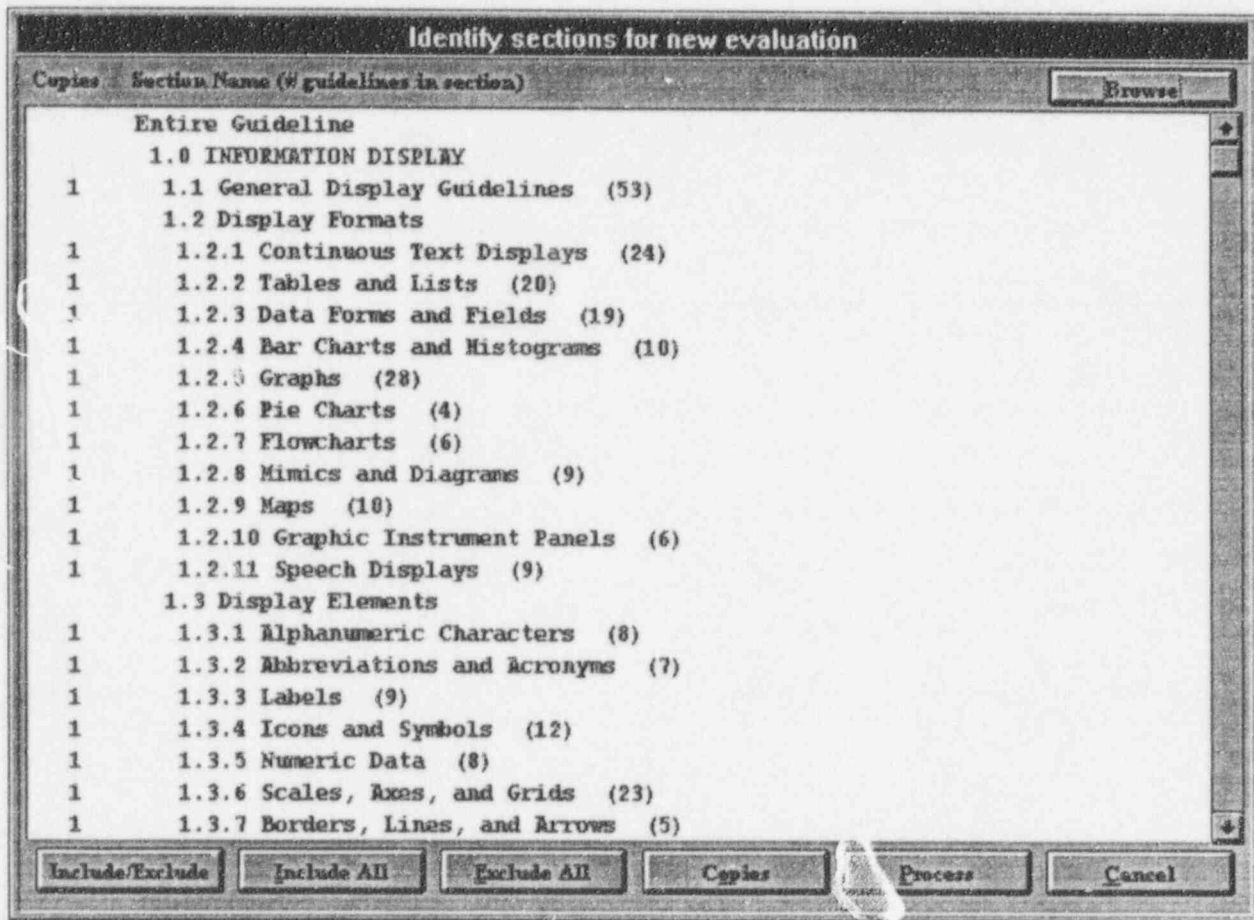


Figure 2 List of guidelines sections

The database can be customized to display only those sections needed for the specific design review by excluding sections not appropriate to the type of HSI being evaluated. Sections can be excluded by first clicking on the section titles in the "Select" window and then clicking the **Exclude** button. A section that has been excluded can be included back in the file by clicking on the section title of the excluded section. When this is done, the label on the **Exclude** button changes to **Include**. When the **Include** button is clicked, the section is included back in the guidelines and can be used for the evaluation.

The **Include All** button selects and includes all sections, including any previously excluded items, resetting the Contents List to its original state of making all guidelines available for review. The **Exclude All** button

excludes all sections from the current review. A dialog box will ask for confirmation before proceeding to include or exclude all sections. The **Exclude All** button is useful if only a small number of sections are needed for a review. In that case, it is easier to exclude all the sections, then selectively include those sections that are needed. Clicking either of these buttons produces an advisory tone. To disable the tone, select the **Beep** option under the **File** menu and turn it to off. Alternatively, the underlined letter within the button (or within menus) can be pressed. For example, to use the **I**nclude All option, click on this function, or just press **I** in conjunction with the **Alt** key.

To assist the reviewer in determining the appropriateness of the guidelines within a section, the **Browse** button opens a window which lists the titles and text of the individual guidelines associated with the section currently highlighted (see Figure 3). This window is closed by clicking **OK**.

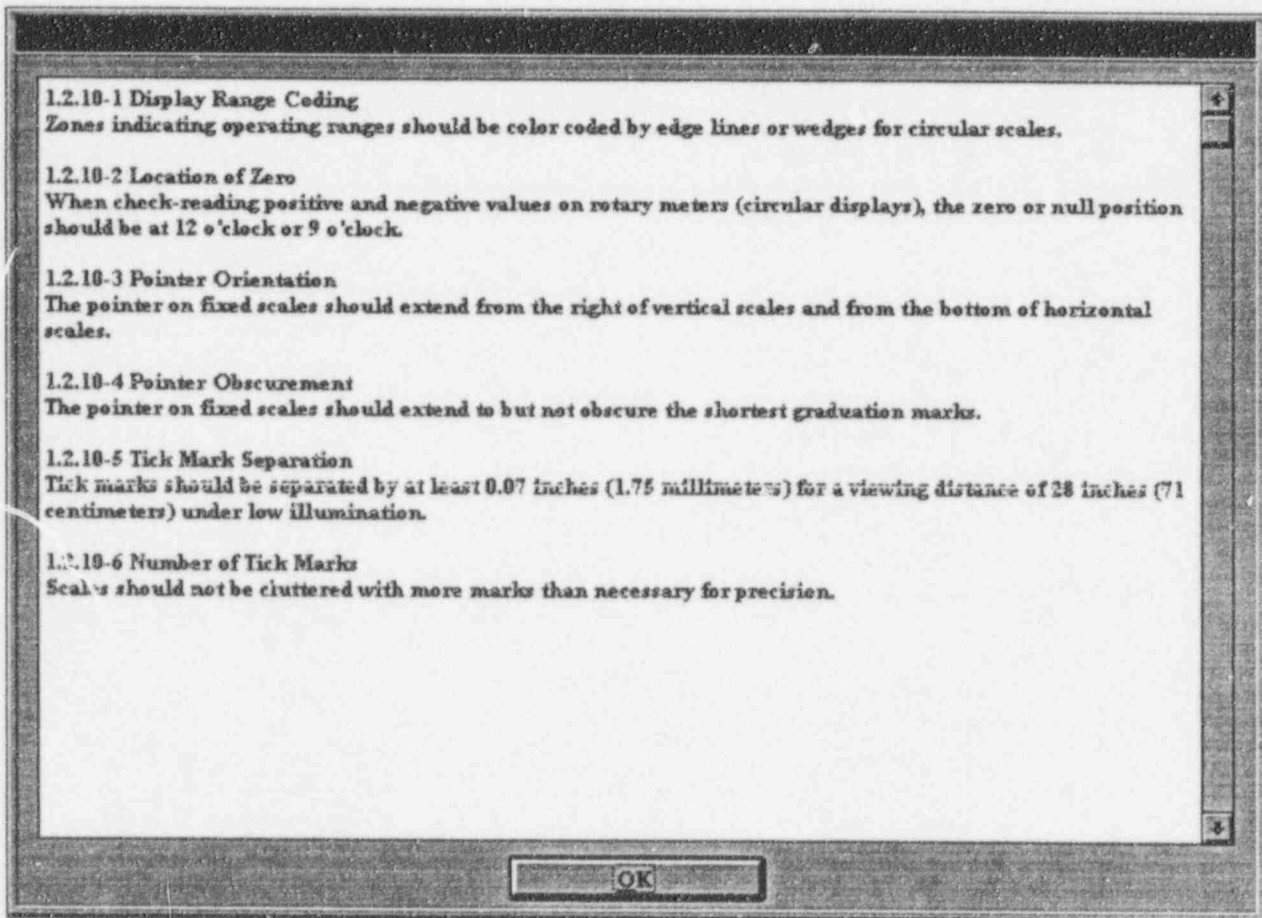


Figure 3 Browse window

It may occasionally be necessary to use a given section of guidelines many times during a single evaluation. This can be accomplished by highlighting the title of the subsection containing that particular guidance, and pressing the **Copies** button. A dialog box will appear in which the number of copies required can be entered. The number of copies made will appear in the left column next to the guideline and/or section title. Additional copies may be added after an evaluation has been created by using the **Modify** function (described on the next page).

When the selection process is completed, the file should reflect only the guidelines needed for the review. At this point, select the **Process** button and confirm. A prompt will ask for a password, limited to 19 characters, to be assigned to the file to prevent unauthorized access to the evaluation file. This password will be requested every time the file is opened. After pressing **OK**, the DRG executes the inclusion/exclusion action for all sections. The guidelines that have been excluded can only be accessed via the index and search functions but not as part of the evaluation.

The **Cancel** button allows you to exit the **New** function without creating an evaluation file.

During an evaluation, a reviewer may wish to include a section that was excluded from the file. This can be accomplished using the **Modify** function. To change the sections available in an existing evaluation file, click on the **Modify** command under the **File** menu name in the "DRG" window. A list of existing evaluation files is displayed. After the file to be modified is selected and the password is entered, the DRG opens that file and displays the existing topic sections and associated guidelines in the window labeled "Identify sections for <path> <filename>" (see Figure 4). New topic sections may be added, or existing ones can be deleted using the **Include** or **Exclude** buttons. The **Copies** button may be used to add duplicates of a particular guideline to the review. When completed, click the **Process** button to execute the modification. A dialog box will confirm that the file has been modified.

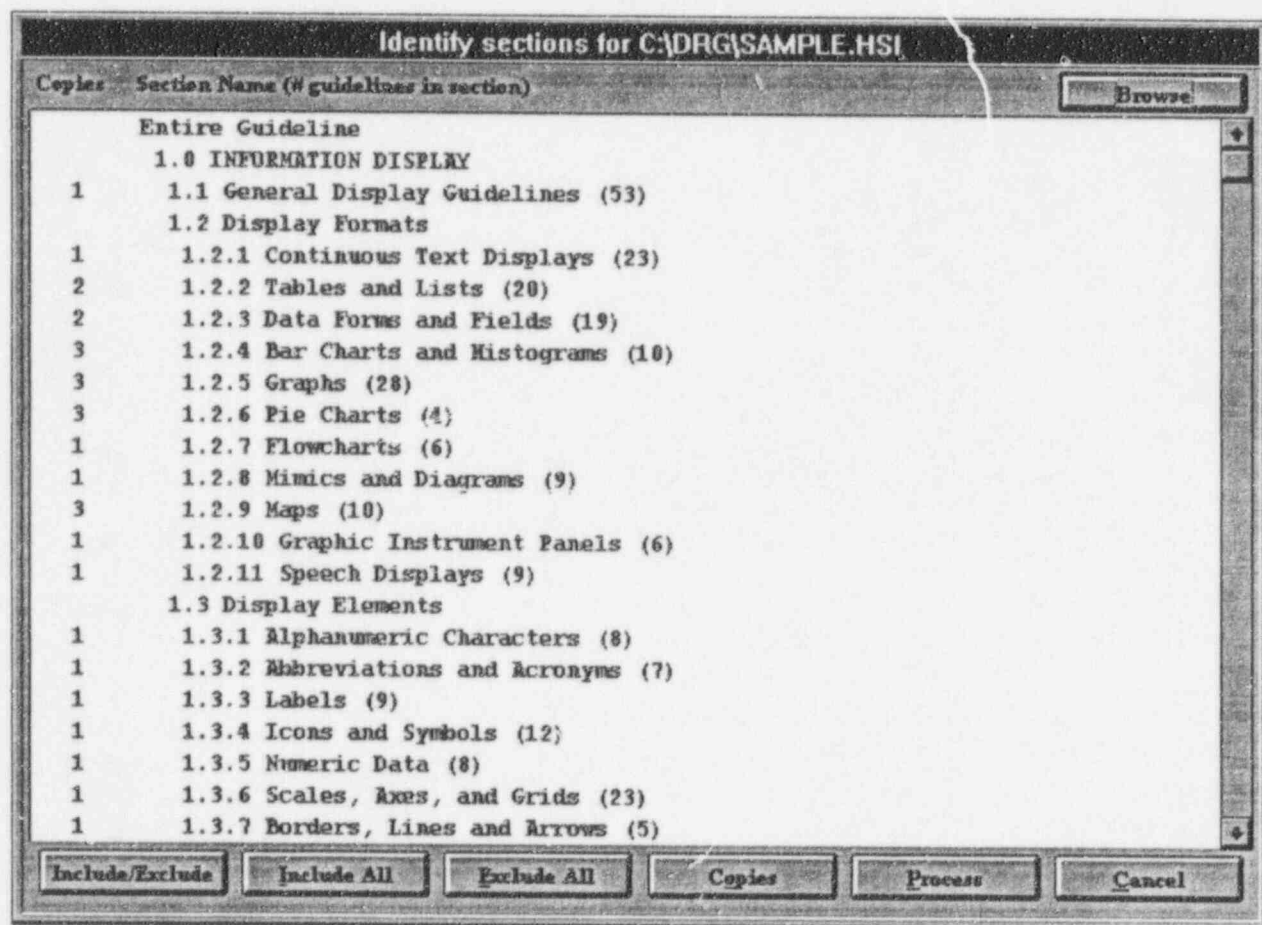


Figure 4 Window to modify sections in an existing evaluation

4 CONDUCTING AN EVALUATION

4.1 Opening Existing Evaluation Files

Use the **Open** command under the **File** menu name of the "DRG" window to list the existing evaluation files. After the file is selected using the correct password, the DRG displays the sections and associated guidelines for that evaluation (see Figure 5).

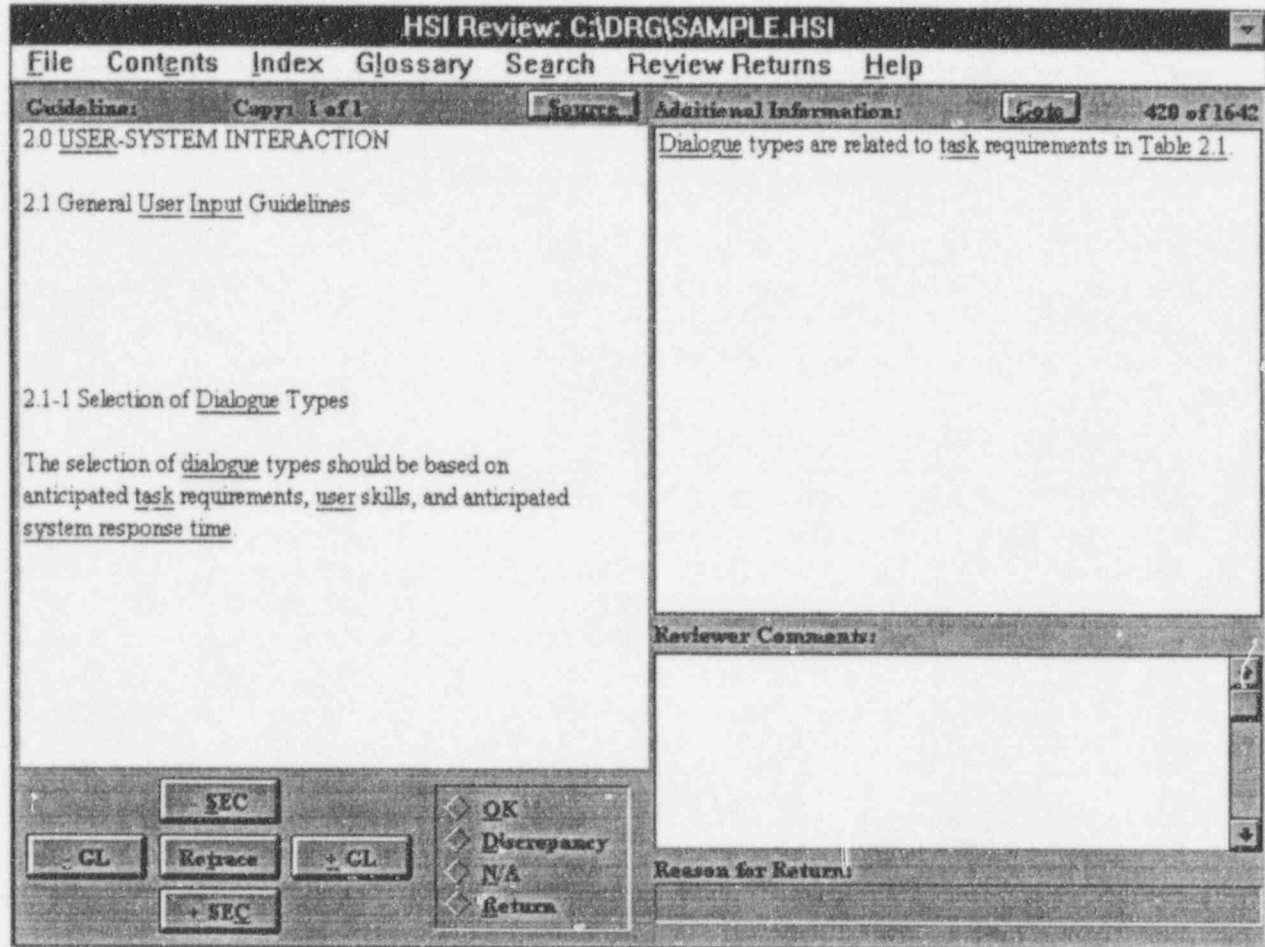


Figure 5 Main HSI review window

4.2 Viewing the Guidelines

Each of the guidelines in NUREG-0700, Rev. 1, is composed of the following components:

Guideline Number - Within each section, individual guidelines are numbered consecutively. Each guideline has a unique number which reflects its section/subsection location followed by a dash and then its unique number. For example, in Guideline 1.1-1, Display Screen Partitioning for HSI Functions, "1.1" reflects its

location in Section 1.1, General Display Principles, and "-1" indicates that it is the first guideline in that section.

Guideline Title - Each guideline has a brief unique descriptive title.

Review Criterion - Each guideline contains a statement of an HSI characteristic with which the reviewer may judge the HSI's acceptability. The criterion is not a requirement and discrepant characteristics may be judged acceptable as per the procedures in the review process.

Additional Information - For many guidelines, additional information is provided which may address clarifications, examples, exceptions, and/or details regarding measurement, figures, or tables. This information is intended to support the reviewer's interpretation or application of the guideline.

Source - The source refers to the document(s) from which the guideline was developed.

The DRG shows this information in the guideline area of the "HSI Review" window. To the left, the section and subsection(s) are presented with the individual guideline's number, title, and review criterion below them. The additional information is presented on the right side of the screen in the window so labeled. The source(s) is displayed when the **Source** button is activated. Volume 1 contains full references for the sources.

Underlined words have hypertext links to glossary definitions, tables, and figures. To view the information, click on the underlined words. Click **OK** when finished viewing. In addition to obtaining word definitions through hypertext links, an on-line glossary is available by selecting **Glossary** from the menu bar. It is displayed as an alphabetical list to the left of the "Glossary" window and can be scrolled using the vertical window bar (see Figure 6). When the desired term is displayed, click on it to display the definition in the upper right window. Alternately, clicking the **Enter Term** button presents a dialog window in which a term can be entered. Click the **OK** button, or press <Enter> or <Return> to display the desired term and its definition in the upper right "Glossary" window. Glossary functions will find only exact matches to the entered terms.

The lower right of the "Glossary" window is the Definition Clipboard (see Figure 6). Desired definitions can be put on the clipboard using the **Add** button. These definitions can be saved to a file using the **Save** button. The file can be retrieved into a word processing program for later use. Terms stored in the clipboard can be deleted using the **Clear** button or printed using the **Print** button. Return to the "HSI Review" window by clicking on **Exit**.

4.3 Evaluation Functions

The evaluation function consists of the evaluation buttons and reviewer comments window. The evaluation buttons designate how well the HSI being reviewed conforms to the guideline. These designations are **OK**, **Discrepancy**, **N/A** and **Return**. **OK** indicates conformance with the guidelines criteria, while **Discrepancy** indicates nonconformance (see NUREG-0700, Rev. 1, for information on the interpretation of evaluations). **N/A** means that the specific guideline does not apply to the HSI being reviewed. The **Return** button indicates that a guideline applies, but more information is needed to assess conformance (in other words, the guideline will be returned to at a later time). When the **Return** button is selected, the "Reason for Return" dialog box is presented, and the reason for returning to the item can be given (see Figure 7).

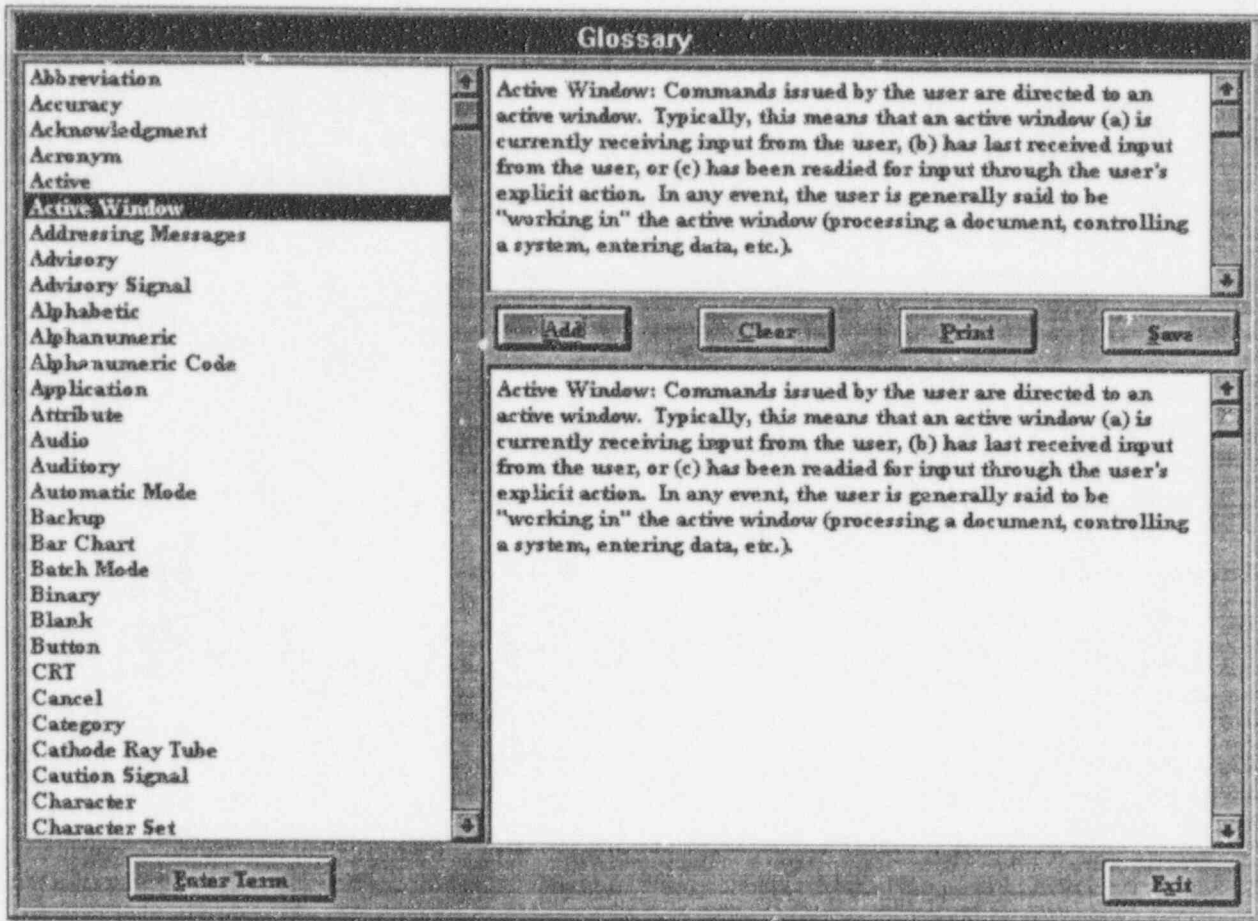


Figure 6 Glossary window

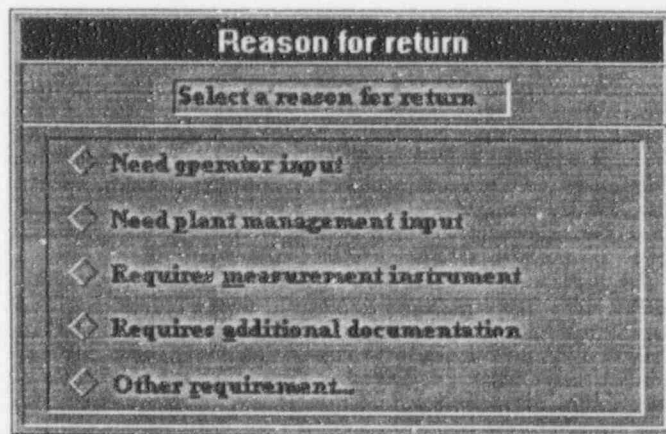


Figure 7 Reasons for returning to guideline

Guidelines to be returned to are collected and reviewed by using the **Review Returns** function on the menu bar of the "HSI Review" window. The guidelines to be reviewed are selected by category using a dialog box similar to that shown in Figure 7. The **Find/Next** button appears within the "Review Returns" dialog box on the screen only when "Returns" are being reviewed and is used to move through the subset of selected items.

Comments can be added using the "Reviewer Comments" area. These comments are stored with the guideline and can be printed in an evaluation report summary.

4.4 Navigation and Search Functions

Movement between entire sections can be made in two ways: using the **Contents** function, or using the +/- section buttons. Selecting **Contents** from the window bar opens a window titled "Select a section to jump to" (see Figure 8). The scroll bar at the right of the "Contents" screen is used to move through the topics list. To go to a topic of interest, simply click on it. Clicking on the **Cancel** button exits the **Contents** window and returns to the "HSI Review" window at the point at which the **Contents** button was activated.

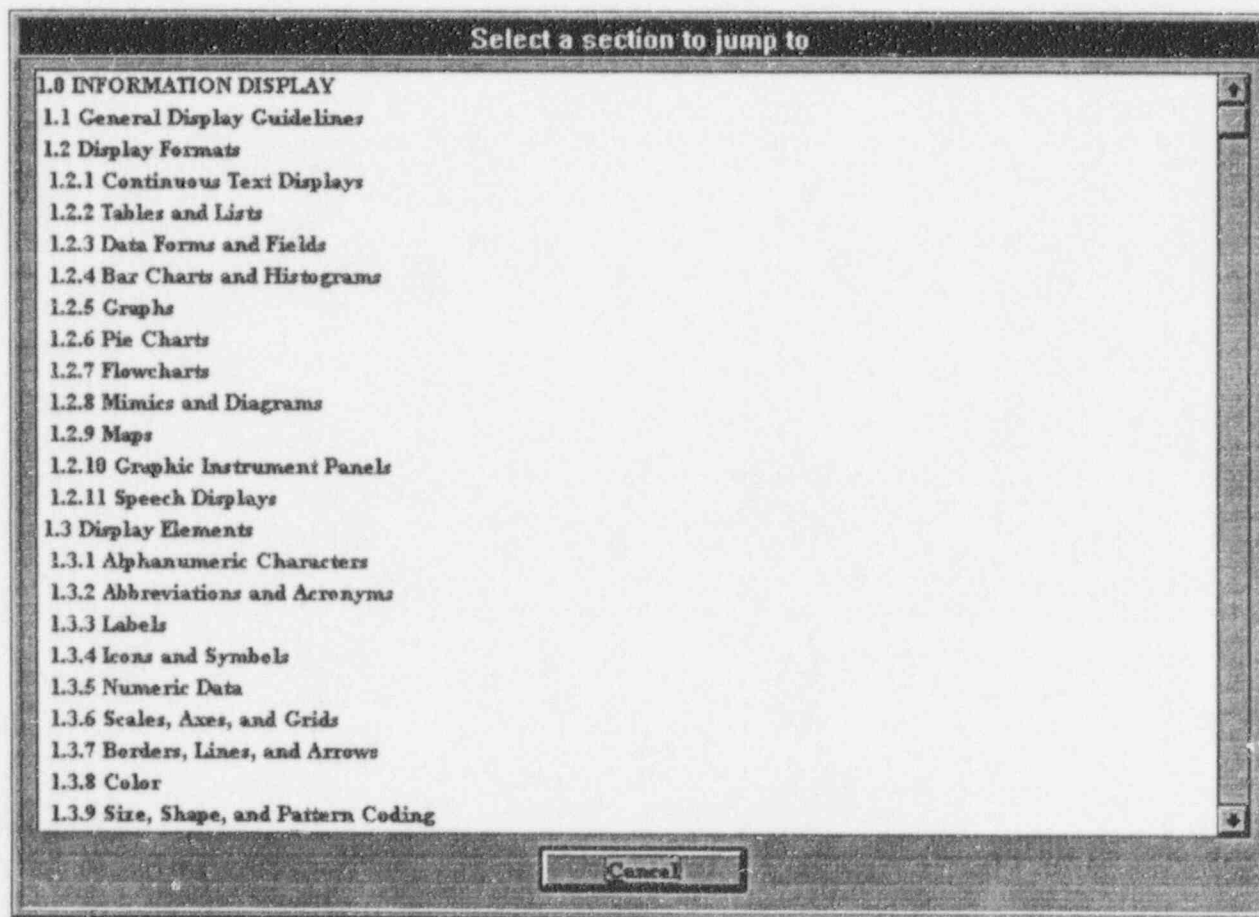


Figure 8 Select a section to jump to window

The **+SEC** and **-SEC** buttons can be used to move from section to section. Clicking the **+SEC** button causes the first guideline of the section following the current section to be displayed. Clicking the **-SEC** button causes the previous section to be displayed.

Within a section, the **+GL** and **-GL** buttons can be used to cause the next or previous guideline in the current section to be displayed. If the **+GL** button is pressed while the last guideline in the section is being displayed, the first guideline in the next section of the document will be displayed. If the **-GL** button is pressed while the first guideline in the section is being displayed, the last guideline in the previous section will be displayed. The **ReTrace** button retraces the path through the guidelines.

When using multiple copies of sections, the copy number appears in boldface just below the menu bar in the second most left-hand column. Use the **Contents** button to navigate from one copy to another by clicking on the number of the copy desired (each is listed below the section title within the Contents list).

Individual guidelines can also be accessed through the **Go To** button. The **Go To** button, located above the Additional Information area (see Figure 5) allows a search to a specific guideline by entering its record number at the pop-up dialog box.

Two navigation functions, **Search** and **Index**, enable the reviewer to find specific guidance of interest. Clicking on the **Search** function on the menu bar of the "HSI Review" window displays the "Search" dialog box. A search can be made forward and backward through any combination of guideline names, guideline text, additional information fields, and comment fields for any term specified (see Figure 9). Click on the **Exit** button to close the "Search" dialog box.

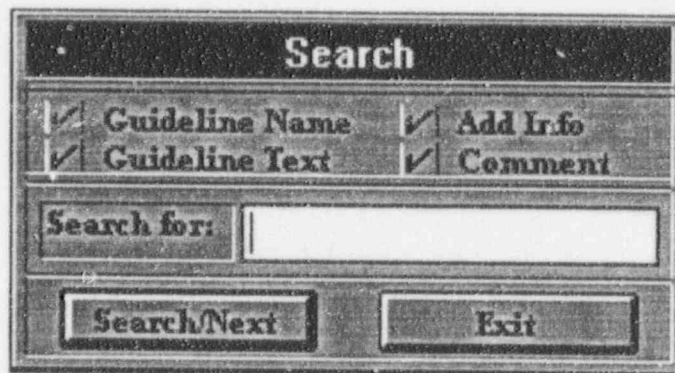


Figure 9 Search dialog box

When the **Index** button is clicked, the "Context Index" window opens (see Figure 10). Index terms are listed in the upper left-hand section of the "Context Index" window. The number of times the term appears in the DRG is listed to the right of the word. Note that the Index function shows all words contained in the document, even words such as "a" or "the". Search for a specific term using the vertical scroll bar, or click on the **Enter Term** button and, in the dialog box that appears, type in the desired index term and click **OK**. When a word is selected, the first 96 occurrences (sufficient for all technical terms) are displayed in the "Context Index" window in the lower part of the screen. The index displays the selected word in the center and the surrounding text as it appears in the guidelines. Clicking on a line of text brings the reviewer to that guideline in which the text string appears. The **Exit** button returns to the "HSI Review" window at the point at which the **Index** button was activated.

Instead of clicking the button, each navigation and evaluation function can be executed by typing its underlined character in conjunction with the Alt key.

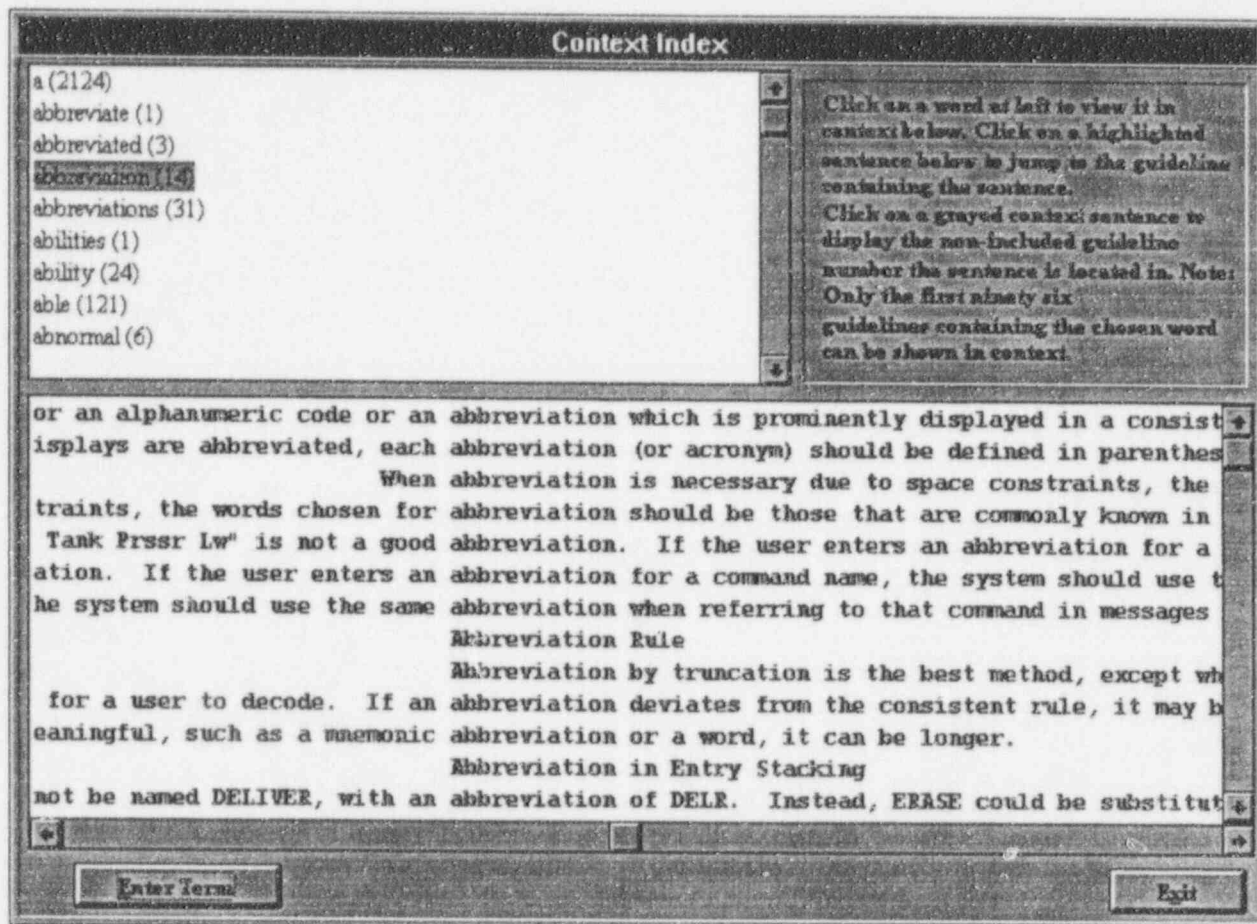


Figure 10 Context index window

5 PREPARING A REPORT AND REPORT FILE

5.1 Preparing a Report

Clicking on the **Report** command under the **File** menu name of the "HSI Review" window displays the "Report Specification" window (see Figure 11). This window lists the number of guidelines currently evaluated as "OK", "Discrepancy", "Not Applicable", "Incomplete" (i.e., not yet evaluated), or marked "Return" for later review. Any or all of these evaluation categories can be included in the report by clicking on the check boxes associated with each category. The "Report Specification" window also displays the number of guidelines (records) included in the current evaluation, and the number excluded from the complete set of guidelines.

Report to Include:	Occurrences:
<input checked="" type="checkbox"/> OK	5
<input checked="" type="checkbox"/> Discrepancy	4
<input checked="" type="checkbox"/> Not Applicable	1
<input checked="" type="checkbox"/> Return	3
<input checked="" type="checkbox"/> Incomplete	1625
Total Guidelines Included:	1642
Total Guidelines Excluded:	0

Figure 11 Report specification window

Clicking on the **View Report** button causes the specified report to be generated and the report summary screen to be displayed (see Figure 12). The report can include all guidelines or as few as one, depending on the evaluation categories selected for inclusion. The numbers and titles of the guidelines in the report appear in the upper window. The list can be traversed using the vertical scroll bar. Clicking on a guideline number/title causes the entire guideline to be displayed in the lower part of the screen along with any comments entered by the reviewer.

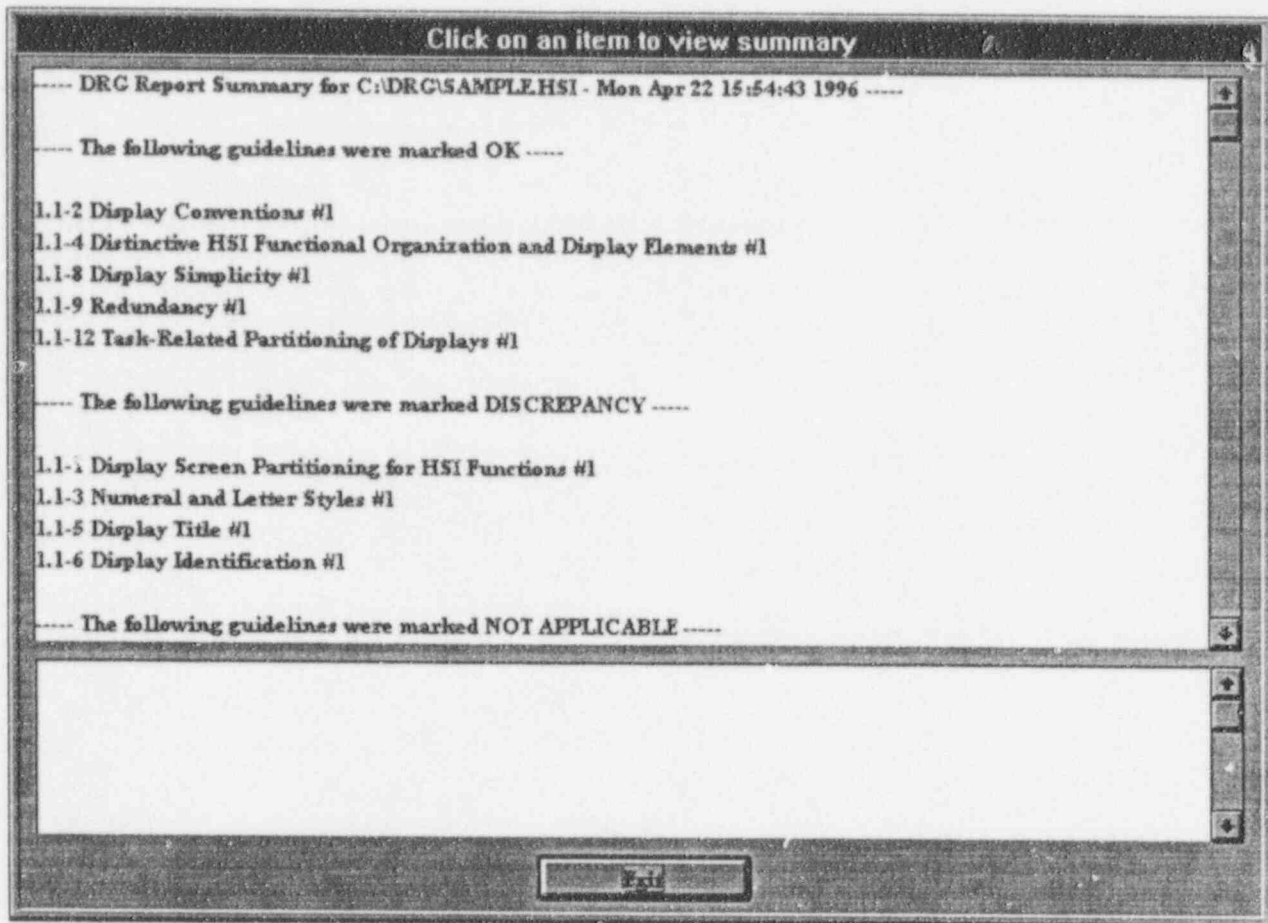


Figure 12 Report summary screen

5.2 Printing a Report

Clicking the **Print Report** button causes the "Print" dialog box to be displayed. This dialog box allows the reviewer to choose quality of output as well as number of copies by clicking in the respective boxes (the **Print to File** checkbox is discussed in the next section). After pressing the **OK** button, a pop-up window will detail the length of the report, and after clicking **OK** again, the report will be printed.

5.3 Saving a Report to a File

To save a report as a generic text file for importing into word processing software, click the **Print Report** button to open the "Print" dialog box. At the lower left, a **Print to File** check box appears which provides the option to save the formatted report as a file.

Click inside the check box, then press **Setup**. The dialog box labeled "Print Setup" will open. Click on the **Specific Printer** option, then use the arrow key to show all printer options. Scroll through to the output format **Generic/Text Only on File:**. When this option is chosen, it will be highlighted under **Specific**

Printer. Press **OK**. As in printing, a pop-up window will detail the length of the report. After pressing **OK**, the "Print to File" dialog box will provide a space in which to type a file name for the report. Unless specified otherwise, the file will be saved in the DRG working directory (for example, C:\DRG). Click on **OK** to save the report with the specified file name. Click on **Exit** when done.

6 ON-LINE HELP

A **H**elp feature is available within every window of the DRG providing on-line assistance for performing a desired function. When the **H**elp button is pressed, a pop-up dialog box will provide the options **C**ontents, **U**sing **H**elp, and **A**bout. When the **C**ontents button is pressed, a window appears listing all topics for which help information is available. Simply click on the topic for the information to be displayed. There are various other features within **C**ontents, such as **S**earch, which enables the reviewer to locate a particular topic, if it is available.

Using **H**elp is a feature that gives the reviewer basic information on using other Help options most efficiently (see Figure 13). Similar options are available in the "How to Use Help" window, as within other windows in the DRG software. Simply click on the highlighted areas for more information.

The **A**bout feature of the Help Window displays the opening screen of the DRG, including the current software version number. Click **O**K to close.

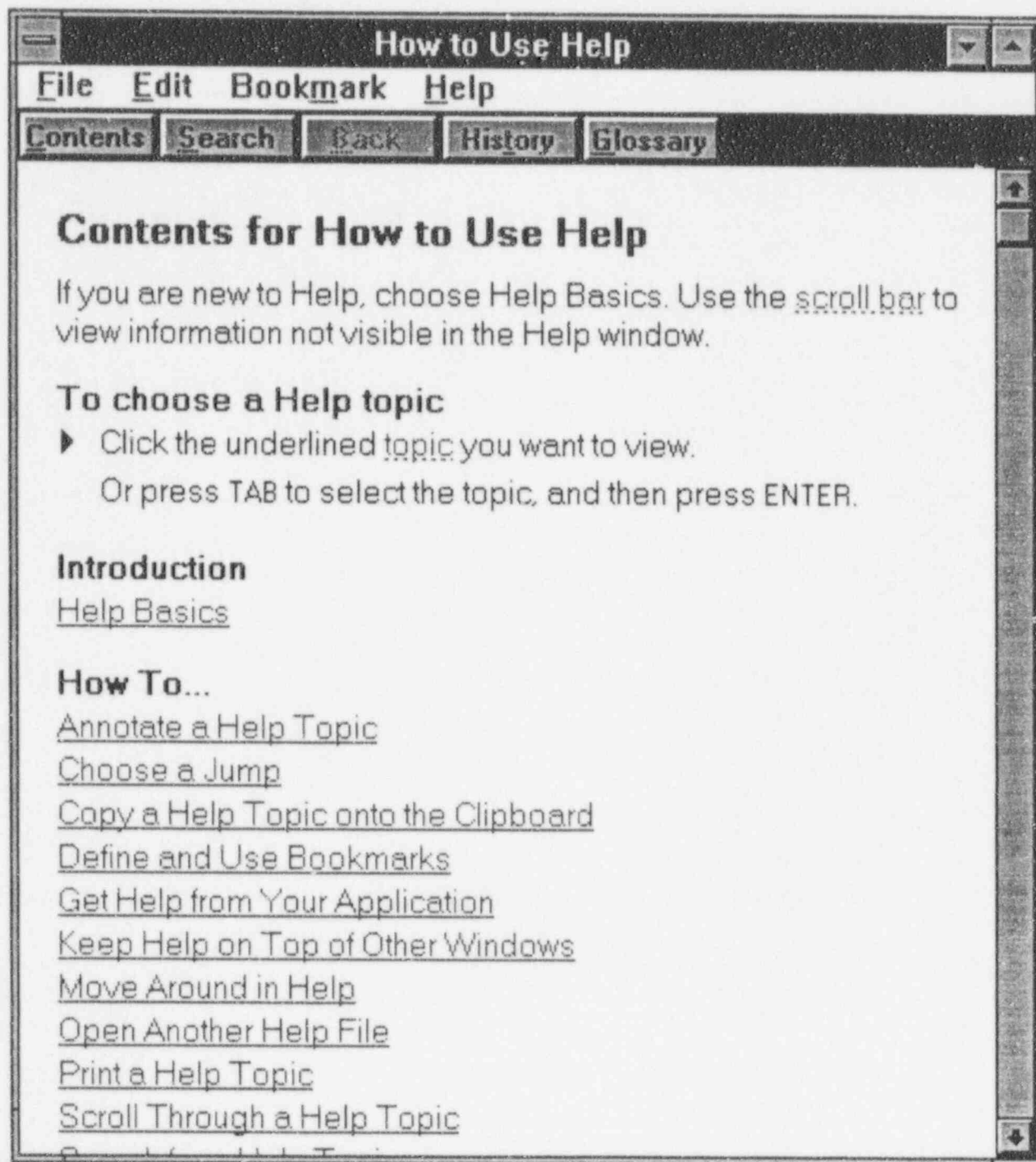


Figure 13 Help window

7 TUTORIAL

The DRG capabilities and functions are demonstrated in the following tutorial. First, a sample evaluation will be created and modified. Then, this sample evaluation can be used to perform a practice review. Finally, a report displaying the results of the review will be generated.

7.1 Creating a Sample Evaluation File

To read more information on this topic before beginning the tutorial, see Section 3, Creating and Modifying Evaluation Files, on page 5.

1. From the "Program Manager" window, choose the DRG icon to open the DRG.
2. From the "DRG" window, select **F**ile in the menu bar, then choose **N**ew to create a new evaluation. The selection window titled "Identify sections for new evaluation" will appear.
3. Note that when you first enter this window, all sections in the Contents are displayed. If you make a mistake, or wish to start over, you can always click the **I**nclude All button to return all sections to the current Contents.
4. Click on section 1.2, Display Formats, to select it.
5. Delete section 1.2 from this evaluation by clicking on the **E**xclude button. Section 1.2 and the 11 subordinate sections will dim.
6. Use the vertical scroll bar to go to section 1.5.1, Video Display Units.
7. Select section 1.5.1, then exclude it from this evaluation by clicking on the **E**xclude button.
8. Browse through section 1.5.2, Large Screen Displays, by selecting it and then clicking on the **B**rowse button.
9. Go to guideline 1.5.2-6 and use the vertical scroll bar as needed to view the entire text.
10. Close the "Browse" window by clicking the **O**K button.
11. Use the vertical scroll bar to return to section 1.2.
12. Select section 1.2.11 by clicking on it (Section 1.2.11 is currently dimmed).
13. Include section 1.2.11 by clicking on the **I**nclude button.
14. Click on the **P**rocess button to build the evaluation from the selected guidelines.
15. When prompted, type in the password you wish to use, making sure you remember it for future use. You may use up to 19 characters. This password will be requested each time the file is opened or modified.

16. When the dialog box titled, "Enter name for new evaluation" appears, enter the filename **SAMPLE.HSI** and click **OK**.
17. When the selected records have been found and processed, you will be taken directly to the "HSI Review" window and the first guideline chosen for your review.
18. Choose **C**ontents on the menu bar. Notice that the excluded sections (1.2.1 through 1.2.10 and 1.5.1) are not listed in the Contents.
19. Return to the "HSI Review" window by clicking the **C**ancel button.
20. Select **F**ile in the menu bar, then choose **E**xit to return to the "DRG" window.

(To see this newly created file in the list, choose **O**pen under the **F**ile menu. Note that the **SAMPLE.HSI** file is now listed under "Files".)

7.2 Modifying the Sample Evaluation File

To read more information on this topic before beginning the tutorial, see Section 3, Creating and Modifying Evaluation Files, on page 5.

1. From the "DRG" window, select File in the menu bar, then choose **M**odify.
2. When the dialog box titled "Select evaluation to modify" appears, select **SAMPLE.HSI** and click **OK**. Type in the password when prompted.
3. You can now modify the **SAMPLE.HSI** evaluation using any of the selection functions in the current window, titled "Identify sections for <path> **SAMPLE.HSI**". For this exercise, select all of the Contents elements by clicking the **I**nclude All button. You will see a warning, just to remind you that all sections will now be included. Press **OK**.
4. Process the evaluation (which includes the complete Contents) by clicking the **P**rocess button, followed by **OK**.
5. You will be brought into the "HSI Review" window to the first guideline. Click on **F**ile and **E**xit to close.

7.3 Conducting a Practice Review

To read more information on this topic before beginning the tutorial, see Section 4, Conducting an Evaluation, on page 9.

1. From Windows, choose the **DRG** icon to open the DRG.
2. From the "DRG" window, select **F**ile in the menu bar, then choose **O**pen. When the selection window appears, select the file **SAMPLE.HSI** and click **OK**. Type your password and click **OK**.

3. Click **C**ontents on the menu bar. When the window titled "Select a section to jump to" appears, click on subsection 1.2.4 ("Bar Charts and Histograms"). Guideline 1.2.4-1 should be displayed.
4. Page through the next three guidelines to 1.2.4-4 using the **+GL** button.
5. Go to the previous guideline 1.2.4-3 using the **-GL** button.
6. Click on the **G**o To button and enter guideline number **112** in the dialog box. Click **O**K.
7. Click on the **R**etrace button to return to guideline 1.2.4-3.
8. Choose **G**lossary on the menu bar to display the "Glossary" window.
9. Click the **E**nter Term button, then type *display* in the "Search" dialog box and click **O**K. The definition of the term should be displayed.
10. Use the vertical scroll bar to find the term *bar chart*. Click on the term to display its definition.
11. Place the definition for *bar chart* in the "Definition Holder" using the **A**dd button.
12. Select and **A**dd the term display to the "Definition Holder."
13. Save the current contents of the "Definition Holder" to a file named **DEF.TXT** using the **S**ave button.
14. If a printer is attached to your computer, click the **P**rint button. When the "Print" dialog box appears, click **O**K to print a copy of the current contents of the "Definition Holder." A dialog box will tell you the report will be one page long. Click **O**K.
15. Clear the current contents of the "Definition Holder" by clicking the **C**lear button.
16. Exit from the "Glossary" window by clicking the **E**xit button.
17. Select **H**elp in the menu bar of the "HSI Review" window. Click on **C**ontents. Click on any help topic to display it, then click on the **S**earch button to display the "Search" window.
18. Select a topic, click the **S**how Topics button, then click on a topic below. Click the **G**o To button.
19. Select the **G**lossary function from the menu bar. Click on any glossary term to view its definition. To close the glossary term definition box, click anywhere outside the box.
20. Select **E**xit under the **F**ile menu name to close the Help function and return you to the "HSI Review" window.
21. Go to guideline 1.2.5-1 using the **+SEC** button.

22. View the source of guideline 1.2.5-1 by clicking the **Source** button. Click **OK** to close the "Source" dialog box..
23. Use the **Contents** function to move to section 1.2.2.
24. Click on any underlined word to display its glossary definition. Click **OK** in the dialog box to close it.
25. Select the **Search** function from the menu bar. When the dialog box appears, enter *legend* in the field titled "Search for".
26. Click the **Search/Next** button. The next appearance of *legend* (in guideline 1.2.4-2) is displayed. Click on the **Exit** button to close.
27. Go to guideline 1.2.2-2 using the **Contents** function and **±GL** button.
28. Designate that guideline 1.2.2-2 is OK by clicking the **OK** button.
29. Move to guideline 1.2.2-3 with the **±GL** button and designate Discrepancy. Enter *Rows and columns not labeled* in the "Reviewer comments" area.
30. Move to guideline 1.2.2-4 with the **±GL** button and designate it as a "Return".
31. When the "Reason for return" dialog box appears, select *Need Operator Input*.
32. Move to guideline 1.2.2-5 with the **±GL** button, designate it as a Return, and select *Other Requirement* as the reason for return.
33. Enter *The list to be inspected is temporarily unavailable* in the "Reviewer comments" area.
34. Move to guideline 1.2.2-6 with the **±GL** button and designate it as N/A.
35. Move to guideline 1.2.2-7 with the **±GL** button and designate it as a Return.
36. Select *Need Operator Input* as the reason for return.
37. Use the **Contents** function to move to section 1.2.4, guideline 1.2.4-1.
38. Select **Review Returns** from the menu bar. When the "Review Returns" dialog box appears, select *Need Operator Input* and click the **Find/Next** button. When the dialog box appears prompting "Searched to last guideline, search from first guideline?", click **Yes**. The display will then show Guideline 1.2.2-4.
39. Move to the next guideline designated "Return/Need Operator Input" using the **Find/Next** button. Guideline 1.2.2-7 should be displayed.

40. Use the **Review Returns** button to review guidelines designated "Other requirement". Click the **Find/Next** button in the "Review Returns" dialog box. When the dialog box appears prompting "Searched to last guideline, search from first guideline?", click **Yes**. The display will then show Guideline 1.2.2-5.
41. Click the **Exit** button to leave the "Review Returns" dialog box.
42. Select **I**ndex in the menu bar to open the "Context Index" window.
43. Click the **Enter Term** button and enter *logic* in the "Search" dialog box.
44. A list of statements from guidelines that contain the term *logic* will appear in the lower box. Use the scroll bars until you find the statement "...software logic might prepare and transmit..." Click on this line to display guideline 6.1-5, which contains the identified text.
45. Return to the Index function by clicking on the **I**ndex button.
46. Go to the guideline containing the statement "...understand the analysis logic employed by the KBS..." and click on this text to display guideline 5.1-1.
47. Save the existing evaluation by clicking on the **S**ave command under the **F**ile menu.
48. Leave the "HSI Review" window by clicking on **E**xit under the **F**ile menu. Exit the program.
49. From a text editor or word processing application, open and view the DEF.TXT file in the "DRG" working directory.

7.4 Generating a Sample Report

To read more about the DRG report functions, see Section 5, Preparing a Report and Report File, on page 15.

1. From the "DRG" window, choose **O**pen under the **F**ile menu, then choose the SAMPLE.HSI evaluation and click **O**K. Enter your password and click **O**K.
2. From the "HSI Review" window, choose **R**eport under the **F**ile menu.
3. Use the check boxes in the "Report Specification" box to deselect the guidelines designated "Return" and "Incomplete", leaving "OK", "Discrepancy", and "Not Applicable" selected.
4. Click the **V**iew Report button to build a summary report.
5. When the window labeled, "Click on an item to view summary" appears, click on guideline 1.2.2-3 to view the guideline text and reviewer comment.
6. Use the vertical scroll bar as needed to view the reviewer comments. Click on **E**xit to close.

7. Click the **P**rint **R**eport button and the **Y**es button to include reviewer comments and return codes in the report. Click **O**K in the "Print" dialog box to generate a hardcopy report, or click **C**ancel if a printer is not available. Click **O**K in the "Report Info" dialog box which tells how long the report will be in hard copy.
8. Click the **E**xit button in the "Report Specification" window to return to the "HSI Review" window.
9. Click **E**xit under the **F**ile menu to return to the "DRG" window.
10. Click **E**xit under the **F**ile menu to exit from the DRG program.

This concludes the DRG tutorial.

GLOSSARY

This glossary lists and defines all the buttons, menu bar names, and menu commands used in the DRG. Each term in the following alphabetical list includes a description, location, and function.

Add button

A select button in the "Glossary" window used to add terms to the Definition Holder.

Beep

An option located under the File menu of the "HSI Review" window, which can be turned on to sound an advisory tone before certain actions occur.

Browse button

A button in the selection screens that are accessed by the New or Modify command functions used to open a window listing titles and text of the individual guidelines in the section currently highlighted.

Cancel button

A button located throughout the "HSI Review" window used to leave the current screen or function without executing the function or command.

Clear button

A button located in the Definition Holder in the "Glossary" window used to clear the current contents.

Contents button

A document-support function that is found in the "HSI Review" window menu bar which opens a pop-up scrollable window. Selecting a section displays the first guideline of the selected topic. The scroll bar at the right of the "Contents" Screen is used to move through the topics list.

Definition Clipboard

An area of the "Glossary" window which allows the reviewer to create a list of definitions and save this list to a file. The list of pertinent definitions can be printed and referenced later, as necessary.

Directory

A function located under the File menu of the "DRG" window which can change the working directory (where evaluation files are stored).

Discrepancy

A toggle button located in the "HSI Review" window used when the system being evaluated does not conform to the guidance contained in the guideline.

Enter Term

A button within the Glossary word search function which allows the reviewer to type the desired word in the "Search" dialog box and display its definition.

Evaluation

A set of selected section topics and guidelines that are used to perform a review.

Exclude All button

A button in the selection screen that is accessed by the New or Modify command functions to exclude all sections contained in the DRG.

Exclude button

A button in the selection screens that are accessed by the New or Modify command functions used to exclude a specific DRG section from an evaluation.

Export Database

A command located under Import/Export on the main "DRG" window menu used to export text and graphics files from the DRG.

File menu

A menu of options located on the menu of the main "DRG" window containing commands to open, modify, review evaluations, or to list existing directories.

Find/Next

An evaluation button in the "HSI Review" window which appears on the screen (next to the Review Returns button) only when "Returns" are being reviewed. It is used to move through the subset of selected items.

+GL

A navigation button in the "HSI Review" window which will display the next guideline in the current section (or the first guideline in the next section, if the current position is at the last guideline of a section).

-GL

A navigation button in the "HSI Review" window which will display the previous guideline in the current section (or the last guideline in the previous section, if the current position is at the first guideline of a section).

Glossary

A document support function that is a menu name in the "HSI Review" window bar. This command will display the HFE glossary alphabetically and can be scrolled through using the vertical window bar (clicking the Enter Term button presents a dialog window in which a term can be entered; see **Enter Term**).

Go To button

A navigation button in the "HSI Review" window which opens a pop-up dialog box to enter the record number of a specific guideline.

Help

An on-line function key in the menu bar of the "HSI Review" window which accesses the DRG help information.

Import Database

A command located under the Import/Export menu name of the main "DRG" window used to import text and graphics files into the DRG.

Import/Export

A menu name located in the "DRG" windows bar containing Import Database and Export Database commands to edit DRG text and graphics using external programs.

Include All button

A button in the selection screen that is accessed by the New or Modify command functions to include all the sections contained in the DRG.

Include button

A button in the selection screens that are accessed by the New or Modify command functions to include a specific section of the DRG.

Incomplete

A toggle button located in the "Report Specification" window used when there is not enough information to assess whether the system or design conforms to the guideline criteria.

Index

A document support function that is a menu name in the "HSI Review" window. This command displays an index of terms used in the guidelines documentation. Search for a specific term using the vertical scroll bar, or click the Enter Term button and enter the desired term in the dialog box. The first 96 occurrences of that word in guideline titles or text will be displayed.

Modify

A command located under the File menu of the main "DRG" window used to revise existing evaluations.

N/A

A toggle button located in the "HSI Review" window used when guidance contained in the guideline does not apply to the system being reviewed.

Need Operator Input

An option in the "Reason for return" dialog box to explain a Return designation.

New

A command located under the File menu of the main "DRG" window used to create an evaluation.

OK button

¹A general button used throughout the DRG to continue or proceed.

²A toggle evaluation button in the "HSI Review" window used when the system conforms to the guidance contained in the guideline.

Open

A command located under the File menu of the main "DRG" window to open an existing evaluation for review or generating a report.

Other Requirement

An option in the "Reason for return" dialog box to explain a Return designation.

Print button

A button in the "Glossary" dialog box to print the current contents of the Definition Clipboard.

Print Report

A button in the "Report Specification" dialog box used to print a report.

Process button

A button in the selection screen that is accessed by the New or Modify command functions used when all guideline sections for a particular review have been selected (this screen will not close if inclusion/ exclusion changes are pending).

Report

A command located in the menu bar of the "HSI Review" window used to access the report generation options.

Retrace button

A navigation button in the "HSI Review" window which causes the previously displayed guideline to appear.

Return button

A toggle evaluation button located on the "HSI Review" window used when there is insufficient information to make an assessment. A pop-up dialog box lists reasons from which to choose to mark a return to the guideline.

Review Returns

A command in the "HSI Review" window used to review those guidelines in a specific category designated as returns.

Save

A command located under the File menu of the main "DRG" window used to update and store files.

Save As

A command on the menu bar of the main "DRG" window used to save a new file or an existing file under a new name.

Search function

A command on the menu bar of the "HSI Review" window which allows a search for a particular term in guideline titles, text, additional information, and/or comment fields.

+SEC

A navigation button in the "HSI Review" window which displays the first guideline in the next section.

-SEC

A navigation button in the "HSI Review" window which displays the first guideline in the previous section.

Source button

A button in the "HSI Review" window that identifies the source document(s) for the guideline

View Report

A button in the "Report Specification" dialog box which displays a summary report.

INDEX

add 7, 10, 23, 27
beep 6, 27
browse 6, 21, 27
cancel 7, 12, 22, 26, 27
clear 10, 23, 27
contents 5, 12, 13, 19, 21-24, 27
definition clipboard 10, 27
directory 3, 17, 25, 27
discrepancy 10, 15, 24, 25, 27
enter term 10, 13, 23, 25, 27-29
evaluation functions 10-14, 27
exclude 5-7, 21, 28
exclude all 5, 6, 28
export 4, 28, 29
file menu 5-7, 9, 15, 22, 23, 25-30
find/next 12, 24, 25, 28
+GL 13, 23, 24, 28
-GL 13, 23, 28
glossary 10, 11, 23, 24, 27, 28, 30
go to 12, 13, 21, 23-25, 28
help 19, 20, 23, 28
import 4, 28, 29
import/export 4, 28, 29
include 5-7, 15, 21, 22, 29
include all 5, 6, 15, 21, 22, 29
incomplete 15, 25, 29
index 7, 13, 14, 25, 29
modify 6, 7, 22, 27-30
N/A 10, 24, 29
need operator input 24, 29
new 5, 7, 19, 21, 27-30
OK 6, 7, 10, 13, 15-17, 19, 21-26, 29
open 6, 9, 16, 22, 25, 29
other requirement 24, 25, 30
print 10, 16, 17, 23, 26, 30
print report 16, 26, 30
process 6, 7, 10, 21, 22, 30
report 12, 15, 16, 25, 26, 30, 31
retrace 13, 23, 30
return 10, 15, 24-26, 29, 30
review returns 12, 24, 25, 28, 30

save 10, 16, 23, 25, 27, 30
search 7, 12, 13, 19, 23-25, 27, 29, 30
+SEC 12, 13, 23, 30
-SEC 12, 13, 31
source 10, 24, 31
view report 15, 25, 31

SUGGESTIONS/COMMENTS

If you have any suggestions or comments on the guidelines, the software, or this Guide, please send them to:

**Director, Division of Systems Technology
NUREG-0700 Administration
Office of Nuclear Regulatory Research
Mail Stop T-10 E37
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001**

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER
(Assigned by NRC. Add Vol., Supp., Rev.,
and Addendum Numbers, if any.)

NUREG-0700

Rev. 1

Vol. 3

2. TITLE AND SUBTITLE

Human-System Interface Design Review Guidelines

Review Software and User's Guide

Final Report

3. DATE REPORT PUBLISHED

MONTH

YEAR

June

1996

4. FIN OR GRANT NUMBER

L1317

5. AUTHOR(S)

6. TYPE OF REPORT

7. PERIOD COVERED (Inclusive Dates)

January 1995 - June 1996

8. PERFORMING ORGANIZATION - NAME AND ADDRESS (If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)

9. SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)

Division of Systems Technology
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

10. SUPPLEMENTARY NOTES

11. ABSTRACT (200 words or less)

NUREG-0700, Rev. 1, provides human factors engineering (HFE) guidance to the U.S. Nuclear Regulatory Commission staff for its: (1) review of the human system interface (HSI) design submittals prepared by licensees or applicants for a license or design certification of commercial nuclear power plants, and (2) performance of HSI reviews that could be undertaken as part of an inspection or other type of regulatory review involving HSI design or incidents involving human performance. The guidance consists of a review process and HFE guidelines. The document describes those aspects of the HSI design review process that are important to the identification and resolution of human engineering discrepancies that could adversely affect plant safety. Guidance is provided that could be used by the staff to review an applicant's HSI design review process or to guide the development of an HSI design review plan, e.g., as part of an inspection activity. The document also provides detailed HFE guidelines for the assessment of HSI design implementations. NUREG-0700, Revision 1, consists of three stand-alone volumes. Volume 1, Human System Interface Design Review Guideline: Process and Guidelines, is the principal technical document and provides a detailed discussion of both the review procedures and HFE guidelines. Volume 2, Human System Interface Design Review Guideline: Reviewer's Checklist, provides the HFE guidelines in a checklist format. Volume 3, Human System Interface Design Review Guideline: Review Software and User's Guide, contains an interactive software application to support design reviews.

12. KEY WORDS/DESCRIPTORS (Use words or phrases that will assist researchers in locating the report)

control rooms, human factors engineering, man-machine systems, nuclear power plant design, reactor safety, decision making, functional models, inspection, interfaces, reactor instrumentation, reactor operators, standardization

13. AVAILABILITY STATEMENT

unlimited

14. SECURITY CLASSIFICATION

(This Page)

unclassified

(This Report)

unclassified

15. NUMBER OF PAGES

16. PRICE



Federal Recycling Program

ISBN 0-16-048754-4

