CORPS OF ENGINEERS HARBOR PROJECTS:
Development of Tools, Measures, and Organization of Data for Evaluating Performance

VOLUM III – User's Manual
IWR HARBORVU Version 1.1

Prepared for

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CORPS OF ENGINEERS HARBOR PROJECTS:
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Volume II - IWR-HARBORVU Users Manual

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1.0 INTRODUCTION

This User's Manual contains instructions on how to operate IWR-HARBORVU, a software product created for the Institute for Water Resources (IWR) by The Greeley-Polhemus Group, Inc. (GPG). Questions regarding this product should be directed to Mr. Arthur Hawnn, the Institute for Water Resources, Phone (703) 428-6242.

1.1 What is IWR-HARBORVU?

IWR-HARBORVU is a database application that enables a user to evaluate the performance of U.S. Army Corps of Engineers (Corps)-maintained harbor projects. Written in Oracle Personal Express Version 5.0, IWR-HARBORVU contains the following base data:

- Historical total annual cargo traffic (1985-1996) in short tons for all Corps-maintained harbor projects.
- Detailed United States Waterborne Commerce Data for the period 1991 to 1996. The Cargo Manuscript files show, for each port in the U.S., the annual quantities of import, export, and domestic cargo listed by commodity type. Canadian trade is shown separately.
- Historical total annual Operations and Maintenance (O&M) expenditures for the period 1985-1996 for all Corps-maintained harbor projects.
- A table of estimated unit commodity values ($/short ton) for import, export, and domestic commodities.

Under Task Order 0007 of Contract DACW72-95-D-0003, GPG developed and assessed a variety of performance measures for evaluating Corps harbor projects.[1] An initial version of IWR-HARBORVU was completed in September 1997 that applied six (6) performance measures. The current version of IWR-HARBORVU described in this manual is an extension of the earlier version. The eight (8) performance measures used in the current version of IWR-HARBORVU were analyzed as to data availability, exclusivity, and independence. The eight (8) selected measures were incorporated into the current version of IWR-HARBORVU, and they form the basis for the product's main function, which is preparing a ranking of harbor projects tailored to user needs.

In addition to the ranking function, IWR-HARBORVU can prepare various reports related to O&M costs, traffic, cargo value, and other characteristics of specific harbor projects. IWR-HARBORVU also contains an update function that allows users to import commerce data and O&M costs data as they become available in the future.

The remainder of this section describes how to set up IWR-HARBORVU and access its main menu. Section 2.0 shows the various capabilities of the program to analyze the data and produce various reports about the performance of harbor projects. Section 3.0 discusses the update capabilities of the program. Finally, Section 4.0 contains documentation for experienced Personal Express programmers in case the software needs to be updated in the future.

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[1] Development of Tools, Measures, and Organization for Evaluating Corps of Engineers Harbor Projects, Contract DACW72-95-D-0003, Task Order 0001, September 1997.

1.2 Getting Started

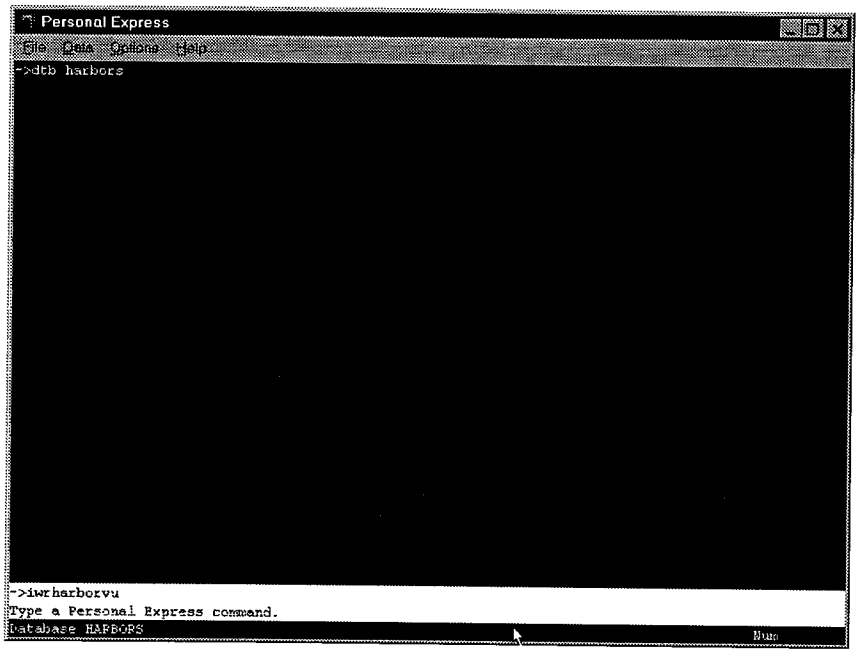
It is not necessary to be knowledgeable in Oracle Personal Express in order to run IWR-HARBORVU. This manual assumes that the user is familiar with basic computer operations, such as navigating about the Windows interface and copying files.

To use IWR-HARBORVU, a user must have a computer that is capable of running Personal Express and have that software loaded. The user must be operating in either Windows 3.1, 3.11 or Windows 95. All subsequent instructions in this manual assume that the IWR-HARBORVU software file is loaded into a subdirectory called C:\HARBOR2.[2]

The full IWR-HARBORVU software files take up about 340 megabytes of disk space. They are supplied on the Zip disk that accompanies this manual. The user must first copy the files (named HARBOR2.DB and HARBOR2.LCK) onto the hard disk in the subdirectory C:\HARBOR2.

The user starts up Personal Express from the Windows interface, as in any program. Next, the user loads the database by entering the command [dtb c:\harbor2\harbor2] at the Personal Express arrow prompt.[3] Next, execute the IWR-HARBORVU program by entering [iwrharborvu] at the arrow prompt. Figure 1 shows a screen shot of the Personal Express interface after typing the latter command but before pressing the [Enter] key. If the tasks are performed correctly, the Main Menu shown in Figure 2 will appear.

Figure 1. Personal Express Interface



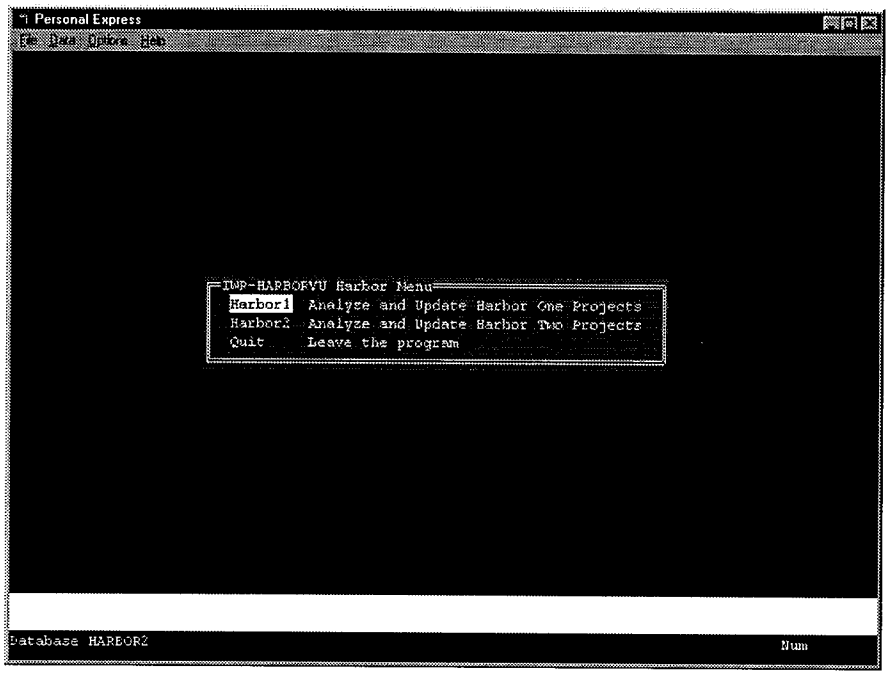
[2] The user can place HARBOR2.DB in any subdirectory. However, after Personal Express is started, the user will need to change to that directory by typing the DOS command "cd\" followed by the directory name at the Personal Express arrow prompt.

[3] "Enter" when used in this manual means to type in the information within the brackets (do not type the brackets) verbatim, followed by pressing the Enter key.

Figure 2 shows the Personal Express IWR-HARBORVU Main Menu. The user may choose the Harbor1 or the Harbor 2 option. The Harbor1 option allows users to analyze data, produce reports, and update information, all included in the initial version of IWR-HARBORVU described in the Corps of Engineers Harbor Projects: Development of Tools, Measures, and Organization for Evaluating Performance, September 1997. The Harbor 2 options allows the user to analyze data, produce reports and update information contained in the current version of IWR-HARBORVU described in Corps of Engineers Harbor Projects: Development of Tools, Measures, and Organization for Evaluating Performance, December 1998.

- **Harbor1**: Select this option to process data related to Harbor One Projects, September 1997.
- **Harbor2**: Select this option to process data related to Harbor Two Projects, December 1998.

Figure 2: Personal Express IWR-HARBORVU Main Menu



1.3 The Main Menu

Figure 2 shows the IWR-HARBORVU Main Menu. The user can move the highlight to the desired action with the arrow keys ([↑] or [↓]) or the [Tab] key. The user can also select the action by pressing the key that corresponds to the first letter of the choice (i.e. press the [A] key to select **Analyze**).[4] After selecting either Harbor1 or Harbor2, the Main Menu then offers three (3) choices:

[4] Text presented in **bold** identifies specific menu choices.

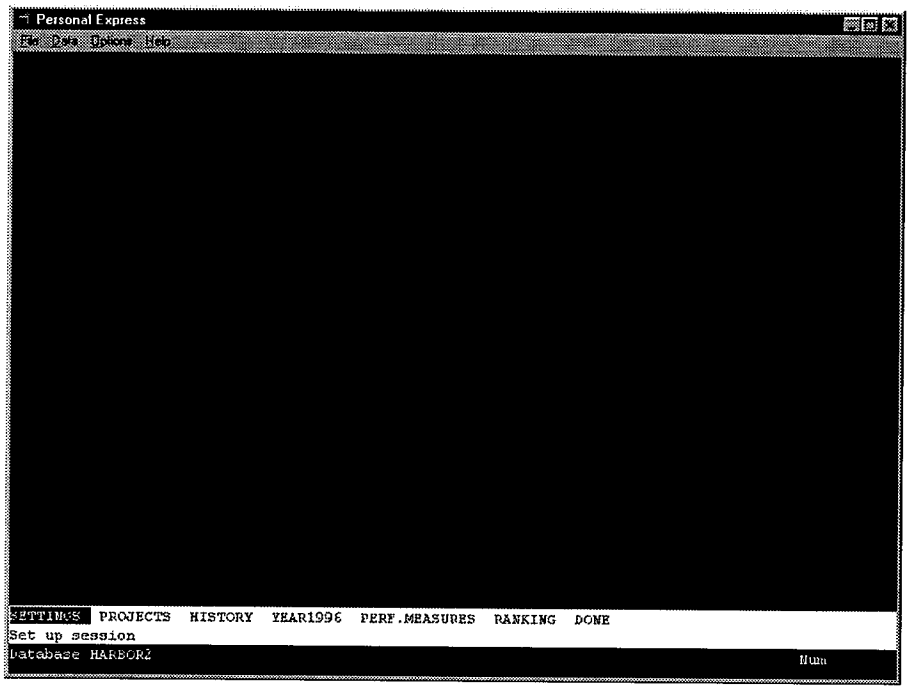
- **Analyze:** View the current harbor project rankings, as well as selected data.
- **Update:** Enter new data into the database and recalculate the rankings.
- **Quit:** Exit IWR-HARBORVU, returning to the Personal Express interface.

Section 2.0, Viewing the Data, guides the user through the software after selecting the **Analyze** command. Section 3, Updating the Data, illustrates what happens after selecting the **Update** command.

2.0 VIEWING THE DATA

When users select **Analyze** from the Main Menu, the **Analyze** submenu appears on the screen, replacing the Main Menu (Figure 3). As with the Main Menu, users may select an option by moving the highlight with the [Tab] or arrow keys or by pressing the key that corresponds to the first letter of the desired option. If the user selects the last option, **Done**, IWR-HARBORVU returns to the Main Menu. The following subsections describe what happens when the user selects each of the options in the **Analyze** Submenu.

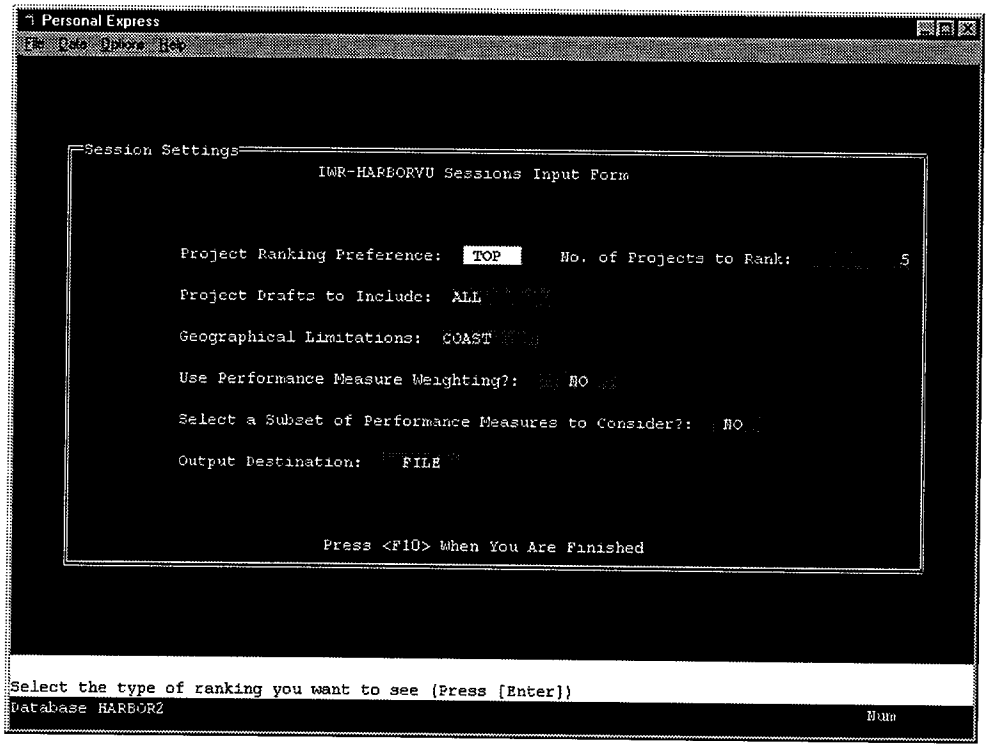
Figure 3. Menu for Viewing Rankings and Data (**Analyze** Submenu)



2.1 Setting Up a Session

The **Settings** command is the first option in the **Analyze** submenu. The **Settings** command allows the user to control the appearance of the reports prepared with all the other commands: **Projects, History, Year1996, Perf.Meaures, and Ranking.** When the **Settings** command is selected, IWR-HARBORVU displays the Session Settings Form shown in Figure 4. With it, the user can control the output destination and filter the projects he or she wishes to analyze. On the computer screen, the fields of the form are normally red, while the currently highlighted field is white. Press the [Tab] key to move the cursor field by field throughout the form. The following paragraphs describe each entry in the form as it appears in Figure 4.

Figure 4. Session Settings Form

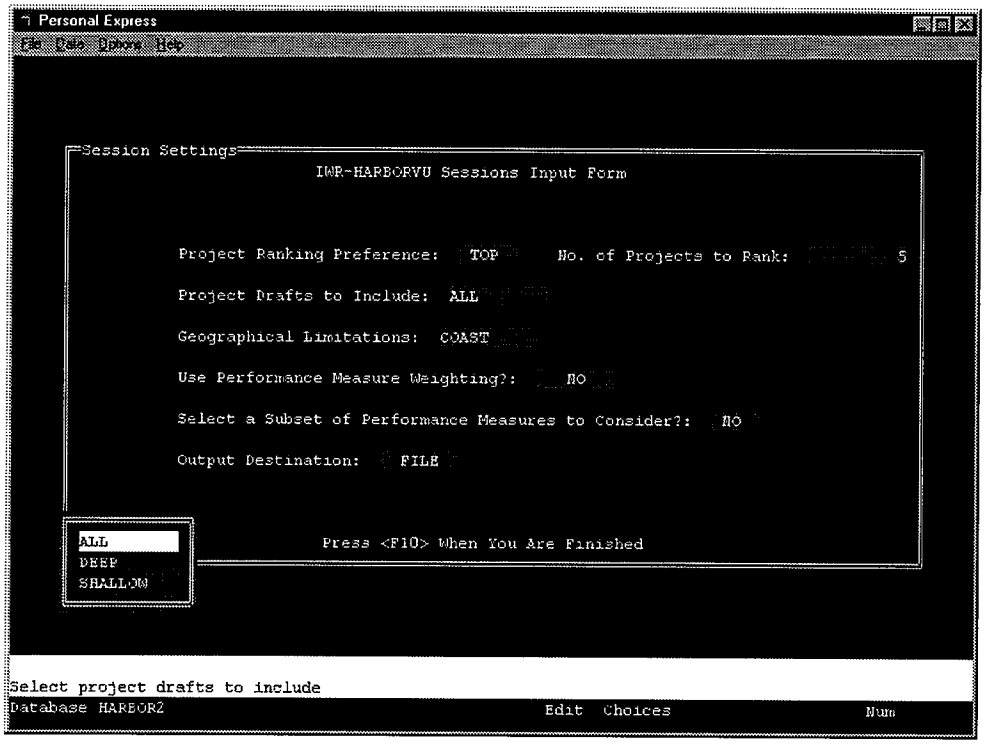


The **Project Ranking Preference** field controls how the rankings are displayed. Pressing [Enter] when this field is highlighted toggles between the two choices. If **TOP** is selected, the highest-ranking projects are displayed when the **Rankings** menu is executed (Section 2.6). If **BOTTOM** is selected, IWR-HARBORVU will display the lowest ranking projects. The project-ranking field is directly linked to the number of projects to rank field.

The **Number of Projects to Rank** field controls the number of projects to be included in the ranking report. Type in a whole number (the default is set at 20) to select the number of projects the user wishes to see. For example, if a user selects **TOP** and enters [50], IWR-HARBORVU will display the 50 highest-ranking projects.

The **Project Drafts to Include** field allows the user to limit the harbors to be included in the future reports according to their draft. If, after highlighting this field, a user presses [Enter], a "pop-up" choice menu appears, as shown in Figure 5. Users can limit their analysis to **DEEP** draft projects, **SHALLOW** draft projects or **ALL** projects by highlighting the appropriate choice and pressing [Enter].

Figure 5. Choice Menu for **Project Drafts to Include:** Field



The **Geographical Limitations** field allows the user to generate future reports by Corps Division, District, or Coast. Pressing [Enter] brings up a window displaying these options (**None** means that users don't want to limit by geography), as shown in Figure 6. When users select one of the limitation options, another window opens which allows for the choice of the appropriate Division, District or Coast. For example, if the user highlights **DIV** and presses [Enter], a choice list appears that contains the three-letter Corps division designation.[5] Similarly, selecting **COAST** causes IWR-HARBORVU to display the choice menu shown in Figure 7.

The ranking results and other reports displayed by limiting the geography are also dependent upon the setting of the **Project Drafts to Include** field. In other words, if a user sets the draft to **SHALLOW** and then limits geography to the East Coast (**COAST** = 1), IWR-HARBORVU displays a ranking of shallow draft harbors on the East Coast.

The **Use Performance Measure Weighting** field is a **YES/NO** toggle. Pressing [Enter] switches the choice back and forth. If **YES** is selected, IWR-HARBORVU applies user-selected weights to the performance measures and recalculates the rankings.[6] Section 3.1 discusses the performance measure weighting process.

[5] It is assumed that the reader is familiar with the Corps' district and division abbreviations.
[6] The weights are initially set to 1.0 for all measures. The user must go into the **Update** menu (see Section 3) to change these weights.

Figure 6: Choice Menu for **Geographical Limitations** Field

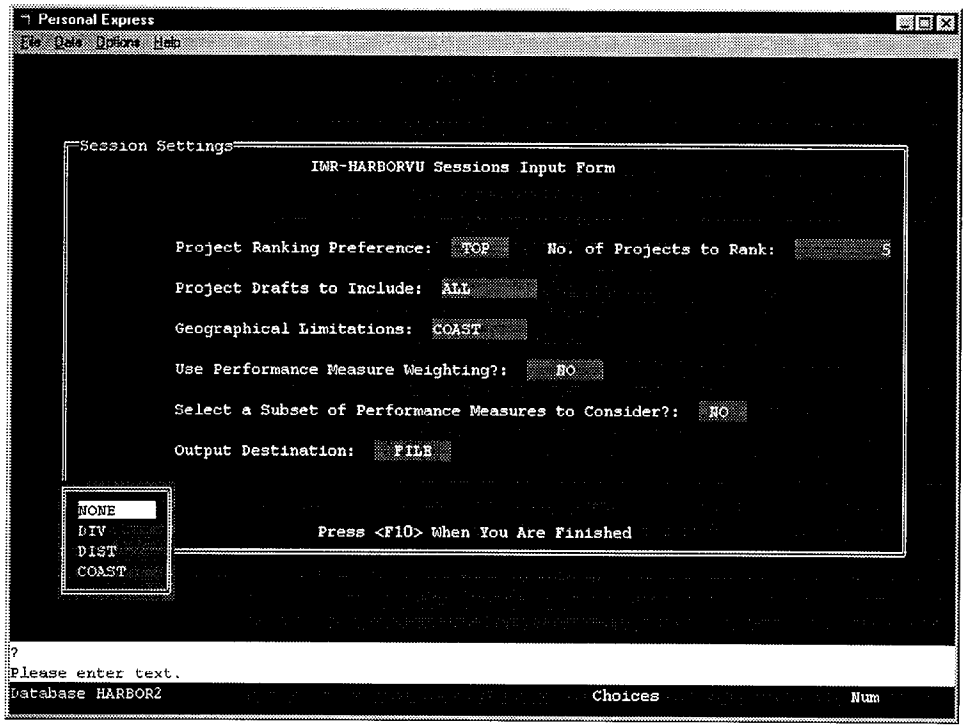
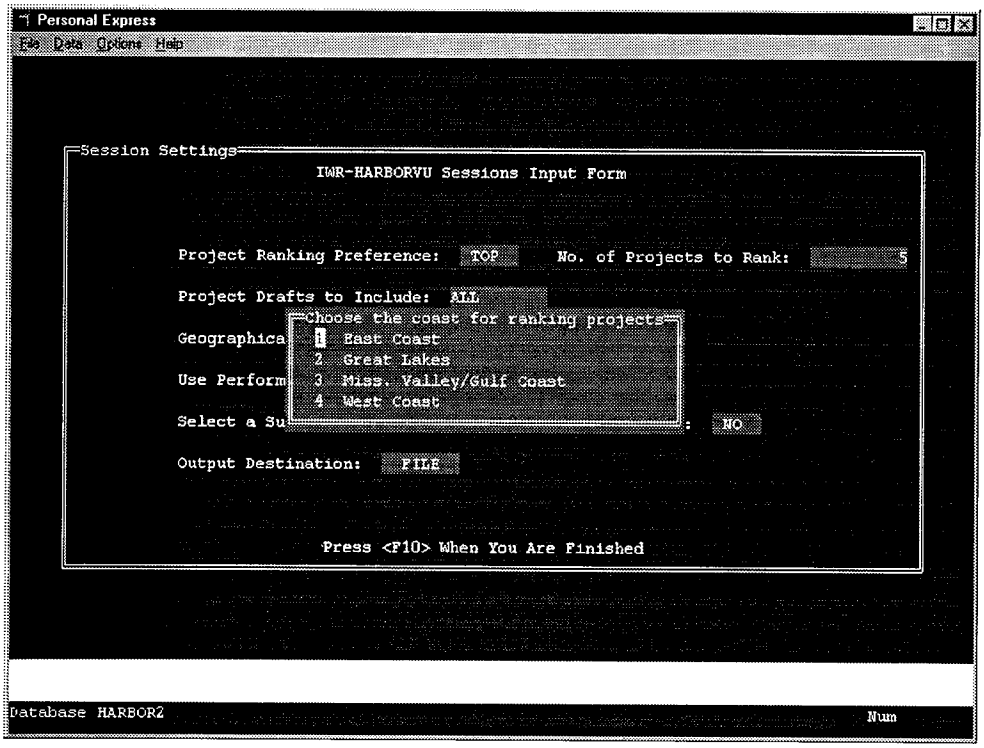
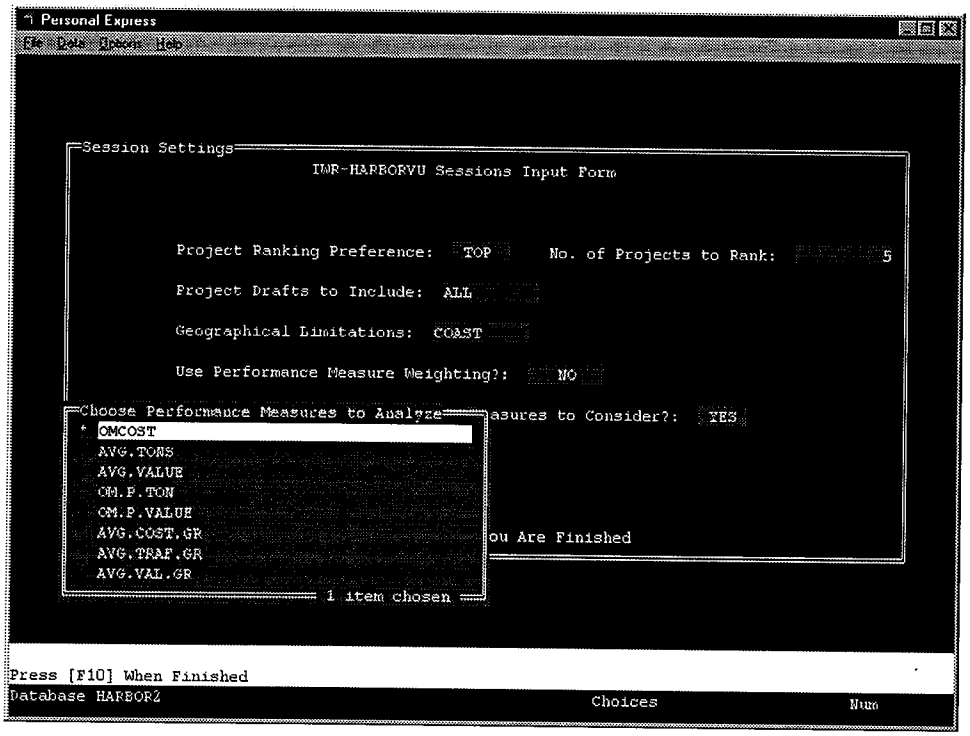


Figure 7: Pop-Up Menu for **COAST** Geography Limitaiton



The **Select a Subset of Performance Measures to Consider?** field is also a YES/NO toggle that is changed by pressing [Enter]. This field enables the user to limit the number of performance measures that IWR-HARBORVU applies to construct the project rankings. If a user selects YES, the pop-up menu shown in Figure 8 appears. The user can select any number of measures by moving the highlight to the desired choice and pressing the [Enter] key. An asterisk appears next to each measure selected. When finished, the user may press [F10] (Function Key #10) to exit this choice list and return to the Session Settings Screen. IWR-HARBORVU re-calculates rankings if the user changed the information in this field.

Figure 8. Choice Menu for Select a Subset of Performance Measures to Consider Field



The last field on the Sessions Setting Screen, **Output Destination:**, controls how all subsequent reports will be displayed. Pressing [Enter] toggles between SCREEN, PRINTER and FILE (Figure 9). If the user selects SCREEN, any time a report is requested, IWR-HARBORVU will send it to the computer screen. If the user selects PRINTER, IWR-HARBORVU will send the user's request to the printer. If the user selects FILE, IWR-HARBORVU saves the report as an ASCII text file.

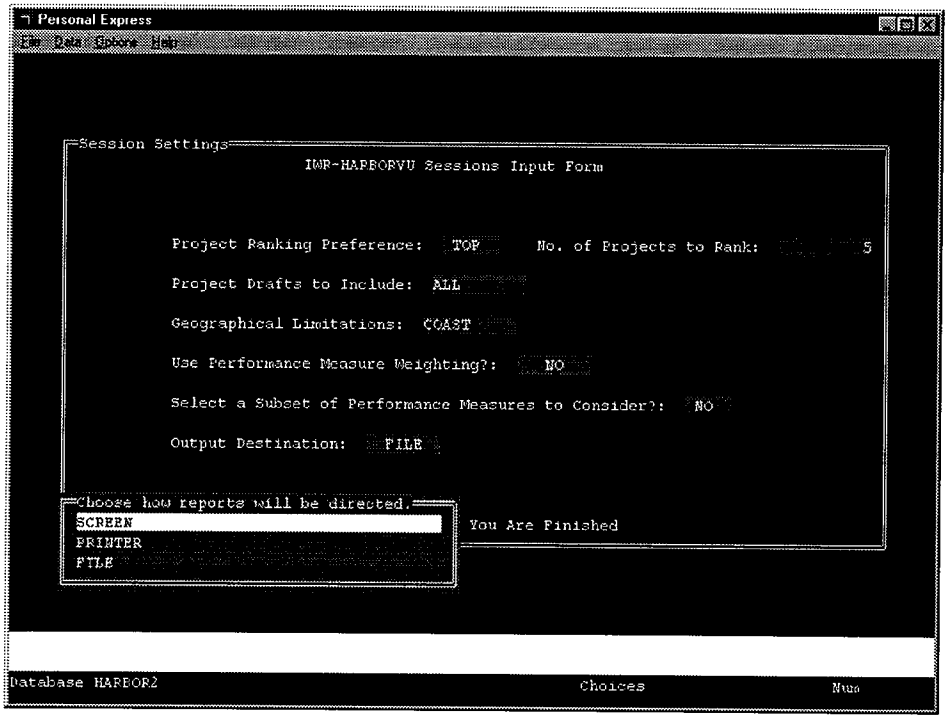
Use of the printer to display output requires further explanation. First, Personal Express is not very sophisticated with regard to printed reports when compared to the mainstream Windows databases. The user cannot control font style or point size from within Personal Express. When the user directs a report to an HP laser printer, it prints in standard Courier 10 characters to the inch font. The user can control whether the output is Portrait or Landscape by selecting the File pull down menu from the Personal Express menu bar at the top of the screen, but that is the limit of printer control from within Personal Express. This is a factor when printing the wider data reports (see Section 2.3). If the user wants to use smaller fonts, he/she must directly control the printer. See the printer's user's manual for details.

The FILE option is useful when the user plans to issue reports for others or conduct further analyses on the information. Saving the various reports and rankings to text files allows users to import them into spreadsheet and word processing programs, where they can be more easily formatted.

This section describes below how IWR-HARBORVU responds to the FILE setting. Whenever a user tells IWR-HARBORVU to display a report, the user will be prompted to enter the full file name for that report. File names are limited to the eight (8)-character name plus a three (3)-character file extension (e.g. FILE001.TXT).[7] IWR-HARBORVU saves the file to the currently selected directory, which is probably C:\ HARBOR2 or C:\PCXWIN, the home directory of Personal Express.

The user has now visited all of the Session Settings screen fields. The user can cycle back through these fields by moving the highlight until he/she is satisfied with his/her selections. When the user has finished making his /her selections, press the [F10] key to exit the screen and return to the Analyze submenu, shown previously in Figure 3. The selections made by the user are saved even if he/she quits IWR-HARBORVU. The user is now ready to generate project ranks and other reports.

Figure 9: Choice Menu for Output Destination

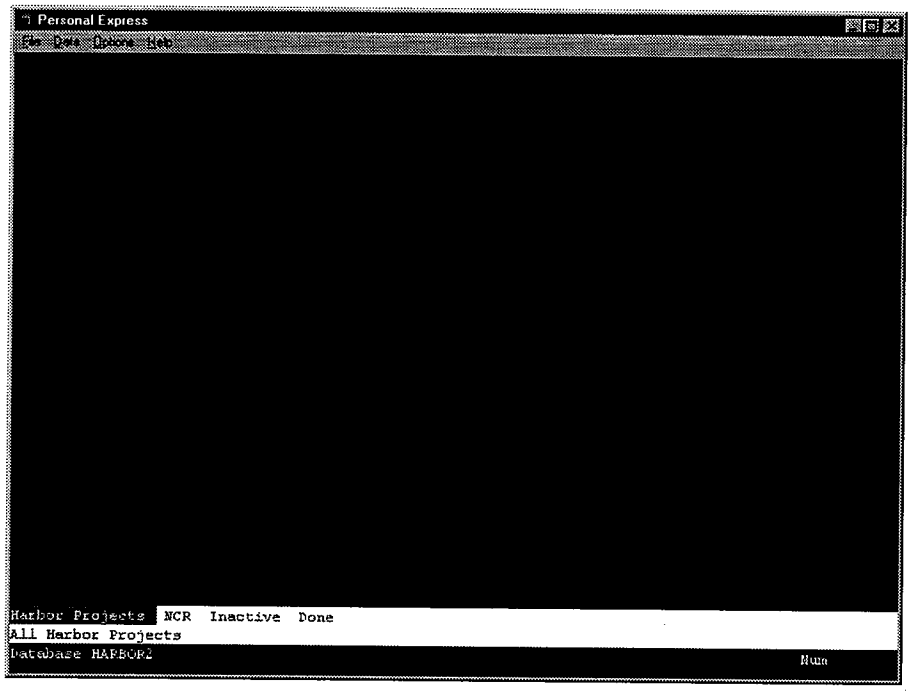


2.2 Projects Submenu

The **Projects** command provides information about the harbor projects that are contained in the database. Users have three options: **Harbor projects, NCRs, and Inactive**. The reports prepared in this section are limited by the geography and draft selections in the Settings menu. Figure 10 shows the Projects submenu that is reached by highlighting PROJECTS in the **Analyze** submenu (Figure 3) and pressing Return.

[7]Windows 95 users can employ file names longer than 8 characters.

Figure 10: **Projects** Submenu



When the command **Harbor projects** is selected from the Projects submenu, IWR-HARBORVU prepares a report with all harbor projects for which both a WTWY and a PWI code is available. The report includes the WTWY, PWI, draft, division, district, project name, and state, for all active and inactive projects.

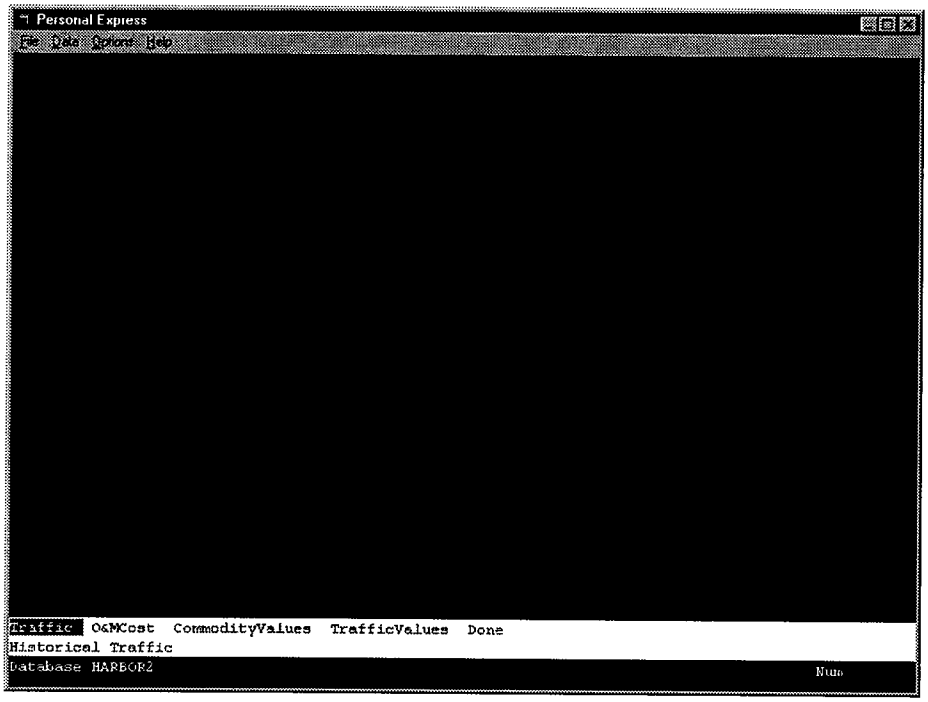
When **NCR** is selected, IWR-HARBORVU lists all projects with no commerce reported (NCR) or zero traffic. Some of these projects may be active because they may have incurred some O&M costs.

When **Inactive** is selected, IWR-HARBORVU lists all projects with no commerce reported or zero traffic, which, also, have not incurred any O&M costs during the period of analysis.

2.3 History Submenu

The **History** submenu, shown in Figure 11, provides historical O&M cost, traffic, and cargo value information for each harbor project in the database. The reports prepared in this section are limited by the geography and draft selections made previously in the Settings menu. The **History** submenu provides the following choices: **Traffic, O&MCost, CommodityValues,** and **TrafficValues.**

Figure 11: **History** Submenu



When the **Traffic** submenu is selected, IWR-HARBORVU creates a report of annual traffic for each harbor project for the period 1985 to 1996. The database currently contains traffic in thousands of short tons. At the bottom of the screen, the user is prompted for a file name and extension for the report.

When the **O&Mcost** submenu is selected, IWR-HARBORVU creates a report of annual real O&M cost for each harbor during the period 1985 to 1996. The database currently contains real O&M costs in thousands constant 1992 dollars.

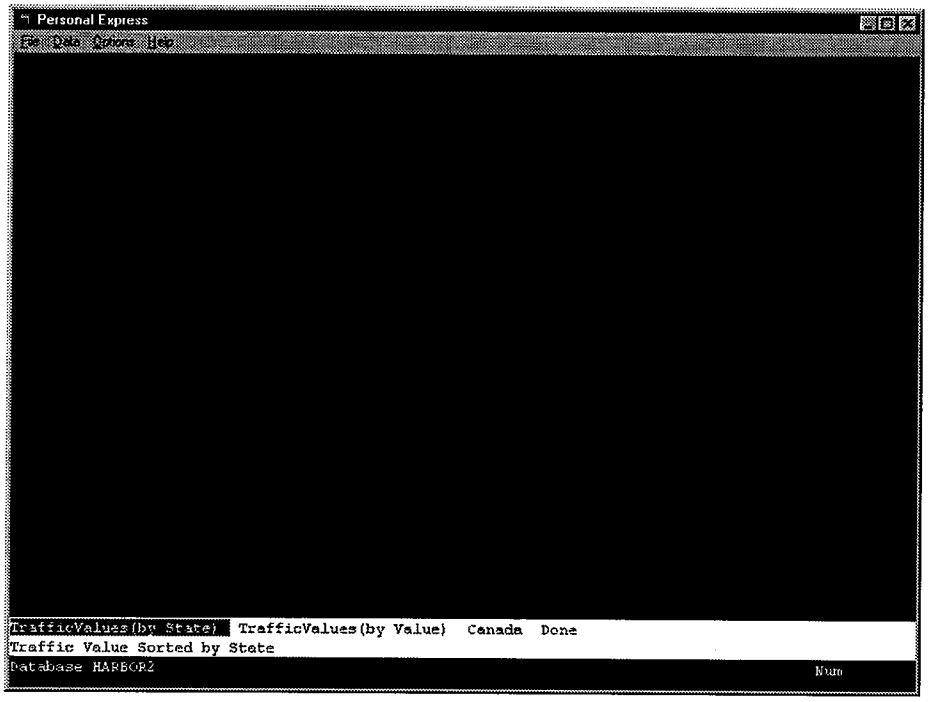
The **CommodityValues** submenu provides a short report showing the unit commodity values (dollars per short ton) that were created as part of this project.

When the **TrafficValues** submenu is selected, IWR-HARBORVU creates a report with historical annual cargo values for active projects during the period 1991 to 1996.

2.4 Summary Year Submenu

The **Year** submenu allows a user to obtain more detailed traffic and cargo value information for a specific year. Harbor1 allows users to obtain detailed information for 1994; while Harbor2 allows a user to obtain detailed information for 1996. The term "YEAR1996" appears in the **Analyze** submenu (Figure 3 of HARBORVU2). The **Year** submenu has the following choices shown in Figure 12: **TrafficValues(byState), TrafficValues(by Value)** and **Canada.**

Figure 12: **Summary Year** Submenu



When **TrafficValues(byState)** is selected, IWR-HARBORVU creates a report with tonnage and cargo values by import, exports, and domestic cargo for all active projects. The report is sorted by state. The user may limit the scope of the report by geography and/or draft using the **Settings** menu. Once again, the user is prompted for a file name and extension for the report he/she wishes to generate.

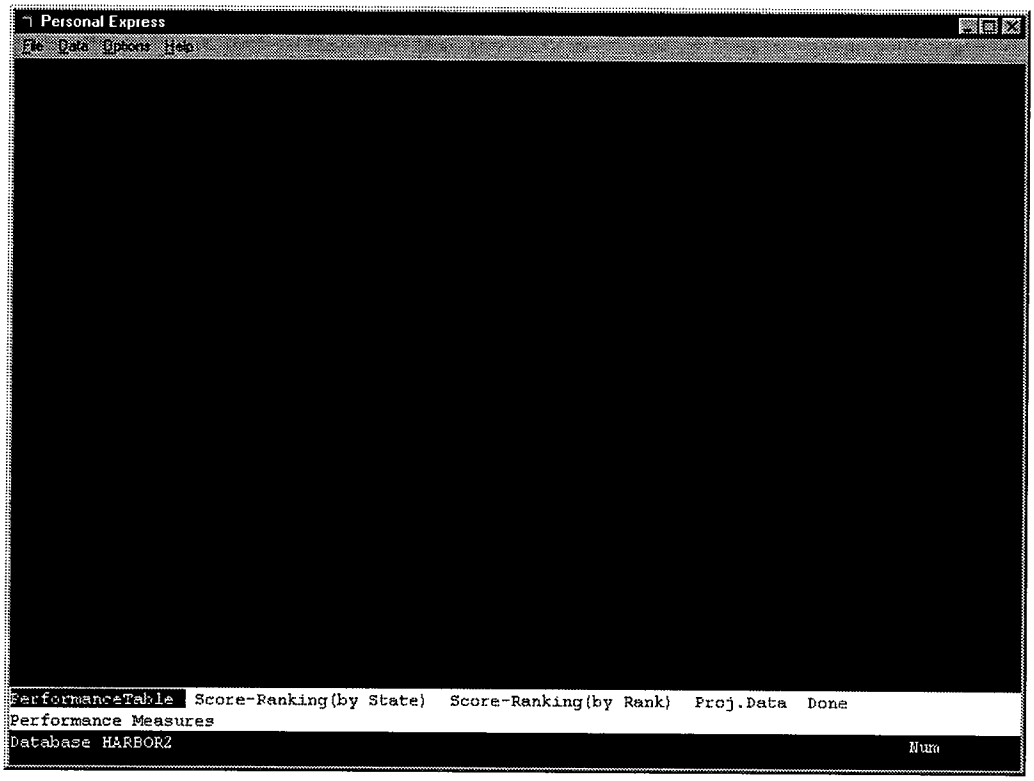
When **TrafficValues(byValue)** is selected, IWR-HARBORVU creates a report with tonnage and cargo values by import, exports, and domestic cargo for all active projects. The report is in descending order by traffic. A user may limit the scope of the report by geography and/or draft using the **Settings** menu.

When the **Canada** submenu is selected, IWR-HARBORVU creates reports illustrating trade with Canada. Specifically, the reports contain traffic and cargo values for trade with Canada. Data contained in these reports are for information purposes only. They are not used for calculation of value performance measure.

2.5 Performance Measures Submenu

The **Performance Measures** submenu calculates performance measures and average score rankings for each active harbor project. The **Performance** submenu contains the following choices shown in Figure 13: **PerformanceTable, Score-Ranking(byState), Score-Ranking(by Rank), and ProjectData.** A user may limit the scope of any report by geography and/or draft using the Settings menu.

Figure 13: Performance Measures Submenu



When **PerformanceTable** is selected, IWR-HARBORVU calculates performance measures for each project using the data stored in the PC Express database. Currently, Harbor 2 is programmed to calculate eight (8) performance measures for each project. These are: 1) Average annual O&M costs between 1985 and 1996 in thousands of 1992 dollars; 2) Average annual traffic between 1985 and 1996 in thousands of short tons; 3) Estimated annual cargo values 1991 through 1996; 4) Average annual real O&M costs per ton 1985 through 1996; 5) Average annual real O&M costs per $10,000 of cargo value 1991 through 1996; 6) Change in O&M costs; 7) Change in traffic; and 8) Change in cargo value. A complete description of these performance measures is found in the Corps of Engineers Harbor Projects: Development of Tools, Measures, and Organization for Evaluation Performance.

When the **Score-Ranking(byState)** menu is selected, IWR-HARBORVU ranks each individual project for each of the eight (8) performance measures and presents a report with projects sorted by state. In order to rank projects, IWR-HARBORVU software sorts average traffic, average cargo value, change in traffic, and change in cargo value in descending order; it sorts the remaining measures in ascending order. The procedure gives high performance levels to projects with high absolute values of traffic, cargo value, increasing traffic, and increasing cargo value. Conversely, it gives higher performance levels to projects with low absolute values for O&M costs and O&M costs per ton, and low rates of increase in O&M costs. NA ranks last when the performance measures are sorted in ascending order and first when the performance measure is sorted in descending order. Project rankings are determined by sorts within each performance measure. Two (2) or more projects with the same value, for a given performance measure, receive the same ranking. The presence of duplicate numbers does not affect the ranks of subsequent projects. For example, if the value 120.00 is calculated for two (2) projects for a given performance measure and they receive a rank of 49, then the project with a value of 120.01 for that performance measure would receive a rank of 50.

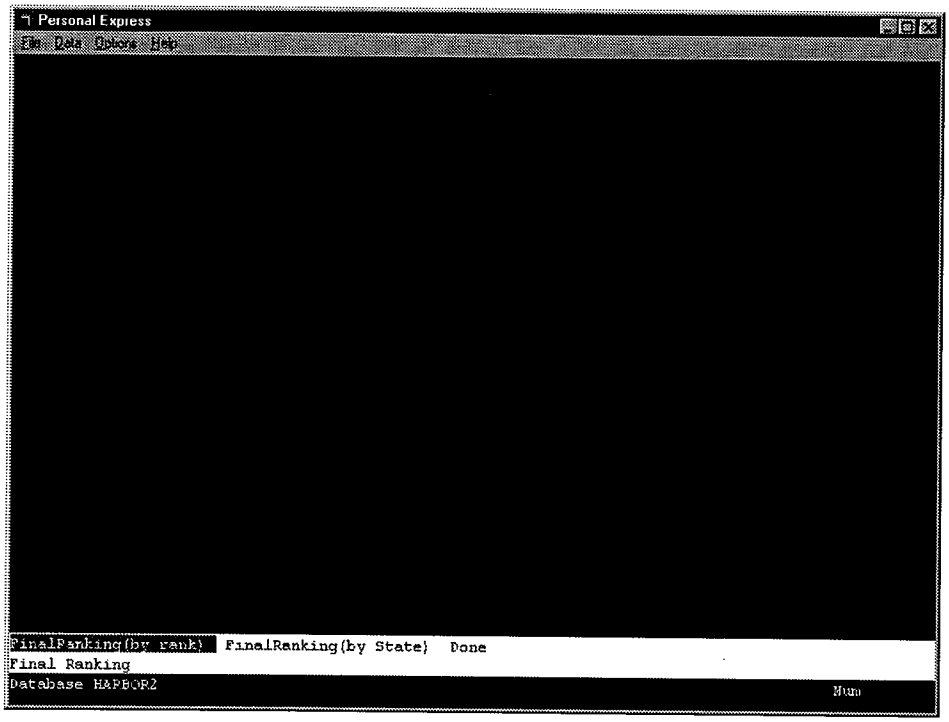
When the **Score-Ranking(byRank)** menu is selected, IWR-HARBORVU calculates the average score ranking as the mean of ranking values for a single project across all eight (8) performance measures. Then it ranks projects based on the average score-rankings. The project with the lowest average score ranking is ranked first, and the project with the highest average score ranking is ranked last.

Selecting **Proj.data**: allows the user to view the values for any or all performance measures for one specific project

2.6 Ranking Submenu

When the **Ranking** submenu, shown in Figure 14, is selected, IWR-HARBORVU reviews the selections made in the Settings menu, runs the performance measure calculations and sorting routines, and sends the results to the selected output destination. Since the ranking report is sized to fit a standard 8 ½ by 11-inch page, the user can set the printer to print in Portrait mode if he/she is sending it to the printer. The user may obtain a ranking report sorted by state by using the **FinalRanking (by State)** submenu, or a ranking report sorted by rank by using the **FinalRanking(by rank)** submenu.

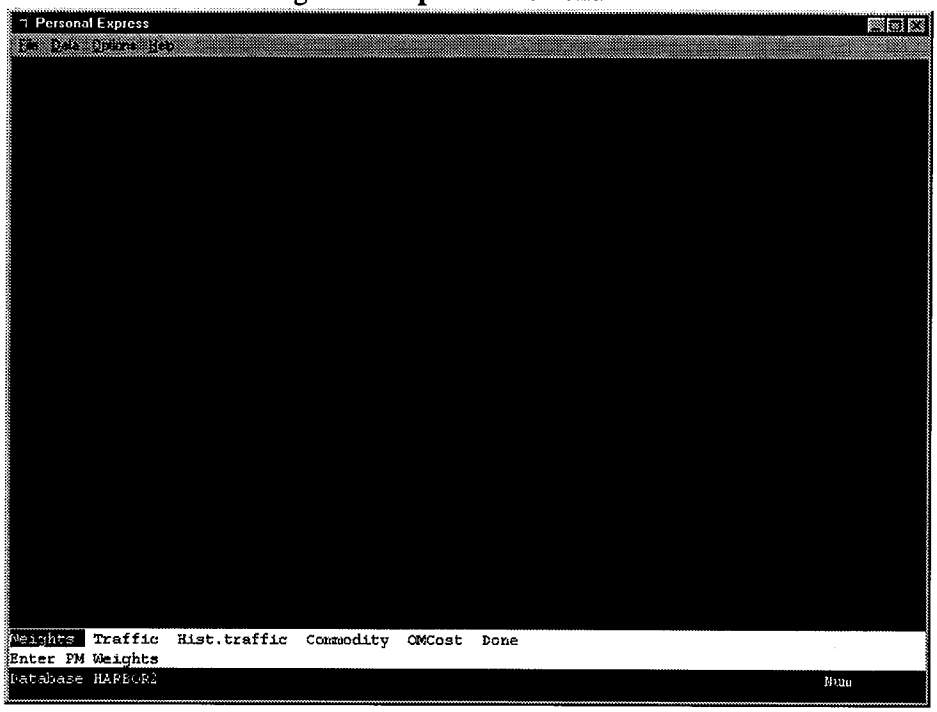
Figure 14: The Ranking Submenu



3.0 UPDATING THE DATA

As supplied IWR-HARBORVU contains historical traffic and O&M cost data for the years 1985-1996 and the Cargo Manuscript data needed to determine cargo values for 1991 to 1996. IWR-HARBORVU was designed to enable users, who are not familiar with Personal Express, to easily add new historical data and Cargo Manuscript file data as it becomes available. Figure 15 presents the **Update** Menu.

Figure 15: **Update** Submenu



When **Update** is selected from the IWR-HARBORVU Main Menu (see Figure 2), the **Update** Submenu appears on the screen. The various menu options allow users to change performance measure weights, escalate commodity values, and introduce new data into the database. Each of these options is discussed in detail in the following subsections.

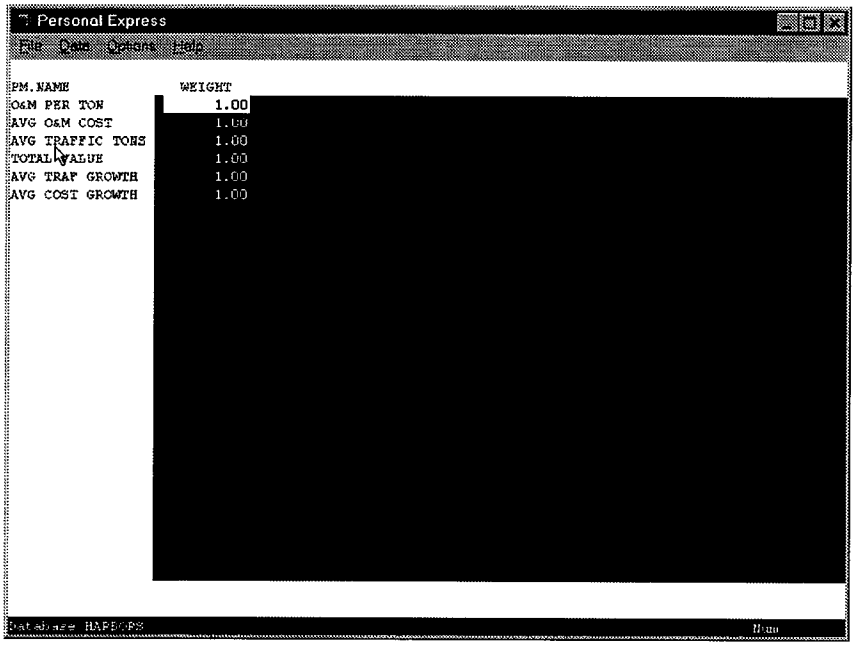
3.1 Weights Submenu

This option allows the user to assign weights to the performance measures. When the **Weights** submenu is selected, a table with weights for all eight (8) performance measures appears, as shown in Figure 16. The default weights are 1.0 for each performance measure. The user may type in any number he/she chooses, and IWR-HARBORVU will internally normalize the weights to 1.0 by summing them and dividing each individual value by that sum. When the user has finished entering the weights, IWR-HARBORVU displays the results of the normalizing computations and gives users the opportunity to return to the weight entry table. Normalized weights are presented in Figure 17. The user can revise any of the performance measure weights at a later date by re-executing **Weights**.

The **Update** submenu is unique within IWR-HARBORVU because it does not automatically recalculate the project rankings when the weights are changed. To re-rank the projects once new weights have been assigned, a user must go into the Session Settings screen and change the **Use Performance Measure Weighting** field from NO to YES.

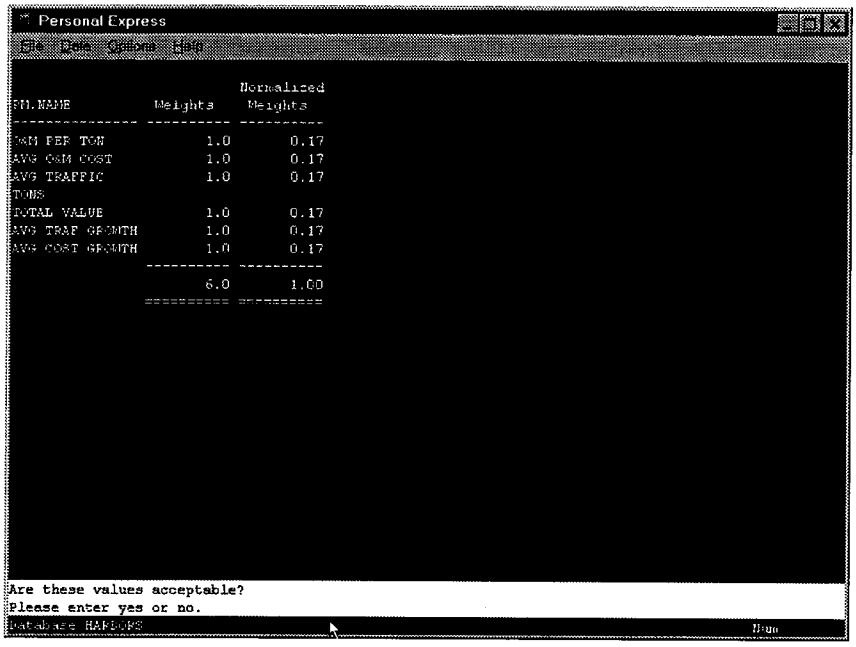
IWR-HARBORVU permanently saves the weights so that the user need enter them only once, instead of having to re-enter them every time he/she executes the software. Again, these weights are not used unless users change IWR-HARBORVU in the Session Settings screen.[8]

Figure 16. Table for Entering Performance Measure Weights



[8] IWR-HARBORVU recalculates the normalized values whenever the user decides to limit his or her performance measures in the Session Settings Screen.

Figure 17. Normalized Weight Display and Confirmation Screen



3.2 Traffic Submenu

The largest data files within IWR-HARBORVU are the cargo traffic and value variables files. These files hold, for each data year, between 1985 and 1996, every individual project's traffic tons and variables categorized by commodity type and traffic type. If the user envisions one year's worth of data as a three-dimensional table (project x commodity x traffic type), there are approximately 2.9 million available cells! Manual data entry is, obviously, out of the question.

Before the user can execute **Traffic**, he/she must move the Cargo Manuscript files from the Waterway CD to any subdirectory on his/her computer's hard disk. There are four (4) such files, which appear as MANxxxnn.TXT, where nn is the year (96 represents 1996) and xxx is either ATL (Atlantic ports), MVG (for Mississippi Valley/Gulf ports), GLK (for Great Lakes ports) or PAC (for Pacific ports). The user must make sure that he/she copies the .TXT (ASCII text) files, not the .DBF (dBASE format) files.

Executing **Traffic** causes IWR-HARBORVU to prompt the user for the year for which he/she is updating the Cargo files (see Figure 18). IWR-HARBORVU only displays those years that have not previously received Manuscript file data. A user can, however, make a mistake and accidentally place the 1997 data in the 1989 file, so the user must make sure he/she has picked the right year. If the wrong year is chosen, the user can halt the process and return to the **Update** submenu by pressing the Escape key.

The following example illustrates how this option works. Suppose the user wishes to enter new data for 1997 contained on the most recent version of the Waterway CD. After copying the MANATL97.TXT, MANMVG97.TXT, MANGLK97.TXT, and MANPAC97.TXT files from the CD to

Figure 18. New Traffic Data Year Prompt.

the TEMP subdirectory on the hard drive (C:) of the computer, the user should select **Traffic** from the **Update** submenu. When the Year choice list is seen, move the highlight down to 1997 and press [Enter]. If IWR-HARBORVU determines that the 1997 file is empty, it issues two prompts: one (1) for the drive and one (1) for the subdirectory that contains the four (4) files. After entering [c] for the drive and [temp] for the subdirectory, the screen should look like the one shown in Figure 19. IWR-HARBORVU now prompts the user for the name of the first file (Figure 20). Enter [manatl97.txt] to start the data entry process. Depending on the computer, this could take several minutes. When the data are loaded, IWR-HARBORVU asks if the user wants to load another file. If the user answers YES, IWR-HARBORVU repeats the file name prompt shown in Figure 20. The user should repeat this process until all four (4) new 1997 files have been loaded, then answer NO to the prompt.[9] IWR-HARBORVU will now automatically calculate the cargo values for the new traffic using either the base year commodity unit values or, if available, the escalated unit values assigned to 1997 (see Section 3.3).

Several million pieces of data have just been loaded into IWR-HARBORVU in only a few minutes and are now available for analysis and display in the **Analyze** menu. The next time the user calls up the Session Settings Screen, the **Traffic Year** field will have 1997 available for selection. If the user selects 1997, all subsequent rankings and reports will be based on 1997 data.

[9] A conscious decision was made to not automate the file loading process, in case future Waterway CDs utilize more than four files to hold the Cargo data.

Figure 19. Prompt for Manuscript File Location

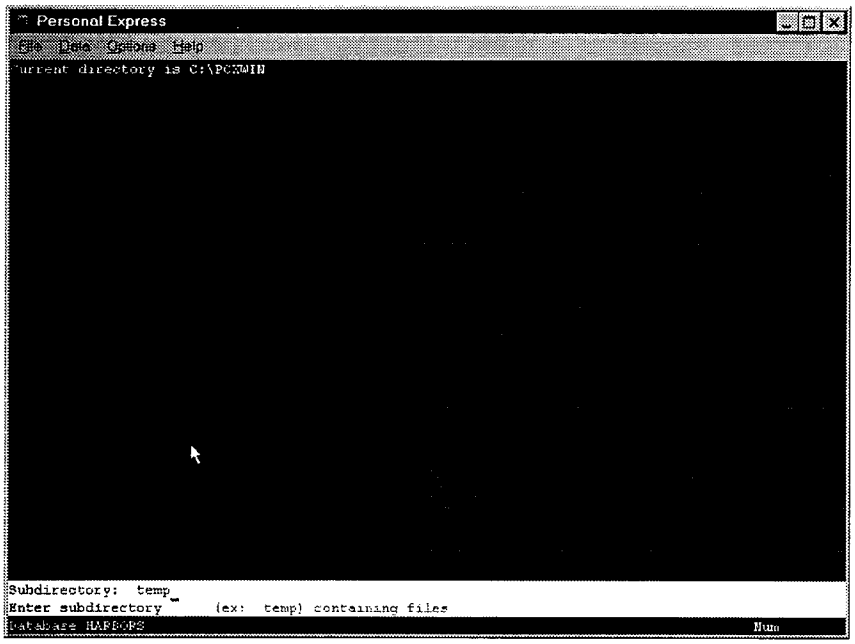


Figure 20. Prompt for Manuscript File Name

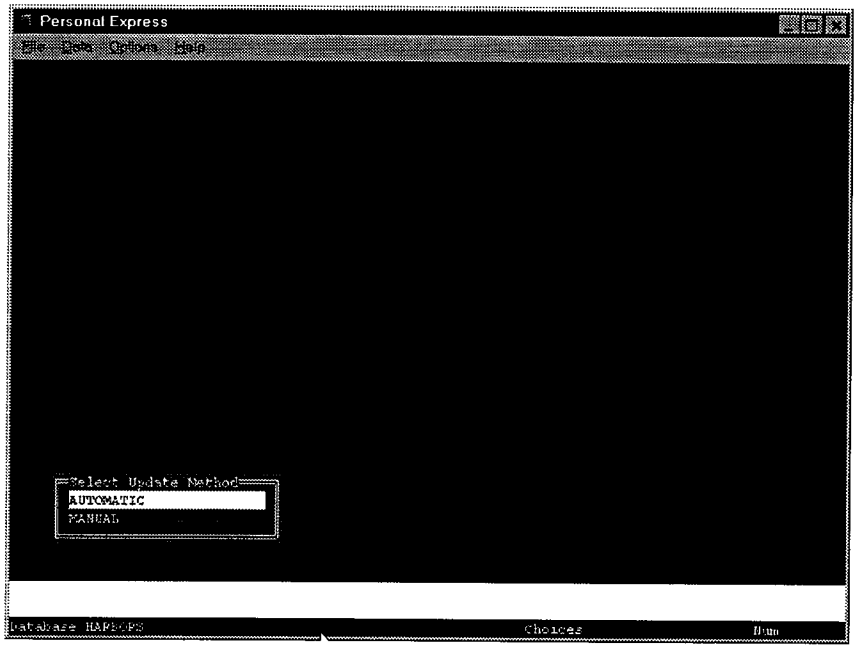
3.3 Historical Traffic Submenu

IWR-HARBORVU currently stores total annual traffic at the individual project level for the years 1985-1996. These data are used to calculate project-specific values for the eight (8) performance measures. Although twelve (12) years of history provide a good measure of harbor project performance,

users may wish to augment this data in future years. The procedure for adding "new" historical traffic can be somewhat cumbersome, depending on the method chosen, so the user will need to decide whether the additional data is worth the effort.

To begin the historical traffic update procedure, select the **Hist.traffic** menu option from the **Update** submenu. IWR-HARBORVU immediately prompts the user to choose either the **Automatic** mode or the **Manual** mode (Figure 21). The automatic mode, which is highly recommended, provides a one-step procedure for updating the historical traffic database.

Figure 21: Historical Traffic Update Mode Selection Prompt



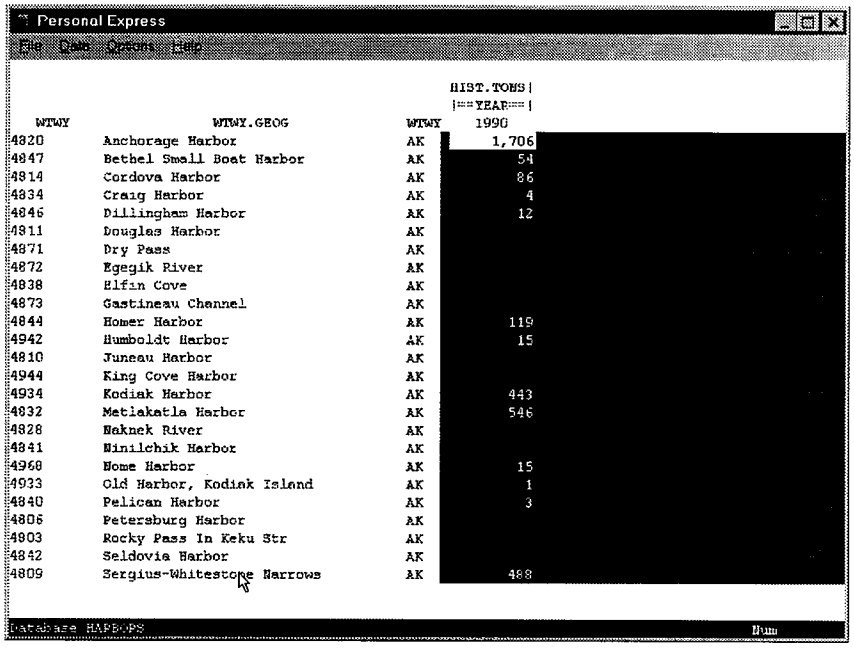
After the user selects **Automatic**, IWR-HARBORVU issues a year choice list (Figure 22). The user selects the year that he/she wishes to add to the historical database. For example, since the years 1985-1996 are already in the historical database, the first year the user would need to add is 1997 (IWR-HARBORVU will not let the user select a year between 1985 and 1996). Whichever year is chosen, the user must have previously added that year's traffic data from the Waterway CD (see Section 3.2). Assuming 1997 is selected, IWR-HARBORVU now prompts the user for confirmation to give him/her a chance to change his/her mind.[10] When the choice is confirmed, IWR-HARBORVU obtains the total traffic from the 1997 traffic file and copies it to the 1997 slot in the historical traffic database. IWR-HARBORVU then executes a function to calculate the average annual change in traffic, which is an approximation of Excel's average traffic growth function.

Selecting **Manual** initiates the manual data entry process. IWR-HARBORVU generates a year choice list that includes all available years, as shown in Figure 22, not just the years after 1996. The user can therefore use the manual entry process to revise historical traffic figures. After selecting the desired year (e.g., 1990), IWR-HARBORVU presents the table shown in Figure 23. Similar to entering data into a spreadsheet, the user moves the cursor around and types in the data. When he/she is finished, pressing [F10] will leave the table and return to the **Update** submenu.

[10] The user need not worry if he/she forgot to update the 1995 traffic file: the **Automatic** function will just place blanks in the historical traffic database, which can be overwritten later.

Figure 22. Historical Traffic Update Year Choice List (**Automatic** Mode)

Figure 23. Historical Traffic **Manual** Mode



3.4 Commodity Submenu

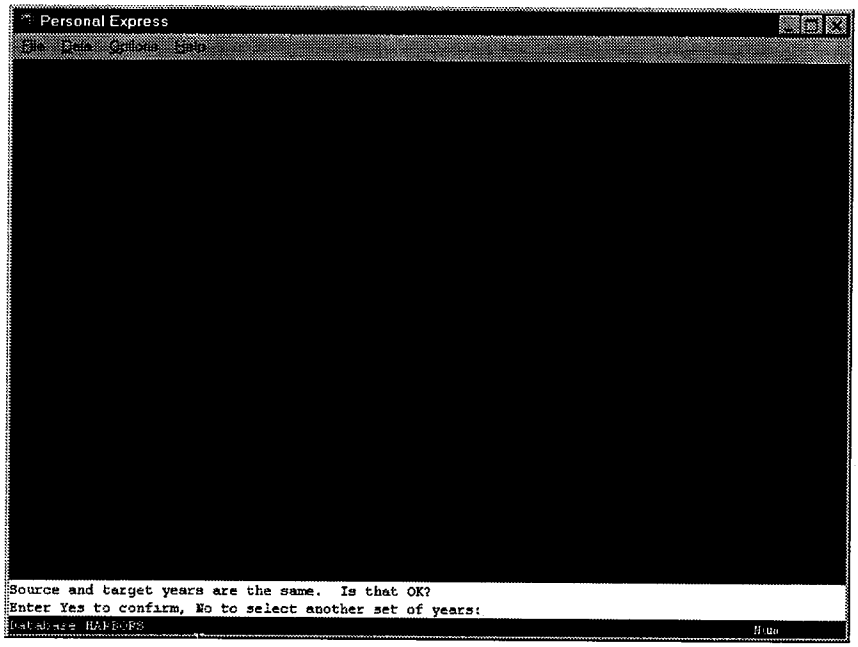
IWR-HARBORVU contains unit commodity values (expressed as $/ton) for each commodity class that was created as part of the research conducted under the IWR contract. The user has the ability to change or escalate these values to reflect the general impact of inflation or to set a new price for an individual commodity. The changed unit values are stored by year; thus, the default values are not overwritten unless the user manually changes them.

To start the process, select **Commodity** from the **Update** submenu. IWR-HARBORVU immediately prompts the user (Figure 24) to choose between applying an overall escalation factor or manually editing the unit values. Next, IWR-HARBORVU generates a choice list and prompts for the source year, which is the year the user will be applying to create the new set of unit commodity values. IWR-HARBORVU accepts the user's choice and checks to see if the file is empty. If it is, update cannot be performed, and the user is given the chance to either enter another source year or return to the **Update** submenu.

Once IWR-HARBORVU determines that the user has entered an acceptable source year, it will prompt his/her to choose a target year; that is, the year which will receive the updated commodity values. Note that the user can specify the same source and target year. This is how IWR-HARBORVU allows users to update the base year commodity unit values that were calculated as part of the IWR contract effort. If the user chooses the same source and target years, IWR-HARBORVU issues a warning (Figure 25) and gives the user a chance to enter another set of source and target years. IWR-HARBORVU also checks to see if the target year file is empty. If it is not, IWR-HARBORVU issues a warning and gives the user a chance to choose another target year. If the user confirms the target year, any existing data in that file will be overwritten.

Figure 24. Commodity Value Update Mode Choice List

Figure 25. Warning Message Issued when Source and Target Years are the same



If an earlier user had chosen to apply an escalation factor, IWR-HARBORVU would now prompt the current user for that number (Figure 26), which can be any positive real number. All source year unit values would be multiplied by this number to create the target year values. For example, if a user wanted to increase 1994 unit values by 4% to convert to 1997 dollars, he/she would enter [1.04] in response to the escalation factor prompt. The percent change entered must be the total percent change between the source and target years, not the annual percent change.

IWR-HARBORVU also lets users establish unit commodity values for prior years. For example, to create values for 1985 from the 1994 file, users would select 1994 as the source year and 1985 as the target year. Assuming that 1985 price levels were one-half of 1994 prices, users would enter [0.5] when prompted for the escalation factor.

If the user chooses **Manual** at the prompt shown in Figure 24, IWR-HARBORVU would display the table shown in Figure 27 on the user's computer screen[11]. Similar to entering data in a spreadsheet, the user can move the highlight down to any cell and manually change the entry (a user cannot change the information in the top and left borders—they are not data). When the user is finished, pressing [F10] will exit the table and save the new values.

When the user has finished updating the unit values, IWR-HARBORVU will take a few moments to automatically recalculate the cargo value data for the specified year. When it finishes, the user will be returned to the **Update** submenu. It should be noted that IWR-HARBORVU does not recalculate the performance measures or the rankings—that is accomplished when the user changes the **Traffic Year:** field in the Session Settings screen.

[11] Since a value must appear for each commodity (i.e., no blanks allowed), IWR-HARBORVU first copies the values from the source year file to the target year file.

Figure 26. Commodity Unit Value Escalation Factor Prompt

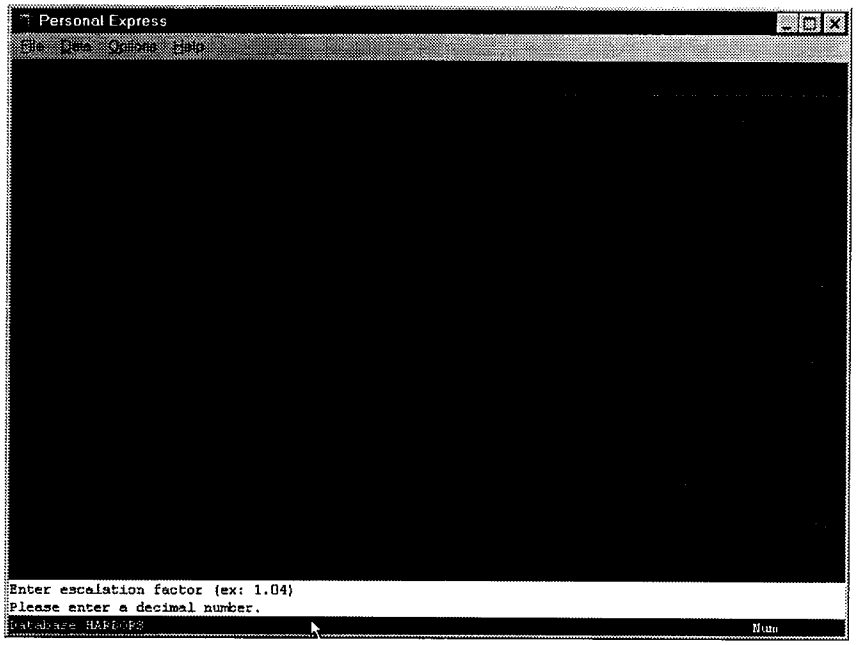
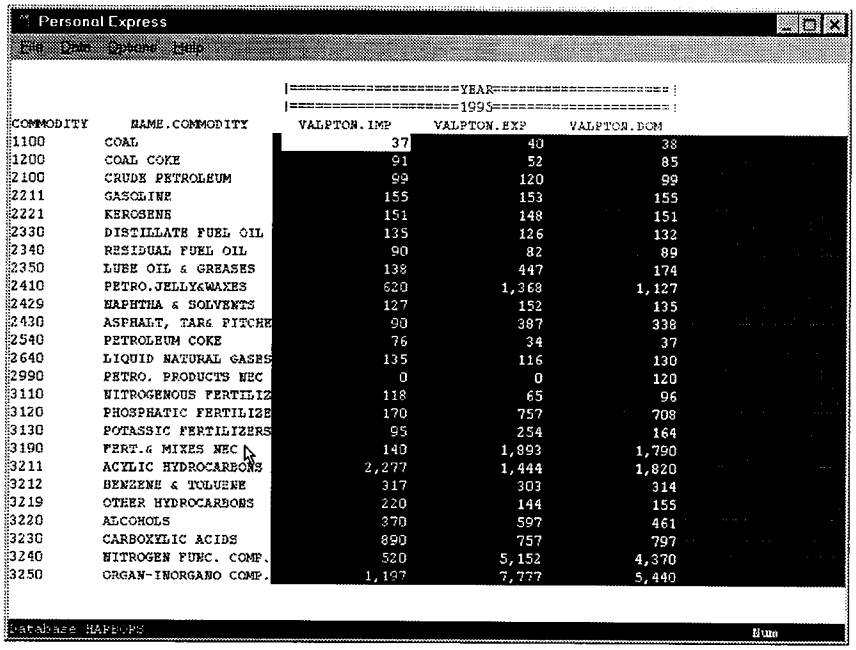


Figure 27. Commodity Unit Value Manual Update Screen



3.5 O&M Cost Submenu

Compared to historical traffic, updating historical O&M costs is somewhat more involved. Unlike the historical traffic data discussed in the previous section, there is no direct way the user can add another year of O&M costs to the database. The user can either use an external file, or have IWR-HARBORVU call up a table and manually enter the costs. Since there are about 720 projects, the manual entry mode would require the user to spend some time at the keyboard.

Let us assume the user wishes to update historical O&M, select **OMCost** from the **Update** submenu. IWR-HARBORVU prompts the user to select either the **Manual** mode or the **Spreadsheet** mode (Figure 28). If the user selects **Manual**, IWR-HARBORVU prompts him /her for the update year via a choice list similar to the one shown earlier in Figure 23. As with the historical traffic update, the first year the user would need is 1997, although the user has the ability to select any year. When the user chooses 1997, the table shown in Figure 29 appears on the screen. Once this screen appears, the user can start manually entering 1997 O&M cost data.

The user need not enter all of the data at one sitting: he/she can leave the update table at any time by pressing [F10]. Every time the user leaves, however, IWR-HARBORVU will recalculate the appropriate performance measures. If the user has not finished entering the new cost data, he/she should do so before executing any rankings, otherwise, IWR-HARBORVU will be analyzing some projects that have the previous cost history and some that have the new costs.

If the user selects the **Spreadsheet** option, IWR-HARBORVU prompts him/her for the update year (only 1997 through 2000 are available) via a choice list. When this option is selected, the user is telling IWR-HARBORVU that he/she has an external file containing the latest available O&M cost data from the Waterborne Commerce Statistics Center (WCSC). To read that file into the database, the user must answer IWR-HARBORVU's prompts for the file's location and name.[12] IWR-HARBORVU internally stores the file's format and automatically reads the project's PWI code and assigns the annual O&M cost for that project into the historical O&M database.

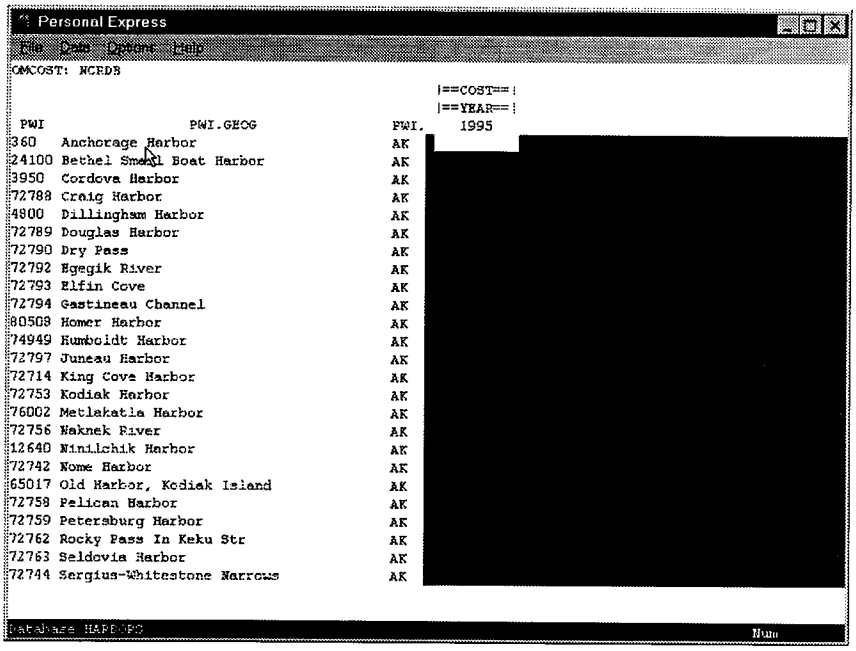
IWR-HARBORVU performs several processing steps after it has loaded the new cost data. First, the affected performance measures (Average O&M, O&M Cost per Ton, and Average O&M Cost Growth) are recalculated. As with the traffic growth parameter, IWR-HARBORVU uses a program to approximate the Excel function. Rankings are not recalculated until users request a ranking in the **Analyze** submenu. Any cost or performance measure reports the user subsequently requests will incorporate the new data.

The user may have already realized that the **Spreadsheet** update option assumes that the external file has a certain format. If, in future years, WCSC changes this format, IWR-HARBORVU will be unable to correctly read the data. Appendix A.1 contains instructions on how to modify the program coding to conform to a file format change. Only knowledgeable Personal Express programmers should attempt these modifications.

[12] The procedure is identical to that shown earlier for the traffic update (Figures 19 & 20).

Figure 28. Historical O&M Cost Update Menu

Figure 29. Historical O&M Cost Manual Update Screen



APPENDIX A

PROGRAMMER'S REFERENCE

A.1 Dealing with Input File Format Changes

There are two (2) instances within the **Update** submenu of the IWR-HARBORVU software where data from external files are read into the databases. The first instance is when a new year's worth of Cargo Manuscript files are introduced on the annual Waterway Data CD-ROM. Consisting of four (4) files – MANATLxx.TXT, MANPACxx.TXT, MANGLKxx.TXT, and MANMVGxx.TXT ("xx" represents the last two digits of the year) – each new year's Manuscript files contain traffic tons for a commodity organized by traffic type (import, export, Canadian import and export, and domestic) and waterway code. Inspection of older Manuscript files reveals that the record format has not changed since at least 1990. Therefore, there is little chance that a programmer will need to change the software that reads in these files.

The second instance involves the updating of O&M costs for each project. IWR obtains this information each year from Corps' personnel who track the costs. Since this is an internal transfer of information and is not normally presented for public review, the consistency of the file format is less certain than that for the Manuscript files.

Manuscript files are read in the program module READ.TRAFFIC. The record format is as follows:

Start Column	Width	Description of Item
5		Traffic Code
8, 9, 10, or 11	4, 3, 2, or 1	WTWY Code[13]
13	4	Commodity Code
22	9	Cargo (thousands of tons)

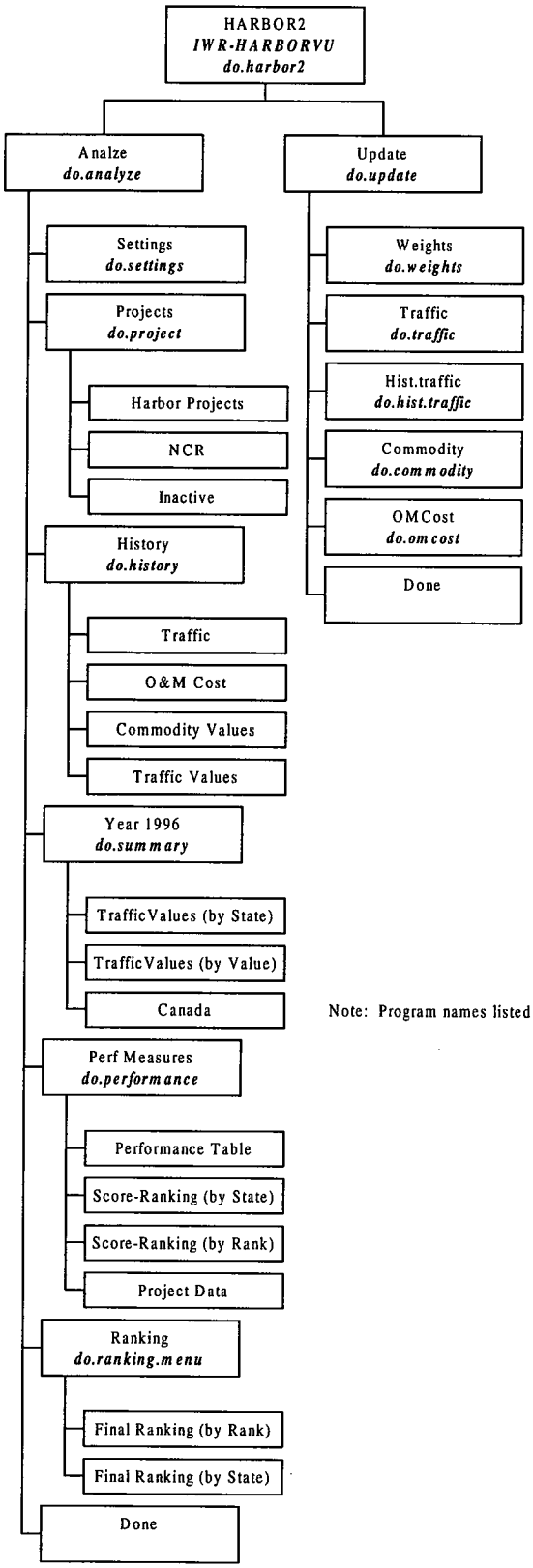
IWR-HARBORVU uses the FILENEXT/FILEVIEW series of commands to read the record because the WTWY code entry needs to be previewed for leading zeroes in the four-column wide field. The normal starting point for WTWY is Column 8, but the program needs to read columns 8, 9 and 10 first to check for leading zeroes. For example, if the Manuscript File contains a record for WTWY 2 (Lubec Channel, ME), the WTWY code would appear as 0002. To properly read the code, IWR-HARBORVU must ignore the first three digits in the WTWY code field (columns 8-11).

A.2 Program Documentation

This section describes the layouts of IWR-HARBORVU and contains the source code for all of the programs that make up the software. Figure A-1 shows the IWR-HARBORVU menu system and the controlling subprograms that are called when a user selects a menu option. Figures A-2 and A-3 depict the subroutines that support the two Main Menu options **Analyze** and **Update**. Table A.1 presents a list of the dimensions, variables, programs, and relations contained in IWR-HARBORVU.

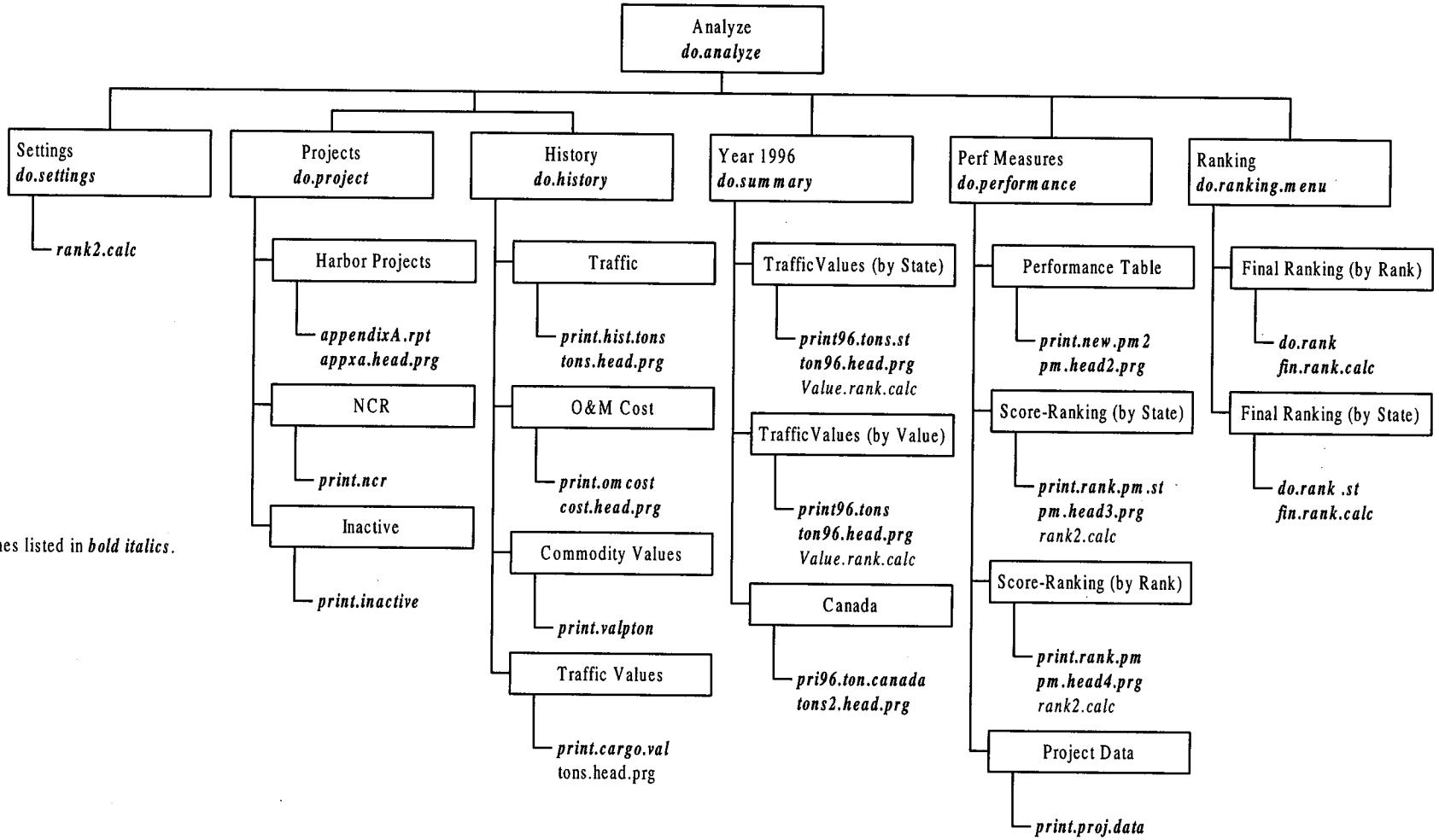
[13] The program must eliminate leading zeroes that appear in the Cargo Manuscript files, hence the need for checking columns 8, 9, and 10 for the existence of the number zero (0).

Figure A-1. IWR-HARBORVU Menu Structure



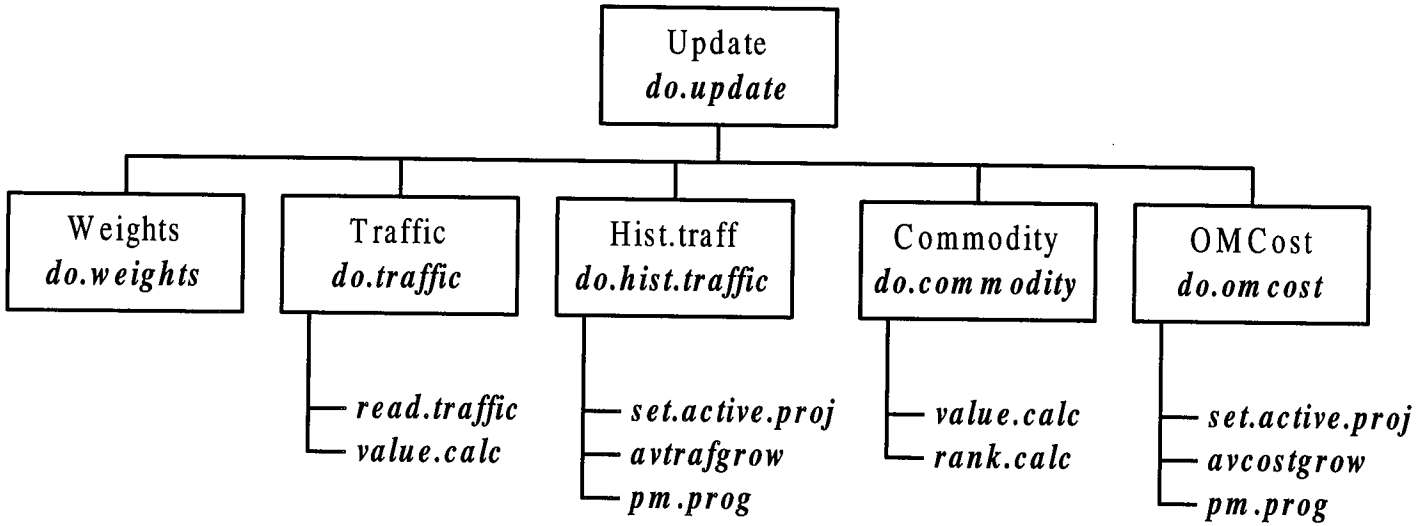
Note: Program names listed in ***bold italics***.

Figure A-2. **Analyze** Submenu Programs



Note: Program names listed in *bold italics*.

Figure A-3. **Update** Submenu Programs



Note: Program names listed in ***bold italics.***

Table A.1 List of Dimensions, Variables, Programs, and Relations Included in the Harborvu Software

18 DIMENSIONs	54 VARIABLEs	134 PROGRAMs	17 RELATIONs
COAST	AVG.RANK	ADDPWI.PROJ	GEOG.STATE
COMMODITY	AVG.RANK.94	APP.A.HEAD	PARENT.TRAFFIC
DIST	AVG85_91	APPENDIXA.RPT	PWI.COAST
DIV	AVG85_91_TONS	APPXA.HEAD.PRG	PWI.DIST
DRAFT	AVG92_96	AVGCOSTGROW	PWI.DIV
GEOGRAPHY	AVG92_96_TONS	AVGCOSTGROW.94	PWI.DRAFT
GEOGTREE	BOT.SCALE	AVGTRAFGROW	PWI.GEOG
LINK.CODE	CARGO.VALUE	AVGTRAFGROW.94	PWI.LINK.CODE
LOC.CODE	COAST.LIM	AVGVALGROW	PWI.LOC.CODE
MENUID	COST	CHOOSE.DIV	PWI.STATE
MENUITEM	DIST.LIM	CHOOSE.OUTPUT	PWI.WTWY
OMCOST	DIV.LIM	CHOOSE.PMS	WTWY.DIST
PM	EVAL.YR	CHOOSE.RANK	WTWY.DIV
PWI	EVAL2.YR	COMM.READ	WTWY.DRAFT
STATE	FILE.NAME	COST.HEAD.PRG	WTWY.GEOG
TRAFFIC	FINAL.RANKING	CUST.DET.TONHEAD	WTWY.PWI
WTWY	FINAL.RANKING.94	CUST.DETAIL.TON	WTWY.STATE
YEAR	HIST.TONS	CUST.DIST.MAINT	
	HIST.VALUE	CUST.GEOG.MAINT	
	MENUTEXT	CUST.GEOG.OM	
	NAME.COMMODITY	CUST.H.TONHEAD	
	NORM.WEIGHT	CUST.HTON.PRINT	
	NUMTORANK	CUST.NAME.LOAD	
	PERF.MEASURES	CUST.OM.LOAD	
	PERF.MEASURES.94	CUST.OM.MAINT	
	PM.NAME	CUST.PWI.STATE	
	PROJ.SCALE	CUST.PWIWTWY	
	RANK.PM	CUST.STATE.MAINT	
	RANK2.PM	CUST.TONHEAD	
	RANK2.PM.94	CUST.TONPRINT	
	SESSIONS.FORM	CUST.WTWYPWI	
	SUB.PM	DIM.READ	
	TEMPVAR	DIV.DISTREAD	
	TEMPVAR2	DO.ANALYZE	
	TONS	DO.COMMODITY	
	TOP.SCALE	DO.DATA.DUMP	
	TOT.PROJ.SCALE	DO.HARBOR1	
	TOTAL.RANK.PM	DO.HARBOR2	
	TOTAL.VALUE.RANK	DO.HIST.TRAFFIC	
	TRAF.YR	DO.HISTORY	
	USE.SUBSET	DO.HISTORY.VALUE	
	USE.WEIGHT	DO.OMCOST	
	VALPTON.DOM	DO.OTHER	
	VALPTON.EXP	DO.PERFORMANCE	
	VALPTON.IMP	DO.PROJECT	
	WEIGHT	DO.PROJECTS	
	WHICH.COAST	DO.RANK	
	WHICH.DIST	DO.RANK.94	
	WHICH.DIV	DO.RANK.MENU	
	WHICH.DRAFT	DO.RANK.ST	
	WHICH.GEO	DO.RANK94.ST	
	WHICH.HARBOR.VAR	DO.SETTINGS	
	WHICH.OUTPUT	DO.SETTINGS1	
	WHICH.RANK	DO.SUMMARY	

Table A.1 (cont'd)

18 DIMENSIONs	54 VARIABLEs	134 PROGRAMs	17 RELATIONs
		DO.TRAFFIC	
		DO.UPDATE	
		DO.WEIGHTS	
		FIN.RANK.CALC94	
		FINAL.RANK.CALC	
		HIST.TONS.READ	
		INACT.HEAD.PRG	
		IWRHARBORVU	
		LOAD.PWI.PGR	
		LOAD.WTWY.PGR	
		LOC.CODE.READ	
		NAME.FILE	
		NCR.HEAD.PRG	
		OMCOST.READ	
		PM.94.PROG	
		PM.HEAD.PRG	
		PM.HEAD2.PRG	
		PM.HEAD3.PRG	
		PM.HEAD4.PRG	
		PM.PROG	
		PM.SUBSET	
		PM.VALUE.PROG	
		PRI94.TON.CANADA	
		PRI96.TON.CANADA	
		PRINT.APP.A	
		PRINT.CARGO.VAL	
		PRINT.COAST	
		PRINT.HIST.TONS	
		PRINT.INACTIVE	
		PRINT.NCR	
		PRINT.NEW.PM	
		PRINT.NEW.PM2	
		PRINT.NEW.PM94	
		PRINT.OMCOST	
		PRINT.PM	
		PRINT.PM2	
		PRINT.PROJ.DATA	
		PRINT.PROJ.SCALE	
		PRINT.RANK.PM	
		PRINT.RANK.PM.ST	
		PRINT.RANK.PM94	
		PRINT.RANKPM94ST	
		PRINT.RANKS	
		PRINT.TON.CANADA	
		PRINT.VALPTON	
		PRINT.WTWY.EQ.NA	
		PRINT.WTWY.HEAD	
		PRINT94.TONS	
		PRINT94.TONS.ST	
		PRINT96.TONS	
		PRINT96.TONS.ST	
		PWI.WTWY.READ	
		RANK.CALC	
		RANK.SCALE	
		RANK2.CALC	
		RANK2.CALC.94	
		RANKS.HEAD.PRG	
		READ.COMM.DOM	

Table A.1 (cont'd)

18 DIMENSIONs | 54 VARIABLEs | 134 PROGRAMs | 17 RELATIONs

PROGRAMs:
READ.COMM.EXP
READ.COMM.IMP
READ.LANE
READ.TRAFFIC
RUN.CARGO.VALUE
SET.ACTIVE.PROJ
SET.SESSION.PWI
TEMP.PRG
TEMP.UPDATE.TONS
TEMP1
TON94.HEAD.PRG
TON96.HEAD.PRG
TON96.HEADE3.PRG
TONS.HEAD.PRG
TONS2.HEAD.PRG
TONS94.HEAD.PRG
VAL.HEAD.PRG
VALUE.CALC
VALUE.CALC2
VALUE.RANK.CALC
WTWY.APPEND
WTWY.PWI.READ

10 VALUESETs

ACTIVE.PROJECTS
DATA.YRS
HARBOR2.PM
HARBOR94.PM
HIST.YRS
HIST.YRS.94
INACT.PROJECTS
LGA.PM
NEW.HIST.YRS
SESSION.PWI

Appendix G2: Summary Score-Ranking for All Active Projects

RANK	WTWY	PWI	DRAFT	DIV	DIST	PROJECT NAME	ST	AVG. SCORE RANKING
558	4668	16860	D	NWD	NWP	Siuslaw River	OR	354.00
554	446	73574	S	NAD	NAB	Rhodes Point To Tylerton, Some	MD	351.50
556	3944	48011	S	MVD	MVP	Warroad Harbor	MN	352.50
557	451	9980	S	NAD	NAB	Little Wicomico River	VA	353.38
560	1226	5220	S	NAD	NAN	East Rockaway	NY	356.88
559	3735	11060	D	LRD	LRC	Michigan City Harbor	IN	356.00
562	226	41006	S	NAD	NAN	Jones Inlet	NY	357.75
561	535	9340	S	NAD	NAN	Lake Montauk Harbor	NY	357.38
566	4652	15600	S	NWD	NWP	Rogue River	OR	360.75
564	762	16800	S	SAD	SAW	Silver Lake Harbor	NC	359.25
563	523	41082	S	NAD	NAN	Mattituck Harbor	NY	358.13
564	2179	1001	S	SAD	SAJ	Johns Pass	FL	359.25
565	139	39018	S	NAD	NAE	Newburyport Harbor	MA	359.50
567	1344	87455	S	NAD	NAO	Rudee Inlet	VA	360.88
569	675	10310	S	NAD	NAO	Lynhaven Roads	VA	362.00
568	237	8170	S	NAD	NAP	IWW Between Rehoboth Bay &	DE	361.00
570	3931	99871	D	LRD	LRE	Grand Marais Harbor	MN	363.38
575	2159	75027	S	SAD	SAJ	St. Augustine Harbor	FL	366.00
571	864	87088	S	SAD	SAC	Folly River	SC	363.63
572	216	73644	S	NAD	NAN	Shinnecock Inlet	NY	364.25
577	4670	20300	S	NWD	NWP	Yaquina River	OR	366.38
573	669	73801	S	NAD	NAO	Willoughby Channel	VA	364.50
574	1268	556	S	NAD	NAE	Bullocks Point Cove	RI	364.88
574	3779	6610	S	LRD	LRE	Fox River	WI	364.88
576	418	73589	S	NAD	NAB	Knapps Narrows	MD	366.13
578	4425	73338	D	POD	POH	Port Allen Harbor, Kauai	HI	368.13
579	220	5890	S	NAD	NAN	Fire Island Inlet	NY	368.25
580	2400	18510	S	SWD	SWG	Trinity River Channel To Liberty	TX	371.88
581	4687	4610	S	NWD	NWP	Depoe Bay	OR	372.50
582	2174	13880	S	SAD	SAM	Perdido Pass Channel	AL	373.88
583	666	73793	S	NAD	NAO	Pagan River	VA	375.63
585	600	19550	S	NAD	NAO	Waterway on the Cost of Virginia	VA	377.88
584	6530	230	S	LRD	NA	Allegheny River, Open Channel I	PA	375.88
586	2189	4980	S	SAD	SAM	East Pass Channel From The G	FL	381.25
587	4933	65017	S	POD	POA	Old Harbor	AK	382.63
588	877	16450	S	SAD	SAS	Savannah River Below Augusta	GA	382.88