Documentation of Software for Tracking EAA Phosphorus Loads

prepared for

Department of Everglades Regulation
South Florida Water Management District

by

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Introduction

To facilitate implementation of the EAA Regulatory Rule (40E-63), software has been developed for tracking phosphorus loads at basin and farm levels. This report provides guidance for future use and maintenance of the software by SFWMD staff. It is anticipated that the procedures will be executed at a quarterly frequency to provide current information on phosphorus load reductions and compliance with the Rule. Some evolution of the software is expected to reflect changing conditions in the EAA (new inflows, outflows, measurement locations, farm permits, etc.) and to reflect needs for any new software features or algorithms which become apparent as the methodology is applied in the future. This report provides basic information on program structures, data structures, and updating procedures. All software has been developed for application on IBM PC-compatible computers. Descriptions of the algorithm for calculating basin loads and the models/equations used for testing compliance are contained in the Rule and are not repeated here. To supplement this report, many comment statements have been added to the workbooks and Fortran programs used in the calculations. Since the previous version of this documentation (May 1997), all workbooks have been converted from Lotus-123 (Rel. 4/5) to Excel 97.

Basin-Scale Calculations

Overview

Table 1 lists and describes data files and programs involved in basin-scale calculations. Primary steps include:

1. Retrieval of New Data. Daily flow, daily rainfall, and phosphorus concentration data are extracted from data bases maintained on the SFWMD's mainframe computers. Retrieval programs written in SQL are provided to extract the required data (Tables 2-4). The files are downloaded to a PC for subsequent processing.

2. Updating of Data Files. Historical flow, rainfall, and phosphorus data are merged with new data obtained in Step 1. Monthly total rainfall amounts are calculated from the daily rainfall files. All data files start in October 1978. File contents are summarized in Tables 2-4.

3. Phosphorus Load Calculations. A Fortran program (EAATPLD.FOR) codified in the Rule calculates monthly flows and phosphorus loads at several inflow/outflow points to/from the EAA. Total EAA runoff and phosphorus load are calculated on a monthly basis for the entire period of record. This version of the program differs from that published in the Rule only with respect to input / output formats and comment lines.

4. Compliance Calculations. An Excel 97 workbook (EAABASIN.XLS) calculates load reductions and tests for compliance. Monthly load and rainfall files generated in previous steps are accessed in these calculations. Several tabular and graphic output formats summarize current and historical results. Workbook contents are outlined in Table 5.

Once update files have been downloaded, all calculations are controlled from within the EAABASIN.XLS workbook. Portions of the workbook are referenced in farm-scale calculations. For this reason, basin calculations must be updated before farm-scale calculations can be updated.

Installing Basin Software

To install the basin software on a PC, create a new disk directory and copy all files to that directory. The software and data files require approximately ? megabytes of free disk space. Load the EAABASIN.XLS workbook. The 'Menu' page appears (see Table 5). Enter the name of the disk directory containing the Basin software and data files (e.g., "C:\EAABASIN") at the top of the 'Menu' page. Save the workbook.

Supporting macros are stored as Visual Basic Code attached to EAABASIN.XLS workbook. These are transparent to the user. To view the code, select "Tools Macros VisualBasicEditor", then select 'Modules/Module1' under VBA Project EAAFARM.XLS from the Project window in the upper left corner of the screen.

Updating Basin Calculations

Periodic updates of basin calculations will normally involve the following procedures:

1. Submit retrieval programs (EAARAIN.COM, EAAFLOW.COM, EAATP.COM) to the SFWMD mainframe and download the corresponding

output files (EAARAIN.SPL, EAAFLOW.SPL, and EAATP.SPL, respectively). A date range is specified in each program. The default range is set to retrieve all data after the end of the Rule Base Period (from October 1, 1991 to December 31, 2020). In this way, each update will reflect recent data, as well as any changes or corrections which may have been made to SFWMD's hydrologic or water quality data bases after the Base Period. The downloaded files should be placed in the PC disk directory containing the Basin software and data files.

2. Load the EAABASIN.XLS workbook. The 'Menu' page appears (see Table 5). If not performed during the installation step (see above), enter the name of the disk directory containing the Basin software and data files (e.g., "C:\EAABASIN") at the top of the 'Menu' page.

3. Update the 'Areas' page to reflect acreage removed from the EAA drainage basin, as specified in the Rule. Based upon current interpretations of the Rule, adjustment for reductions in area will be necessary only after the Stormwater Treatment Areas are constructed.

4. Click the "Update Files" button located on the 'Menu' page . This executes a DOS batch program (GO.BAT) which updates data files and calculates monthly basin loads (Table 6). Alternatively, this step can be conducted from the DOS command prompt by entering ">GO". The batch procedure will terminate early if errors are encountered in updating data files. The batch procedure produces a log file "EAA.LOG" which traces the load calculations for each station. If difficulties are encountered, this file can be examined to help identify error sources. When the batch program is completed, the DOS window must be closed manually to return to the workbook.

5. Click the "Update Workbook" button on the 'Menu' page. Compliance calculations ('Monthly' & 'Yearly' pages), output tables, and graphs are updated. Four files produced in the previous step are stored in the following pages of the workbook:

EAARAINM.FIX - monthly rainfall	RainUpdate
EAA.TOT - monthly flows and loads	LoadUpdate
EAA.PRN - load summary	Terms
EAA.INV - sample inventory	Samples

The 'Terms' and 'Samples' pages provide supplementary information that is not used in compliance or load-reduction calculations. Only the first 9 of the 15 stations contained in the rainfall update file are used.

6. Click the "Reports" button to see results for any 12-month period, up to and including the most recent 12 months with complete data.

7. Click the "Graphs" button to view output graphs. Graph pages are located at the end of the workbook and are identified by page titles starting with 'C_' (e.g., 'C_Concs').

The above procedures can be followed to obtain routine updates. The basin files and workbook should be updated before updating farm-scale calculations.

If an error in the calculations is encountered during any of the macro steps, execution will stop and the Visual Basic code window will appear. The location of the error (breakpoint) will be highlighted in yellow. Note the error location. Reset the program by selecting 'Run Reset' from the Visual Basic menu. Return to Excel via the Windows 95 Task Bar (bottom of screen).

Basin Data Files

Data file structures are listed in Tables 2-4. The following constraints apply to data files used in phosphorus load calculations:

1. Flow, rainfall, and phosphorus data files must be sorted by date.

2. With the exception of the six supplementary stations contained in the rainfall file (EAA1-EAA5, PAIGE), the files should contain no missing values.

The above characteristics are automatically maintained by the updating procedure. The procedure checks for missing flow & rainfall data and does not permit the calculations to extend beyond the last date with complete rainfall & flow records. Dates are retrieved and stored in YYMMDD format. The software recognizes this format and will maintain correct sort order in data files extending beyond 1999. For example, April 20, 2000 will be stored as 000420 and will be recognized as a date occurring after December 22, 1998 (981222). Within the batch update procedure (GO.BAT, Table 6), the following steps are taken to update flow, rainfall, and phosphorus data files:

Function	Input File(s)	Program	Output File(s)
Archive Current Data	*.FIX	COPY	/ARCHIVE/*.FIX
Reformat Downloaded File	*.SPL	COPYFX	*.SPC
Create Update Table	*.SPC *.DAT	HYDTAB or RDTP	*.UPD
Create Backup Table	*.FIX	COPY	*.BAK
Append Update Table to Existing Table	*.BAK *.UPD	UPDATE	*.FIX
Calculate Monthly Total Rainfall	EAARAIN.FIX	MTOTAL	EAARAINM.FIX
Summarize Current Data	*.FIX	SCAN	*.SCN

where * = EAARAIN, EAAFLOW, or EAATP. In creating the new data base (*.FIX), all records in the backup table (*.BAK) on and after the first date in the update table (*.UPD) are replaced by records in the update table.

For the flow data set (EAAFLOW.FIX), the update table contains only records with complete data for all stations. The update period stops when the first missing flow value is encountered. In this way, missing values should never occur in the daily flow table. The EAATPLD program assumes that the flow data file contains no missing values.

A monthly rainfall table (EAARAINM.FIX) is created from the daily rainfall table (EAARAIN.FIX). Monthly values are assigned a missing value code if one or more daily rainfall value is missing. EAABASIN.XLS loads the monthly table, checks for missing values, and terminates the calculation interval at the end of the last month with complete rainfall data for all nine stations used in computing the basin-average rainfall. Data from six supplementary stations (EAA1-5,PAIGE) are contained in the EAARAIN.FIX file, but are not loaded into the EAABASIN.XLS workbook or otherwise used in the calculations.

Adding New Stations to Basin Calculations

The Rule requires adjustment of the calculations to reflect new inflows or outflows from the EAA. When this is necessary, the following measures should be taken:

1. Identify the appropriate DBKEY for flow data.

2. Edit EAAFLOW.COM to include the new DBKEY.

3. Add a line at the end of EAAFLOW.DAT to reflect the new DBKEY and a new flow station label. The flow station label is for descriptive purposes only.

4. Using a text editor, modify the backup daily flow file (EAAFLOW.BAK) to contain an additional column (on the right) with a width of 10 characters. Fill in all historical values (10/1/78--end of file) with 0's. Add a station label for this column in line 4; this should equal the label assigned in Step 3. Increase the column counter in Row 2 (currently, 13) by 1.

5. Edit the FLOWREAD subroutine in EAATPLD.FOR to handle the additional flow station. Follow the coding pattern established for other stations. Add a new flow station code at the end of the DATA statement in the FLOWREAD subroutine. These codes are referenced in the control file (EAA.JOB). Recompile the program.

6. Identify appropriate station and project codes for water quality data.

7. Edit EAATP.COM to include the new station and project codes.

8. Add a line to EAA.JOB to reflect the new station. Set the flow sign ("qsign") to 1 if positive flows stored in the DBKEY are to be used or to -1 if negative flows are to be used. Set the term sign ("tsign") to 1 for an outflow term or to -1 for an inflow/thruflow term. Set the composite sample flag ("compos") to 1 if composite samples are collected at the station or to 0, otherwise. The flow station code should be referenced to the code assigned in the DATA statement of the FLOWREAD subroutine in EAATPLD.FOR. The water quality station code should equal that referenced in EAATP.COM.

Once these steps are completed, follow the normal updating procedures describe above.

Freezing Basin Results

Most of the Rule compliance calculations are performed on the 'Monthly' page of the EAABASIN.XLS workbook. There is one row below the heading for each month after September 1978. Columns B-X contain input values for the month identified in Column A; these are retrieved from other pages of the workbook. Columns Y-BK contain results for the 12-month period ending in the current month. Columns BL-BU contain additional calculated fields used

in graphing results. Column BV indicates whether the corresponding row is frozen (1) or thawed (0). When the workbook is updated, new rows are appended to the monthly table using formulas stored in Row 120 (hidden from view).

When results for a recent water year (through April) have been certified, it is necessary to "freeze" the results. This operation ensures that previously-certified results do not change with future file updates. Small variations in historical load estimates might otherwise occur at stations relying on grab samples. Such variations reflect the following characteristics of the load-calculation algorithm specified in the Rule:

1. interpolation based upon date to estimate grab-sample concentrations between sampling dates; and

2. adjustment of grab-sample loads based upon the ratio of average grab-sample load to the average composite-sample load calculated from all data collected after September 1991.

Freezing is accomplished by converting formula cells in appropriate rows on the 'Monthly' page to fixed values.

The procedure of freezing results is located on the 'Freeze' page (Table 7). The user enters a year in the indicated cell; all results up to and including April of the specified year will be frozen. Clicking on the "Freeze Results" button completes the operation by converting all of the corresponding rows on the 'Monthly' page to fixed values. Formulas are retained in rows after April of the specified year.

In the event that results are frozen by mistake, results can be "thawed" by specifying an earlier year in the indicated cell. All results after April of the specified year will be thawed. This converts fixed values back to formulas, so that results will change with current and future file updates.

Freeze operations should be conducted by SFWMD staff on an annual basis after certification of results for a given water year. It will not be necessary to include the required macros in versions of the workbook distributed to the public. Once results have been certified and frozen, the 'Freeze' page can be deleted (optionally) from copies of the workbook distributed to the public containing certified results through the current year.

Farm-Scale Calculations

Overview

Table 8 lists and describes data files and programs involved in farm-scale calculations. Primary steps include:

1. Basin Calculations. Rainfall statistics needed for farm-scale calculations are extracted from the EAABASIN.XLS workbook. Basin calculations must be updated through the period used for summarizing farm results. This is accomplished using the procedures described above.

2. Farm Data Update. Files containing daily farm monitoring data (EAAWQDWN.OUT or EAAWQDWN.DAT) and pump calibrations (PUMPCAL.DAT) are updated by SFWMD staff. The farm data file can have either of two formats: (1) Original format (indicated by the extension .OUT); or (2) Revised (compressed) format (.DAT). A separate utility (RCONV.EXE) has been supplied to convert file formats (see below). Both the farm data file and pump-calibration file must be sorted by Structure & Date. Partial listings of these input files are given in Table 9.

3. Structure Data Reduction. A Fortran program (EAAFARM.FOR) calculates total flows and phosphorus loads by structure for a user-specified time interval (typically corresponding to one May-April Water Year).

4. Farm Data Reduction. Workbooks (EAAF####.XLS, ####= Year) calculate total loads by farm, perform rainfall adjustments, and test for compliance. Workbook contents are outlined in Table 10. Separate versions of the workbook are created and maintained for each Water Year. A separate Excel 97 workbook (FARMCODE.XLS) contains supporting macros (Visual Basic code), notes on installing and updating farm workbooks, a page index which describes the contents of each yearly farm workbook (Table 10), and documentation of any changes made in future software updates.

Once the update files (EAAWQDWN & PUMPCAL) have been acquired, all calculations are controlled from within the yearly farm workbook. To install the software on a PC, copy all files to single disk directory.

Installing Farm Software

The following procedures should be followed in the specified order to install the farm software and data files:

1) Create a new disk directory for farm files and copy all files to that directory. The software and data files require approximately ? megabytes of free disk space.

2) Install the basin software and update basin calculations, as described above.

3) Install the GIS data files (optional).

4) Run Excel & load the FARMCODE.XLS workbook.

5) On the 'Setup' page of FARMCODE.XLS, edit the disk directory names for farm files, GIS output files, and basin files. These values must be edited any time the file locations are changed.

6) Save FARMCODE.XLS (but do not close file).

7) Load a farm yearly workbook (e.g., EAAF1994.XLS).

8) If an explorer window appears looking for EAABASIN.XLS, navigate to basin directory & select EAABASIN.XLS.

9) The Farm workbook is linked to the Basin workbook through in formulas located on the 'Basin' page. Permanently update links from the Farm workbook to the Basin workbook using following Excel commands:

   a) Select 'Edit Links' on the Farm workbook
   b) Select the link to the EAABASIN workbook
   c) Click 'Change Source..'
   d) Navigate to the directory containing the EAABASIN workbook
   e) Select the EAABASIN Workbook
   f) Click 'OK'
   g) Click 'OK'

10) Go to the Farm workbook 'Menu' page.

11) Save the farm workbook (EAAF1994.XLS).

Installation instructions are repeated on the 'Notes' page of the FARMCODE.XLS workbook.

Supporting macros are stored as Visual Basic Code attached to the FARMCODE.XLS workbook. These are transparent to the user. To view the code, select "Tools Macros VisualBasicEditor". Then select 'Modules/Module1' under VBA Project FARMCODE.XLS from the Project window in the upper left corner of the screen.

Additional supporting documentation is provided in the form of comments attached to individual cells in the farm workbook. Cells with comments are indicated by red triangles in the upper right hand corner. Move the cursor over the cell (without clicking the mouse) to view a comment.

Updating Farm Calculations

Periodic updates of the calculations will normally involve the following procedures in the specified order:

1. Load and update the EAABASIN.XLS workbook using procedures described above. Save and close the workbook.

2. SFWMD staff maintains a data base containing daily monitoring data submitted by permittees. Acquire the most recent farm data file (EAAWQDWN.OUT or EAAWQDWN.DAT) and copy it to the disk directory containing farm software. The program reads with either file format (.OUT or .DAT).

3. SFWMD staff maintains a data base of pump calibrations and operating date ranges for each structure. Acquire the most recent output file (PUMPCAL.DAT) and copy it to the disk directory containing the farm software.

4. Load the farm workbook produced for the previous water year. For example, if you are updating the calculations for water year 1996, load the EAAF1995.XLS workbook.

5. Edit the "Farm Data File" field on the "Constants" page of the farm workbook to reflect the name of the farm data file retrieved in Step 2 (EAAWQDWN.DAT or EAAWQDWN.OUT).

6. Click the 'Update Farm Baselines" button on the 'Menu' page. Respond "Yes" to the prompt. This procedure copies the updated farm baseline data in columns W..AA of the 'Results' page to columns C..G of the same page as fixed values.

7. Revise the 'Farms' page to reflect any new structures, farms, or calculation methods for the current water year (see Maintaining Farm Table, below).

8. Edit the "Ending Year", "Ending Month", "Case Title", and "Input File Name" fields on the 'Menu' page to reflect the new water year. For example, if the new water year is 1996, "Ending Year" = 1996, "Ending Month" = 4, "Case Title" = Water Year 1996, and "Input File Name =" EAAF1996.PRN.

9. Save the farm workbook with a new name reflecting the new water year (e.g., "EAAF1996.XLS") using the Excel "File Save_As" command. Once the new farm workbook has been created, steps 4-8 do not have to be repeated when updating calculations for a given water year.

10. Click the "Update Data Files" button on the 'Menu' page. This creates an input control file for structure calculations (AUTO.DAT) and executes a DOS batch file (AUTO.BAT). The EAAFARM.EXE program is executed to summarize results by structure for the specified period. Three output files are generated:

    EAAF####.PRN - Results, one row per structure
    REC####.PRN - Daily values used in structure calculation
    CHK####.PRN - Error Messages, Flagged Records

    where #### = Water Year. The REC and CHK files are for documentation purposes only; they are not referenced in subsequent calculations. The REC file is accessed by the PLOT utility described below. The CHK file should be viewed to identify potential errors in the EAAWQDN.OUT (or .DAT) file. Close the DOS window by clicking on the X in the upper right hand corner.

11. Click the "Update Workbook" button to update all tables in the workbook. This loads the structure file (EAAF####.PRN) created in the previous step, retrieves basin results, calculates farm totals, screens data for completeness, adjusts loads for variations in rainfall, and tests farm compliance. The algorithm is illustrated in Table 13

and Figure ?. The progress of the calculations is shown by the status indicator in the lower left hand corner of the screen. A pop-up window appears when the calculations are complete. Close the window to proceed with the next step.

12. Click the "Output Summary" button on the 'Menu' page or the 'Outputs' tab to view a summary of results. An example is given in Table 12.

13. Click the "Create GIS Files" button on the 'Menu' page to create GIS output files for display using ArcView Version 3.0 (ESRI). An ArcView Project file (EAA.APR) is provided for this purpose (see GIS Output). This step is optional if GIS output is not desired.

14. Click the "Results for One Farm" button on the 'Menu' page to view a summary of results for a particular farm (UAID). This procedure switches to the 'One Farm' page. The requested UAID can be entered in Cell C21. Clicking the "Results" button updates the tables on this page. Clicking the "Next" or "Last" button increases or decreases the UAID number and updates the tables. Clicking the "Menu" button returns to the 'Menu' page.

15. Navigate to the 'Results' page to view a summary of results for all UAID's (one line per farm). The 'Results_C' page contains data in a similar format but excludes farms with rejected data for the current water year.

16. Click the "View Graphs" button to view output graphs summarizing farm results by EAA sub-basin and comparing farm results with basin results.

17. Save the workbook labeled with the current water year (e.g., EAAFARM96.XLS).

Table 13 summarizes the algorithms used for calculating structure and farm loads.

If an error in the calculations is encountered during any of the macro steps , execution will stop and the Visual Basic code window will appear. The location of the error (breakpoint) will be highlighted in yellow. Note the error location. Rset the program by selecting 'Run Reset' from the Visual Basic menu. Return to Excel via the Windows 95 Task Bar (bottom of screen).

Maintaining the Farm Pump Calibration File

The pump calibration file (PUMPCAL.DAT) contains pump calibration values for specified structures and time periods. The format of the file is shown in Table 9. Each structure must be registered in this file before it can be used in calculating structure and farm loads. File contents include structure code, calibrated flow, first date, and last date. The specified date ranges are inclusive. The file must be sorted by structure code and first date. If the first date on each line should contain a valid date in YYYYMMDD format. If the last date is blank, the corresponding calibrated flow applies to all dates after and including the first date. A flow value of -999 is used to indicate a period when the structure was not in operation. Any records encountered during such a period will be ignored. Farms will not be penalized for missing data during a period when the structure is not operational. Each structure is assumed to be non-existent (-999 implied) for all dates prior to the first entry in the pump calibration file. According to the data-reduction algorithm shown in Table 13, calibrated flow is used to estimate flows on missing dates only if the zero flow was reported on all other dates in the calculation interval.

Maintaining the Farm Table

Farm totals are calculated on the 'Farms' page of EAAF####.XLS. Rows are grouped and sorted by Farm or Unit Area Id (UAID). New structures can be added (or removed) by inserting (or deleting) rows in the table at locations adjacent to other structures referenced to the same UAID. The following general rules apply to maintenance of the farm table:

1. The table is sorted by UAID. The first record for each UAID should contain the total results for that UAID.

2. Values in Columns A-K are input cells that must be directly entered, as appropriate.

3. Column E should contain a drainage area value for each line with a GIS-ID code. In addition, in the first line for each UAID, Column E should contain the total area for that UAID. This value may be entered directly (if there is only one GIS-ID for the UAID). Otherwise, the total area should be computed as the sum of the areas for all GIS-ID's in the UAID.

4. Entries in Columns H-K (Early Baseline, Date Ranges, Comments) are for reference purposes only and are not used in the calculations. Data ranges used in the calculations are contained in the Pump Calibration file.

5. Columns L-AC are formula cells. These can be copied from Range L8..AC8 to any new rows inserted into the table. Subsequent editing of these formulas may be required, depending on calculation method, as described below.

6. Columns L-Q retrieve structure results from other portions of the workbook.

7. Columns R-W calculate farm totals (area, flow, load, adjusted load) based upon structure results stored in Columns L-O.

8. Columns R-Y should contain entries only in the first row for each UAID.

9. Column R (Total Farm Area) should always be set equal to Column E.

10. Columns S-W may be edited to reflect any special rules for combining structure results (adding or subtracting results from more than one structure). In some cases (depending upon calculation method), calculating farm totals may involve subtracting results for one group of structures from results for another group of structures. Examples are given in formulas for UAID's 4, 68, 102, & 113.

11. Columns V & W calculate the sums of total load and sampled load for all structures used for the current UAID (regardless of whether a subtraction occurs). These columns are used to calculate the percent of the total load that is sampled for each UAID.

12. If any structures present in previous years are eliminated, the corresponding summation formulas in Columns S-W must be adjusted accordingly. Columns R-Y should contain only one row for each UAID

13. Columns Z-AC contain record selection criteria and scratch variables. These columns are automatically updated when the 'Update Workbook' button is pressed; therefore, these columns can be ignored when adding or deleting records from this table.

14. A "1" can be entered in Column Y to force acceptance of data from a particular UAID (i.e., override data rejection criteria specified on the 'Constants' page). This column is normally left blank. This is provided to accommodate special situations. Entries in Column Y reflecting prior year's calculations should be cleared before starting calculations for a new year.

Document any changes in calculation methods on the 'Methods' page of the farm workbook. The revision log begins in Row 21 of the 'Methods' page. Changes are identified by Water Year.

If new structures or UAID's are added to the Farm table, or if the structure assignments to UAID's are changed, the structure index file used by the Plot Utility (STRUCS.DAT) must be edited to reflect these changes (see Plot Utility).

File Conversion Utility

The utility 'RCONV.EXE' translates farm daily data files in the original format (EAAWQDWN.OUT) to the revised format (EAAWQDWN.DAT). It is executed with the following command line:

>RCONV Infile Outfile

where,

Infile = Input File Name, typically = EAAWQDWN.OUT
Outfile = Output File Name, typically = EAAWQDWN.DAT

Record Counting Utility

The utility 'RCOUNT.EXE' reads the farm daily data file (.OUT or .DAT format) and produces an output table indicating the number of records and date range for each structure. It is executed with the following command line:

>RCOUNT Infile Outfile

where,

Infile = Input File Name, typically = EAAWQDWN.OUT or .DAT
Outfile = Output File, typically 'RCOUNT.PRN'

Plot Utility

A separate utility has been provided for plotting farm daily rainfall, flow, concentration, and/or load data. Missing and estimated values are indicated. Plots can be displayed on the screen or printed using any laser-jet compatible printer directly connected to the PC (probably won't work through network). Plot data are taken from the REC####.PRN files created by EAAFARM.EXE.

To execute the utility, enter the following command from the DOS prompt:

>PLOT YEAR UAID

where,
YEAR = year (1994, 1995, ,1996, etc) (required)
UAID = Unit Area ID Number (optional)

If UAID is 0 or blank, data from all structures will be plotted. If UAID is specified, the utility reads a separate index file (STRUCS.DAT) to find structure codes associated with the specified UAID. This index file must be updated manually if new structures or UAID's are created. Plot instructions are contained in the ASCII file 'PLOT.DAT'. By editing this file, the user can:

- Direct output to screen or printer
- Select early baseline farms, non-early baseline farms, or both
- Select date range within the specified year
- Select plot variables (rainfall, flow, conc., and/or load)
- Change plot size, colors, etc

The last line of the PLOT.BAT file should be edited to reflect the disk directory containing farm data files. A README file provides further documentation.

Outlier Utility

A utility for identifying possible outliers in the farm data set is also provided. The program reads data directly from the EAAWQDWN.OUT file. The ASCII input file 'OUTLIERS.DAT' can be edited to specify the following:

- input file name & directory
- date range
- output file names
- minimum concentration for outlier screening = C_{min}
- significance level for outlier detection

The utility can be executed by entering the following command from the DOS prompt:

>OUTLIERS

The program loads and tests data from each structure. Three output files are created:

DAILY.PRN	listing of data from all days with positive flow
EVENTS.PRN	listing of event-mean concentrations & flows
OUTLIERS.PRN	listing of outliers & significance levels

Outliers are detected based upon deviation from a log-scale regression relating event-mean concentration to event-mean flow for each structure. Events are terminated when the reported daily concentration changes. The algorithm is similar to that used for detecting outliers in basin load calculations. The regression model is of the following form:

$$LOG(C^*) = a + b\ LOG(Q)$$

C^* = Maximum (C , C_{min})
Q = Event-Mean Flow (cfs)
C = Reported Concentration (ppm)
C_{min} = Minimum Concentration (ppb)

C_{min} is specified in the input file (OUTLIERS.DAT). This term is included to reduce negative skewness which occurs in the log-scale concentration distribution when very low concentrations are reported. A C_{min} value of 0.02 ppm is suggested.

The utility is provided to assist in checking the farm data and correcting typographic errors. Flagged values are not necessarily unrepresentative. They should be checked to ensure that unusually low or high values do not reflect typographic errors in the source data set. The PLOT utility can provide additional perspectives on flagged values. There is no provision in the existing methodology to delete values solely based upon outlier detection. A README file provides further documentation.

ArcView Project for Displaying Farm Results

An ArcView 3.0 project file named 'EAA.APR' is distributed with the farm software. It is beyond the scope of this report to provide instructions for using ArcView. The project contains two views (Farms & Structures).

The 'Farms' view shows results in the form of polygons representing UAID's. The GIS attribute table representing the farm boundaries is joined to the farm output file for each year (e.g., FARM94.DBF). The Farm view contains themes

for displaying unit runoff, concentrations, and unit area loads in each year.

The 'Structures' view shows results in the form of points representing structure locations. The GIS attribute table representing structure locations is joined to the structure output file for each year (e.g., STRUC94.DBF). The structure view contains themes for displaying structure concentrations in each year.

The following procedures should be followed for updating the ArcView project when output files for a new water year are available (e.g. 1998).

1) Add new data tables.
   a) From main project menu, select 'Tables', then 'Add'.
   b) Navigate to data base file for next year (FARM98.DBF) & select file.
   c) Select 'Add' again.
   d) Navigate to structure data base file for next year (STRUC98.DBF) & select file.

2) Update 'Farms' View.
   a) Select 'Views' Window (top of left panel) Update Farms View.
   b) Select 'Farms' View
   c) Select Theme labeled 'Concs 1997' from left panel.
   d) Select 'Edit CopyThemes'
   e) Select 'Paste'
   f) Select new theme at top of window (still labeled 'Concs 1997')
   g) Select 'Themes Properties', change Theme Name to "Concs 1998', & click 'OK' to close themes window.
   h) Select 'Themes Table'. A table called 'Attributes of ...' will appear.
   i) Link the Attributes table to the new data file:
      i) Select 'Table Remove All Joins'.
      ii) Move cursor to top of column labeled 'GIS_ID'. Click on label. It should turn dark grey. (It may already have been selected.)
      iii) Minimize window clicking on the '-' in the upper right hand corner.
      iv)From the Table window, select the new data base file (FARM98.DBF).
      v) Move cursor to top of column labeled 'GIS_ID'. Click on label. It should turn dark grey.
      vi)Maximize the previous table window (Attributes of ...).
      vii)Select 'Table Join'. Check to make sure that the 1997 results have been added to the right hand side of the attribute table.
      viii) Close Table window.
   j) Select 'Views' Window
   k) Select 'Farms' View
   l) Double click on the theme labeled 'Concs 1998'.

m) Under 'Legend Type' select 'Graduated Color'
n) Under 'Classification Field' select 'Conc'
o) Click on the 'Apply' box, then close window.
p) The view should now contain concentration values for 1998.

3) To create a view for 1998 runoff:
   a) Select the 'Concs 1998' theme.
   b) Select 'Edit Copy Themes'.
   c) Select 'Edit Paste'
   d) Select the copied theme at the top of the menu.
   e) Select 'Themes Properties', change Theme Name to "Runoff 1998', & click 'OK' to close themes window.
   f) Double click on the theme labeled 'Runoff 1998'.
   g) Under 'Classification Field' select 'Runoff'
   h) Under 'Color Ramps' select a color scheme.
   i) Click on the 'Apply' box, then close window.
   j) The view should now contain runoff values for 1998.

4) Repeat the previous procedure to establish a view for Unit Area Load or other variable in the output data file.

Procedures for updating the 'Structures' view are analogous to those described above for the 'Farms' view. In the Table Join step, select the 'Struc_id' field from the Attributes Table and the 'Structures' field from the data (STRUC98.DBF) table.

Summary of Farm & Basin Results

The Excel workbook 'FARMSUM.XLS' provides summaries of farm and basin results for each year. This file is copies results from each yearly farm workbook. Three data views are provided:

1. Cross-tabulation of farm results by UAID and year for several variables extracted from the 'Results' page of the yearly farm workbooks (e.g., Table 14)

2. Summary of all results for each year and a single UAID (e.g., Table 15)

3. Summary of farm & basin results for each year (e.g., Table 16)

Instructions for installing and updating the file are contained on the first page of the workbook. The workbook is updated by clicking on the 'Update

Workbook' button located on the 'Notes' page. This executes a macro (stored in FARMCODE.XLS) which copies the 'Outputs' and 'Results' pages of each yearly farm workbook to pages of FARMSUM.XLS named SUM#### and EAAF####, respectively. All water years with valid workbooks (starting with 1994) are copied. Formulas are converted to constants, so that FARMSUM.XLS is transportable and contains no 'live' linkages to the yearly farm workbooks. The copied pages are stored before the 'Notes' page. Summary tables are located after the 'Notes' page. Summary tables must be edited when a new water year is added, following the instructions contained on the 'Notes' page.

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Figure 1

Flow Chart of Farm-Scale Calculations

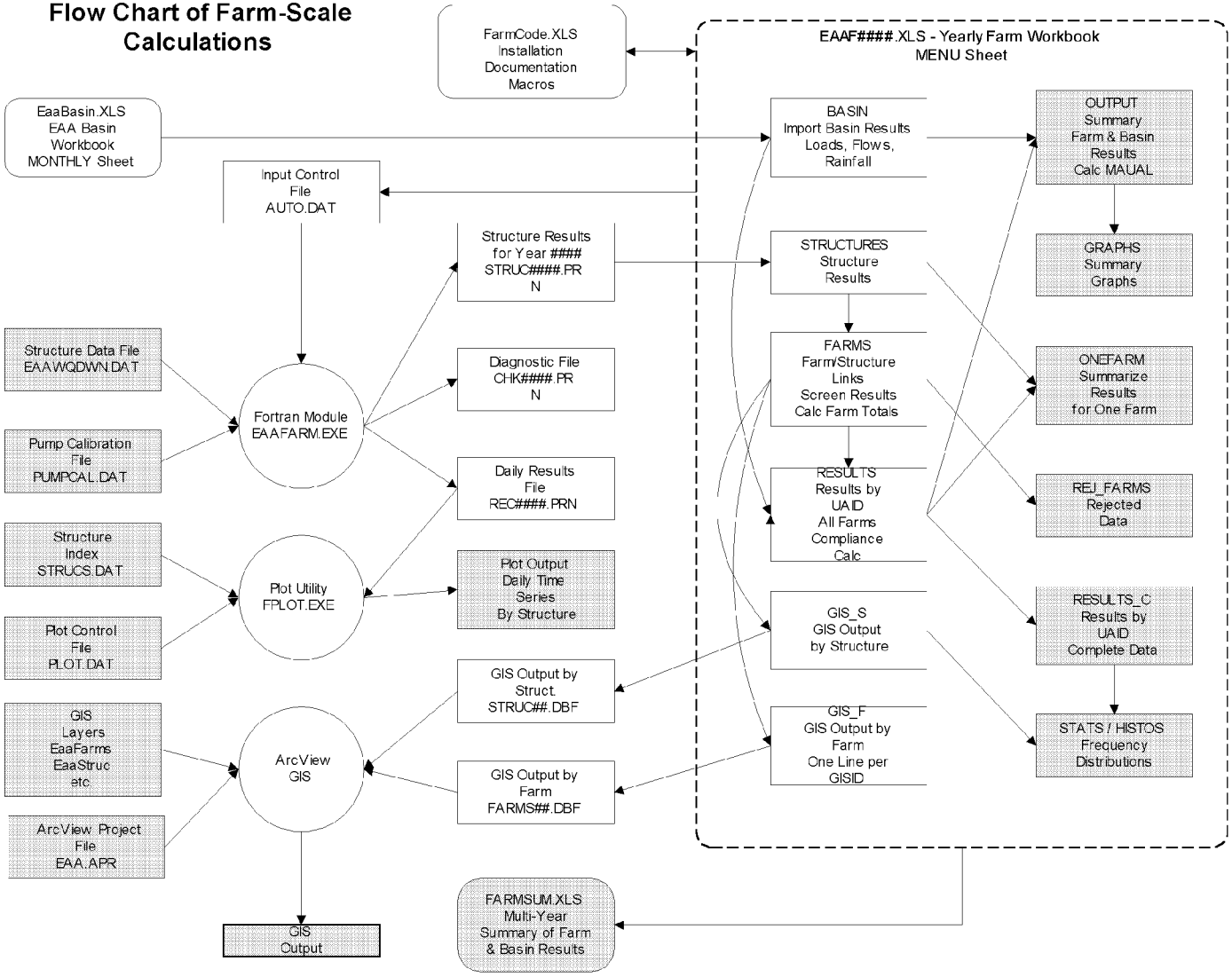

Table 1
File Index for EAA Basin Calculations

Filename	Extension	Type	Contents or Function	Description
EAABASIN	XLS	Program	Basin Load Calculation	Workbook
READMEB	DOC	Readme	Comments, Installation Proc.	Documentation
EAA	JOB	Input	Load Calculations	Control File
EAA	INV	Output	Load Calculations	Sample Inventory
EAA	LOG	Output	Load Calculations	Log File
EAA	MON	Output	Load Calculations	Monthly Flows & Load for Each Term
EAA	PRN	Output	Load Calculations	Summary By Term & Time Interval
EAA	SUM	Output	Load Calculations	Monthly Cross-Tab
EAA	TOT	Output	Load Calculations	Monthly Flows & Loads For Basin
EAAFLOW	COM	Program	Daily Flow Data	SQL to Retrieve Update Data
EAAFLOW	DAT	Input	Daily Flow Data	DBKEY Specifications
EAAFLOW	SPL	Download	Daily Flow Data	Update File - Downloaded
EAAFLOW	SPC	Output	Daily Flow Data	Reformatted Update File
EAAFLOW	UPD	Output	Daily Flow Data	Update Data Table
EAAFLOW	BAK	Output	Daily Flow Data	Previous Data Base
EAAFLOW	FIX	Output	Daily Flow Data	Current Data Base
EAAFLOW	SCN	Output	Daily Flow Data	Data Inventory
EAARAIN	COM	Program	Daily Rainfall Data	SQL to Retrieve Update Data
EAARAIN	DAT	Input	Daily Rainfall Data	DBKEY Specifications
EAARAIN	SPL	Download	Daily Rainfall Data	Update File - Downloaded
EAARAIN	SPC	Output	Daily Rainfall Data	Reformatted Update File
EAARAIN	UPD	Output	Daily Rainfall Data	Update Data Table
EAARAIN	BAK	Output	Daily Rainfall Data	Previous Data Base
EAARAIN	FIX	Output	Daily Rainfall Data	Current Data Base
EAARAIN	SCN	Output	Daily Rainfall Data	Data Inventory
EAARAINM	FIX	Output	Monthly Rainfall Data	Current Data Base
EAARAINM	SCN	Output	Monthly Rainfall Data	Data Inventory
EAATP	COM	Program	Sample Conc. Data	SQL to Retrieve Update Data
EAATP	SPL	Download	Sample Conc. Data	Update File - Downloaded
EAATP	SPC	Output	Sample Conc. Data	Reformatted Update File
EAATP	BAK	Output	Sample Conc. Data	Previous Data Base
EAATP	UPD	Output	Sample Conc. Data	Update Data Table
EAATP	FIX	Output	Sample Conc. Data	Current Data Base
EAATP	SCN	Output	Sample Conc. Data	Data Inventory
GO	BAT	Program	Update All Data Files	Batch Command File
EAATPLD	EXE	Program	Calculate EAA Total P Loads	Compiled Fortran Code
EAATPLD	FOR	Program	Calculate EAA Total P Loads	Fortran Source Code
SUBR	FOR	Program	Subroutines for EAATPLD.FOR	Fortran Source Code
HYDTAB	EXE	Program	Process Hydrology Update File	Compiled Fortran Code
HYDTAB	FOR	Program	Process Hydrology Update File	Fortran Source Code
MTOTAL	EXE	Program	Calc. Monthly Total Rainfall	Compiled Fortran Code
MTOTAL	FOR	Program	Calc. Monthly Total Rainfall	Fortran Source Code
RDTP	EXE	Program	Process Sample Update File	Compiled Fortran Code
RDTP	FOR	Program	Process Sample Update File	Fortran Source Code
SCAN	EXE	Program	Inventory Data Base	Compiled Fortran Code
SCAN	FOR	Program	Inventory Data Base	Fortran Source Code
UPDATE	EXE	Program	Merge Previous & Update File	Compiled Fortran Code
UPDATE	FOR	Program	Merge Previous & Update File	Fortran Source Code
COPYFX	EXE	Program	Copy & Reformat *.SPL File	Compiled Fortran Code
COPYFX	FOR	Program	Copy & Reformat *.SPL File	Fortran Source Code

Table 2
Daily Flow Retrieval Program, File Format, & Data Summary

```
EAAFLOW.COM - SQL to Retrieve Daily Flow Data
$prod
$SQLPLUS PUB/PUB
col daily_date format a8;
col value format 99999.9;
set pagesize 0;
set feedback off;
set termout off;
spool eaaflow.spl;
select to_char(daily_date,'yymmdd') daily_date,
       dbkey, value from dm_daily_data
   where dbkey in
        ('15068', '15021', '15018', '15031', '15034',
         '15037','15041','15040','15196','15195','15736',
         '16222')
/*       S352     S2       S3       S5A      S6     */
/*       S7      S150      S8   G88   G136    G200      */
/*       G250 */
   and daily_date between to_date ('19911001','yyyymmdd')
                      and to_date ('20201231','yyyymmdd')
order by daily_date, dbkey;
spool off;
termout on;
quit;
$EXIT

EAAFLOW.FIX - Daily Flow Table
EAA Daily Flows  May 1996
 13
  -999.999
YYMMDD    S352      S5A5AW    S2        S6        S7        S150      S3
781001.0      .000  2550.000 -1080.000      .000      .000      .000      .000
781002.0      .000  1570.000  -750.000   204.000   185.000      .000      .000
781003.0      .000  1860.000  -519.000   543.000   519.000      .000      .000
781004.0      .000  1620.000      .000   435.000   442.000      .000      .000
etc


EAAFLOW.SCN - Summary of Daily Flow Data Contained in File EAAFLOW.FIX
EAA Daily Flows  May 1996
file inventory

variable   count missing  < zero    minimum    maximum    dfirst     dlast
S352        6483       0      37  -1310.000   1100.000  19781001  19960630
S5A5AW      6483       0    1236   -967.000   4810.000  19781001  19960630
S2          6483       0     469  -4900.000   3840.000  19781001  19960630
S6          6483       0     422   -640.000   4083.550  19781001  19960630
S7          6483       0     243   -684.000   2890.000  19781001  19960630
S150        6483       0      96   -285.000   1575.000  19781001  19960630
S3          6483       0     433  -2620.000   1680.000  19781001  19960630
S8          6483       0     152   -362.000   4060.000  19781001  19960630
G88         6483       0       0       .000   1016.000  19781001  19960630
G136        6483       0       0       .000    640.000  19781001  19960630
G200        6483       0       0       .000    770.200  19781001  19960630
G250        6483       0       0       .000    548.900  19781001  19960630
```

Table 3
Daily Rainfall Retrieval Program, File Format, & Data Summary

EAARAIN.COM - SQL to Retrieve Daily Flow Data

```
$prod
$SQLPLUS PUB/PUB
col daily_date format a8;
col value format 999.99;
set pagesize 0;
set feedback off;
set termout off;
spool eaarain.spl;
select to_char(daily_date,'yymmdd') daily_date,
       dbkey, value from dm_daily_data
   where dbkey in
       ('15197', '15200', '15198', '15201', '15202',
        '15203','15204','15205','15199',
        '15181','15182','15183','15184','15238','05949')
/* ALICO BELLEGL MIAMI PAHOKEE S5A S6 S7 S8 SOUTHBAY */
/* FOLLOWING STATIONS ARE FOR GENERAL INFO., NOT USED IN BASIN CALCS*/
/* EAA1 EAA2 EAA3 EAA5 EAA4 PAIGE */
   and daily_date between to_date ('19911001','yyyymmdd')
                      and to_date ('20201231','yyyymmdd')
order by daily_date, dbkey;
spool off;
termout on;
quit;
$EXIT
```

EAARAIN.FIX - Daily Rainfall Table

```
EAA Daily Rainfall
 16
  -999.999
YYMMDD    ALICO     MIAMILO   SOUTHBAY  BELLEGL   PAHOKEE   S5A       S6        S7          etc
  781001.0      .480      .170      .690      .380     1.590      .970      .090      .050    etc
  781002.0      .350      .610      .000      .880      .030      .000      .390      .000    etc
  781003.0      .000      .000      .000      .000      .410      .060      .000      .000    etc
  781004.0      .000      .000      .000      .000      .000      .000     1.090     2.090    etc
etc.
```

EAARAIN.SCN - Summary of Daily Flow Data Contained in File EAARAIN.FIX

```
EAA Daily Rainfall
file inventory

variable   count missing  < zero    minimum    maximum    dfirst     dlast
ALICO       6389     144       0       .000      4.430  19781001  19960630
MIAMILO     6483      50       0       .000      4.260  19781001  19960630
SOUTHBAY    6483      50       0       .000      4.710  19781001  19960630
BELLEGL     6482      51       0       .000      5.920  19781001  19960630
PAHOKEE     6483      50       0       .000      6.200  19781001  19960630
S5A         6483      50       0       .000      9.540  19781001  19960630
S6          6483      50       0       .000      6.000  19781001  19960630
S7          6483      50       0       .000     11.990  19781001  19960630
S8          6130     403       0       .000      4.670  19781001  19960630
EAA1        1226    5307       0       .000      5.610  19911001  19951206
EAA2        1737    4796       0       .000      5.020  19911031  19960819
EAA3        1661    4872       0       .000      4.110  19911014  19960819
EAA4        1524    5009       0       .000      6.470  19920317  19960819
EAA5        1534    4999       0       .000      4.220  19911105  19960819
PAIGE       4730    1803       0       .000      4.960  19820901  19960729
```

Table 4
Phosphorus Data Retrieval Program, File Format, & Data Summary

EAATP.COM - SQL to Retrieve Phosphorus Concentration Data

```
$prod
$SQLPLUS PUB/PUB
col date_collected format a8;
col TP04  format 990.999;
col sample_type format a3;
set pagesize 0;
set feedback off;
set termout off;
spool EAATP.spl;
select station_id, project_code,
       to_char(date_collected,'yymmdd') date_collected,
       to_char(sample_type,'099'),
       value TP04, source from wqdora.sample
 where project_code in
       ('HOLY', 'HOLE', 'X', 'CAMB', 'R', 'ENRP')
   and station_id in
       ('G136', 'G200', 'L3',
        'S150', 'S2', 'S3', 'S352', 'S5A', 'S6', 'S7', 'S8',
        'ENR002')
   and date_collected between
                  to_date ('19911001','yyyymmdd')
               and to_date ('20201231','yyyymmdd')
   and test_number = 25
   and sample_type not in (1,9)
   and flag is null
order by date_collected, station_id;
spool off;
quit;
$EXIT
```

EAATP.FIX - Phosphorus Concentration Data

```
Phosphorus Data
  4
  -999.999
STATION   YYMMDD    TYPE      TP
S6          781002.0     7.000      .100
S7          781002.0     7.000      .057
S8          781002.0     7.000      .035
L3          781009.0    19.000      .124
etc
```

EAATP.SCN - Summary of Phosphorus Data Contained in File EAATP.FIX

```
Phosphorus Data
file inventory

observations vs. station:
   575 S6          668 S7          667 S8          237 L3          228 S150
   541 S2          474 S3          319 S352        588 S5A         127 G136
   157 G200        214 ENR002

variable   count missing  < zero    minimum    maximum    dfirst     dlast
TYPE        4795       0       0       .000     24.000  19781002  19960805
TP          4795       0       4      -.004      1.030  19781002  19960805
```

Table 5
Contents of EAABASIN.XLS

Worksheet Index (located on 'NOTES' page):

Page	Description
Menu	Program Control
Notes	This Sheet
Freeze	Freeze Results
Report	Summarize Results for User-Specified 12-Month Period
Graphs	Yearly Time Series Plots
Monthly	Monthly Calculations
Yearly	Results for Each Water Year
Areas	Reductions in EAA Watershed Area (Must be Manually Updated)
LoadUpdate	Update Phosphorus Load File from EAATPLD
RainUpdate	Update Monthly Rainfall File
Coefficients	Fixed Model Coefficients (from Rule Text)
Terms	Summary of EAA Mass Balance Terms (from EAATPLD)
Samples	Inventory of Phosphorus Data Used in Load Calculations (from EAATPLD)
Calcs	Calculations & Named Variables
C_Concs	Chart - Yearly Concentrations
C_Reduc	Chart - Yearly Load Reductions
C_AUAL	Chart - Yearly Adjusted Unit Area Load
C_AdjLoad	Chart - Yearly Adjusted Load
C_12MRed	Chart - 12-Month Rolling Average Load Reduction
C_etc..	Charts - Other

MENU Sheet:

Basin Compliance Calculations - EAA Regulatory Rule **Version: February 20, 1998**
South Florida Water Management District

User Inputs are in Blue

Disk Directory-----------> **e:\sfwmd\basin** contains this workbook & data files

Update Files **<-- Press Here to Update Source Data Files**
Updates Rainfall, Flow, & Phosphorus Data
Executes EAATPLD to Update Monthly Load File

Update Workbook **<-- Press Here to Update Workbook**

Data Base:	Workbook	Rainfall	Loads
Last Month:	199709	199709	199709

Report **<-- Press Here to View Results for Specified Period**

Graphs **<-- Press Here to View Graphs**

Table 6
Batch Procedure for Updating Basin Files & Load Calculations

```
echo Batch Procedure to Update EAA Flow, Rainfall, & Phosphorus Data Files
echo.
echo requires the following files downloaded from SFWMD computer:
echo.
echo    EAARAIN.SPL     daily rainfall update
echo    EAAFLOW.SPL     daily flows update
echo    EAATP.SPL       phosphorus conc update
echo.
echo Press Ctrl-C to abort, other key to continue
pause
if NOT EXIST eaarain.spl goto zip
if NOT Exist eaatp.spl   goto zip
if NOT exist EAAflow.spl goto zip
echo.
break on
echo archive current file versions
copy *.fix .\archive
echo.
echo update daily rainfall file
copyfx eaarain.spl eaarain.spc
hydtab eaarain.dat eaarain.spc
copy eaarain.fix eaarain.bak
update eaarain.bak eaarain.upd eaarain.fix
echo summarize daily rainfall file
scan eaarain.fix eaarain.scn
echo.
echo calculate monthly total rainfall
mtotal eaarain.fix eaarainm.fix
echo summarize monthly rainfall file
scan eaarainm.fix eaarainm.scn
echo.
echo update p concentration file
copyfx eaatp.spl eaatp.spc
rdtp eaatp.spc eaatp.upd
copy eaatp.fix eaatp.bak
update eaatp.bak eaatp.upd eaatp.fix
echo summarize p concentration file
scan eaatp.fix eaatp.scn
echo.
echo update daily flow file
copyfx eaaflow.spl eaaflow.spc
hydtab eaaflow.dat eaaflow.spc
copy eaaflow.fix eaaflow.bak
update eaaflow.bak eaaflow.upd eaaflow.fix
echo summarize daily flow file
scan eaaflow.fix eaaflow.scn
echo.
echo update load calculations
del eaa.tot
del eaa.sum
del eaa.prn
del eaa.inv
del eaa.mon
eaatpld eaa.job >eaa.log
echo.
echo *** file updates & load calculations completed
goto next
:zip
echo *** .SPL file missing - file update aborted
:next
echo *** close window & return to EAABASIN.WK4 spreadsheet
:end
```

Table 7
Freeze Procedure

Location: **'Freeze' Page**

Freeze Results

FREEZING converts ed monthly values to constants, so that they won't change with future file updates
Normally, this would once results for current water year have been certified.

Enter Water Year (YYYY)------> **1996** results will be frozen through April of this year
& thawed after April of this year
Value must be between 1993 & last water year
with complete data = 1997

Freeze Results **<-- Press Here to Freeze Results**

Modifies rows in Monthly Worksheet. Frozen Rows have black text. Thawed Rows have red text.

Workbook Updated Thru	199709
Results Currently Frozen Thru	199604
Number of Frozen Rows	211
Number of Active Rows	17
Total Number of Valid Rows	228

Table 8
File Index for EAA Farm-Scale Calculations

Filename	Extension	Type	Description
READMEF	DOC	Readme	Installation Instructions
AUTO	BAT	Program	Batch File for Structure Load Calculations Executed by Spreadsheet
AUTO	DAT	Input	Input File for Structure Load Calculations Created by Spreadsheet
EAAFARM	FOR	Program	Program for Calculating Structure Loads
SUBR	FOR	Program	Subroutines for EAAFARM.FOR
EAAFARM	EXE	Program	Compiled Version of EAAFARM.FOR
RCOUNT	FOR	Program	Summarizes Records in EAAWQDWN.OUT or EAAWQDWN.DAT
RCOUNT	EXE	Program	Compiled Version of RCOUNT.FOR
RCONV	FOR	Program	Converts Farm Daily Data File from .OUT to .DAT format
RCONV	EXE	Program	Compiled Version of RCONV.FOR
EAAWQDWN	OUT	Input	Farm Daily Monitoring Data (Original Format)
EAAWQDWN	DAT	Input	Farm Daily Monitoring Data (Revised Format)
PUMPCAL	DAT	Input	Pump Calibration File
CHK####	PRN	Output	Record Checks, Error Messages
REC####	PRN	Output	Daily Values Used to Calculate Structure Loads in Given Year
EAAF####	XLS	Program	Farm Calculation Workbook (#### = YEAR = 1994, 1995, etc)

Table 9
Partial Listings of Farm Update Files

EAAWQDWN.OUT - Daily Farm Monitoring Data - Original File Format *

Structure	Permit	Date	Conc	Flow	Rain	Load	Type
"50-00039-E	","BC00.1TN	","01-JUN-1993",	.479 ,	1.1 ,"	",	2.0	,"GRAB"
"50-00039-E	","BC00.1TN	","02-JUN-1993",	.479 ,	2.1 ,"	",	3.8	,"GRAB"
"50-00039-E	","BC00.1TN	","03-JUN-1993",	.479 ,	.0 ,"	",	.0	,"GRAB"
"50-00039-E	","BC00.1TN	","04-JUN-1993",	.479 ,	.0 ,"	",	.0	,"GRAB"
"50-00039-E	","BC00.1TN	","05-JUN-1993",	.479 ,	.0 ,"	",	.0	,"GRAB"
"50-00039-E	","BC00.1TN	","06-JUN-1993",	.479 ,	.0 ,"	",	.0	,"GRAB"
"50-00039-E	","BC00.1TN	","07-JUN-1993",	.479 ,	.0 ,"	",	.0	,"GRAB"
"50-00039-E	","BC00.1TN	","08-JUN-1993",	.000 ,	.0 ,"	",	.0	,"GRAB"
"50-00039-E	","BC00.1TN	","09-JUN-1993",	.000 ,	.0 ,"	",	.0	,"GRAB"
"50-00039-E	","BC00.1TN	","10-JUN-1993",	.000 ,	.0 ,"	",	.0	,"GRAB"

etc.

EAAWQDWN.DAT - Daily Farm Monitoring Data - Revised (Compressed) File Format *

Structure Date Conc Flow Rain Method: Format(A10,I8,F7.3,F6.1,F6.2,A4)

BC00.1TN	19930601	.479	1.1	-9.00	GRAB
BC00.1TN	19930602	.479	2.1	-9.00	GRAB
BC00.1TN	19930603	.479	.0	-9.00	GRAB
BC00.1TN	19930604	.479	.0	-9.00	GRAB
BC00.1TN	19930605	.479	.0	-9.00	GRAB
BC00.1TN	19930606	.479	.0	-9.00	GRAB
BC00.1TN	19930607	.479	.0	-9.00	GRAB
BC00.1TN	19930608	.000	.0	-9.00	GRAB
BC00.1TN	19930609	.000	.0	-9.00	GRAB
BC00.1TN	19930610	.000	.0	-9.00	GRAB
BC00.1TN	19930611	.000	.0	-9.00	GRAB
BC00.1TN	19930612	.000	.0	-9.00	GRAB
BC00.1TN	19930613	.000	.0	-9.00	GRAB

etc.

PUMPCAL.DAT - Pump Calibration Data

Pump Calibrations

Structure	Capac gpm	Dstart	Dstop
BC00.1TN	4200	15-Sep-93	
BC00.1TS	14661	11-Jan-94	
BC00.6TN	10713	11-Jan-94	
BC00.6TS	8786	11-Jan-94	
BC01.2TN	18044	01-Jan-93	26-Aug-93
BC01.2TN	18429	27-Aug-93	
BC01.8TN	16662	14-Jan-94	
BC01.8TS	15142	14-Jan-94	
BC02.4TS	325086	01-Jan-93	06-Jun-95
BC02.4TS	263044	07-Jun-95	
BC02.9TN	76700	01-Jan-93	13-Feb-95

etc.

* Input files can be suppied in either format.
The original format is assumed if the file has the extension '.out'.

Table 10
Farm Worksheet Index & Field Descriptions

Sheet	Column	Term	Type	Origin	Description
Menu	-	-	Input		User Inputs and Program Controls
Outputs	-	-	Output		Summary of Results for Basin & Farms
Methods	-	-	Info		Documents Adjustments to Calculation Methods
Structures	-	-	Input		Structure Data for Current Year (from EAAFARM.EXE)
Basin	-	-	Linked		Basin Results for Current Year (Linked with External Spreadsheet EAABASIN.XLS)
Farms	-	-	Both		Farm Data Base
Rej_Farms	-	-	Output		List of Farms with Missing or Rejected Data
Results_C	-	-	Output		Copy of Results Page, With Formulas Converted to Constants
Results	-	-	Output		Results for Each Farm
Stats	-	-	Calcs		Calculates Frequency Distributions for Histograms
Histos	-	-	Output		Histograms
Graphs	-	-	Output		Summary of Results by EAA Sub-Basin
OneFarm	-	-	Output		Results for a Single Farm
Constants	-	-	Input		Fixed Input Values
Calcs	-	-	Calcs		Calculations
Ranges	-	-	Info		Index of Named Ranges
GIS_F	-	-	Calcs		GIS Output File Indexed by GISID
GIS_S	-	-	Calcs		GIS Output File Indexed by Structure
Structures					Structure Table, Read from EAAF####.PRN
Structures	A	STRUCTURE	Input	External File	'EAAF####.PRN' Structure ID Code
Structures	B	DFIRST	Input	"	" " Date of First Record in Current Year
Structures	C	DLAST	Input	"	" " Date of Last Record in Current Year
Structures	D	NOPR	Input	"	" " Number of Operating Dates for Structure in Current Year
Structures	E	NREC	Input	"	" " Number of Records Found
Structures	F	NMIS	Input	"	" " Number of Missing Records
Structures	G	R_MIS	Input	"	" " Number of Missing Rainfall Values
Structures	H	R_TOT	Input	"	" " Total Rainfall (inches)
Structures	I	Q_M1	Input	"	" " Number of Missing Flow Values, Before Estimation of Missing Values
Structures	J	Q_IN	Input	"	" " Total Measured Flow (mgal)
Structures	K	Q_SAM	Input	"	" " Total Measured Flow on Days When Concentration Was Reported (mgal)
Structures	L	Q_M2	Input	"	" " Number of Missing Flow Values, After Estimation of Missing Values
Structures	M	Q_TOT	Input	"	" " Total Flow, After Estimation of Missing Values (mgal)
Structures	N	PCT	Input	"	" " Percent of Total Flow Volume Sampled = Q_SAM / Q_TOT
Structures	O	C_MIS	Input	"	" " Number of Missing Concentration Values
Structures	P	CONC	Input	"	" " Flow Weighted Mean Concentration, from Days with NonMissing Flows & Conc (ppm
Structures	Q	L_MIS	Input	"	" " Number of Missing Load Records [Q Missing or (C Missing & Q > 0)]
Structures	R	L_TOT	Input	"	" " Total Load (lbs) = Conc x Q_TOT x 8.34
Structures	S	Qmis	Input	"	" " Average Positive Flow = Average Measured Flow on Days with Flow > 0, Used for Est
Structures	T	Qcap	Input	"	" " Average Pump Calibration Flow (mgal/day)
Structures	U	GRAB	Input	"	" " Number of (Not Used in Calcs
Structures	V	TPTW	Input	"	" " Time-Propo Not Used in Calcs
Structures	W	FPFW	Input	"	" " Flow-Propo Not Used in Calcs
Structures	X	TPFW	Input	"	" " Time-Propo Not Used in Calcs
Structures	Y	xxx	Input	"	" " Unknown o Not Used in Calcs

Table 10 (ct).

Sheet	Column	Term	Type	Origin	Description
Farms					Farm Table, Calculates Farm Results from Structure Results
Farms	A	UAID	Input	User Input	Unit Area ID (Entered As Character String e.g , '001')
Farms	B	Meth	Input	User Input	Calculation Method for Current Farm
Farms	C	Permit	Input	User Input	Permit Number
Farms	D	GISID	Input	User Input	Geographic Information System ID
Farms	E	Acreage	Input	User Input	Structure or Farm Area (Acres)
Farms	F	Structure	Input	User Input	Structure ID Code
Farms	G	Basin	Input	User Input	EAA Basin Code (S-5A, S-6, S-7, or S-8)
Farms	H	Baseline	Input	User Input	Early Baseline Indicator (Y or N)
Farms	I	Dstart	Input	User Input	First Effective Date for Structure
Farms	J	Dstop	Input	User Input	Last Effective Date for Structure
Farms	K	Comments	Input	User Input	User Comments
Farms	L	Flow	Calc	Structures	Structure Flow (mgal)
Farms	M	Load	Calc	Structures	Structure Load (lbs)
Farms	N	Load_s	Calc	Calc	Sampled Load (lbs)
Farms	O	Load_a	Calc	A. Load	Adjusted Structure Load (lbs)
Farms	P	Load%	Calc	Structures	Percent of Structure Load Sampled (%)
Farms	Q	Rain	Calc	Structures	Total Rainfall (inches). If Rainfall Data Complete
Farms	R	Area	Calc	Calc	Farm Area (acres) - Sum of Stucture Areas
Farms	S	_Flow	Calc	Calc	Total Farm Flow (mgal) - Sum of Structure Flows
Farms	T	_Load	Calc	Calc	Total Farm Load (lbs) - Sum of Structure Loads
Farms	U	_Load_a	Calc	Calc	Sampled Farm Load (lbs) - Sum of Structure Adjusted Lads
Farms	V	Total	Calc	Calc	Sum of Structure Loads for Current Farm - Absolute Values
Farms	W	Sampled	Calc	Calc	Sum of Sampled Structure Loads - Absolute Values
Farms	X	_Load%	Calc	Calc	Farm Sampled Load % = Sampled/Total
Farms	Y	Force	Input	User Input	Switch to Force Acceptance of Farm Data (blank,0= No, 1=Yes)
Farms	Z	Keep	Calc	Calc	Keep(1) or Reject (0) Farm Results
Farms	AA	Row_	Calc	Calc	Row Counter for Farms Table
Farms	AB	_UAID	Calc	Calc	Unit Area ID
Farms	AC	KGIS	Calc	Calc	Keep(1) or Reject (0) Structure Results for GIS Output File

Table 10 (ct)

Sheet	Column	Term	Type	Origin	Description
Results					Farm Results - One Row Per UAID
Results	A	UAID	Input	User Input	Enter As Character String e.g., '001
Results	B	EB	Calc	Farms	Early Baseline Indicator (not used in calculations)
Results	C	Year_	Constant	Previous Year	Farm Baseline Year, if = 1994, EB assumed
Results	D	AUAL_	Constant	Previous Year	Baseline Adjusted Unit Area Load (lbs/ac-yr), from Previous Year, before Basin Credit
Results	E	Credit	Constant	Previous Year	Basin Credit (%) from Previous Year
Results	F	AUALB	Calc	Calc	Baseline Adjusted Unit Area Load (lbs/ac-yr), from Previous Year, after Basin Credit
Results	G	_MAUAL_	Constant	Previous Year	Max Adj. Unit Area Load (lbs/ac-yr) from Previous Year
Results	H	Load%	Calc	Farms	Sampled Load % for Current Year
Results	I	Area	Calc	Farms	Total Farm Area (acres)
Results	J	Flow	Calc	Farms	Total Farm Runoff Volume (mgal)
Results	K	Load	Calc	Farms	Total Load (lbs)
Results	L	Load_a	Calc	Farms	Adjusted Total Load (lbs)
Results	M	Runoff	Calc	Calc	Unit Area Runoff (inches)
Results	N	UAL	Calc	Calc	Unit Area Load (lbs/ac-yr)
Results	O	AUAL	Calc	Calc	Adjusted Unit Area Load (lbs/ac-yr)
Results	P	Conc	Calc	Calc	Flow-Wtd-Mean Concentration (ppm)
Results	Q	OnFarm _Reduc	Calc	Calc	Onfarm Reduction (%), with Basin Credit Applied
Results	R	EB Reduc	Calc	Calc	Onfarm Reduction for Early Baseline Farm
Results	S	Target _AUAL_	Calc	Calc	TargetAdjusted Unit Area Load (lb/yr) Required for Basin Compliance
Results	T	Target Load_	Calc	Calc	Target Load (lbs/yr) Required for Basin Compliance
Results	U	Comp	Calc	Calc	Compliance Indicator (YES OR NO)
Results	V	New MAUAL_	Calc	Calc	Maximum Adj. Unit Area Load (lbs/yr) for Future Years
Results	W	AUAL Rank	Calc	Calc	AUAL Percentile Rank, Relative to Other Farms with Complete Data
Results	X	Yr	Calc	Calc	Revised Baseline Year, to be used in Future Years
Results	Y	_AUAL	Calc	Calc	Revised Adjusted Unit Area Load, ""
Results	Z	Credit_	Calc	Calc	Revised Basin Credit, ""
Results	AA	Row	Calc	Farms	Row Index in Farm Table
Results	AB	Keep	Calc	Farms	Valid Data Indicator (1=Keep, 0 =Reject)
Results	AC	Group	Calc	Calc	0 = Rejected, 1 = Out of Compliance, 2 = In Compliance
Results	AD	AUAL1	Calc	Calc	Intermediate Calc
Results	AE	AUAL2	Calc	Calc	Intermediate Calc
Results	AF	EB _Load_a	Calc	Calc	Adjusted Load (lbs) for Early Baseline Farm
GIS_S					GIS Output File for Structure Data
GIS_S	A	Structure	Output	Farms	Structure ID Code
GIS_S	B	Rain	Output	Farms	Structure Rainfall (in)
GIS_S	C	Flow	Output	Farms	Structure Flow (mgal)
GIS_S	D	Load	Output	Farms	Total Load (lbs)
GIS_S	E	Load_s	Output	Farms	Sampled Load (lbs)
GIS_S	F	Load_a	Output	Farms	Adjusted Total Load (lbs)
GIS_S	G	Conc	Output	Farms	Flow-Wtd-Mean Conc (ppm)
GIS_S	H	Year	Output	Farms	Water Year
GIS_F					GIS Output File for Farm Data
GIS_F	A	UAID	Output	Farms	Unit Area ID Code
GIS_F	B	GISID	Output	Farms	GIS Id code
GIS_F	C	Permit	Output	Farms	Permit Number
GIS_F	D	Acreage	Output	Farms	Total Drainage Area (acres)
GIS_F	E	RUNOFF	Output	Results	Unit Area Runoff for Current Year (inches)
GIS_F	F	UAL	Output	Results	Unit Area Load for Current Year (lbs/ac-yr)
GIS_F	G	AUAL	Output	Results	Adjusted Unit Area Load (lbs/ac-yr)
GIS_F	H	CONC	Output	Results	Flow-Weighted-Mean Conc (ppm)
GIS_F	I	FLOW	Output	Results	Total Flow (mgal)
GIS_F	J	LOAD	Output	Results	Load (lbs)
GIS_F	K	ALOAD	Output	Results	Adjusted Load (lbs)
GIS_F	L	YEAR	Output	Results	Water Year

Table 11
Menu Page of Farm Spreadsheet

Farm Compliance Calculations for EAA Regulatory Rule

Version: Feb 20, 1998

South Florida Water Management District

User Input Cells Are Blue

Inputs	Value	Description
Ending Year	**1997**	Last Year of Calculation Period (YYYY)
Ending Month	**4**	Last Month of Calculation Period (= 4 for Rule Water Year)
Case TItle	**Water Year 1997**	Title for Labelling Output
Input File Name	**eaaf1997.prn**	Output file from EAAFARM.EXE - Results for Each Structure

Basin Sheet Updated Thru	**199709**	<--- Farm Compliance Calculations Cannot Extend Beyond This Date
Basin Sheet Linkage Check:	**OK**	
Date Range Check:	**OK**	
Results Check:	**OK**	

Update Data Files **Update WorkBook** **Create GIS Files**

Results for One Farm **View Graphs** **Output Summary**

Update Farm Baselines <--- run this only when you are creating a new workbook for next year

Setup Information (entered on Setup Page of FARMCODE.XLS):

Disk Directory for Farm Data:	e:\sfwmd\farms
Disk Directory for GIS Files:	e:\sfwmd\arcinfo
Disk Directory for Basin Data:	e:\sfwmd\basin

FarmCode.XLS should be loaded before you load this workbook.

See FarmCode.XLS for Conversion Notes & Worksheet Index

Column Headings with Red Corners Contain Comment Fields With Additional Documentation, Move Cursor Over Cell to View Comments

Table 12
Farm Output Summary

Farm Compliance Calculations for EAA Regulatory Rule 04/30/97
Summary of Results Water Year 1994

e Range ----------> 199305 thru 199404

Data Inventory	No. of Farms	Area Acres	Flow kacre-ft	Load mtons	Adj. Load mtons
EAA Basin		523721	951.7	131.9	166.3
All Farms	188	502286			
Farms with Missing or Rejected Data	100	275785			
Farms with Adequate Data	88	226501	681.9	149.8	210.9
Farms Below Maximum AUAL	78	213198	601.1	109.4	154.6
Farms Above Maximum AUAL	10	13302	80.8	40.4	56.3
Farms with Data & Out of Compliance	0	0	0.0	0.0	0.0

Unit Area Values	Runoff inches	UAL lbs/acre	Adj. UAL lbs/acre	Conc ppb
EAA Basin	21.8	0.55	0.70	112
Farms with Adequate Data	36.1	1.45	2.05	178
Farms Below Maximum AUAL	33.8	1.13	1.60	147
Farms Above Maximum AUAL	72.9	6.68	9.31	405
Farms with Data & Out of Compliance	0.0	0.00	0.00	0

Max AUAL Computation	Units	Value	Comments
Observed Basin Load	mtons	131.9	
Adjusted Basin Load	mtons	166.3	Adjusted for Variations in Rainfall
Basin Load Reduction		17%	
Basin Target Load	mtons	119.9	Observed Basin Load for 25% Load Reduction
Basin Limit Load	mtons	182.6	
Basin Compliance		0.0	
Sum of Farm Loads	mtons	149.8	Measured
Sum of Adjusted Farm Loads	mtons	210.9	Adjusted for Variations in Rainfall
Farm Target Load	mtons	191.7	Required to Achieve 25% Load Reduction
Maximum AUAL - Current Year	lbs/acre	26.92	
Maximum AUAL - Regulated	lbs/acre	6.13	Required to Achieve 25% Load Reduction
Sum of Adjusted Loads - Regulated	mtons	191.7	After Application of Maximum AUAL
Regulated Load - Farm Target Load	mtons	0	Should = 0 If Solution is Reached

Measured OnFarm Reductions	Units					
Base Year	-	1994	1995	1996	1997	All
Number of Farms with Baseline	-	0	0	0	0	0
Total Area	acres	0	0	0	0	0
Average AUAL - Base Year	lbs/acre	0.000	0.000	0.000	0.000	0.000
Average AUAL - Current Year	lbs/acre	0.000	0.000	0.000	0.000	0.000
Average Load Reduction	%	0%	0%	0%	0%	0%
Basin Credit	%	0%	0%	0%	0%	0%
Total Load Reduction	%	0%	0%	0%	0%	0%

Summary by EAA Sub-Basin	Units	EAA	S-5A	S-6	S-7	S-8
Structures with Adequate Data		117	23	41	36	17
Structure Drainage Area	acres	211990	56374	68523	39838	47255
Structures With Complete Rainfall Data		112	24	38	32	18
Structure Rainfall	inches	53.1	57.6	50.5	53.7	51.3
SFWMD Rainfall	inches	50.5	51.6	48.1	52.9	48.9
Rainfall Adjustment Factors		1.260	1.348	1.728	1.035	1.378
Total Flow	kac-ft	666.9	200.6	207.2	165.1	93.9
Total Load	mtons	145.4	57.7	43.7	27.4	16.7
Adjusted Load	mtons	204.5	77.7	75.4	28.4	22.9
Flow-Wtd-Mean Conc	ppb	176	233	171	134	143
Runoff	inches	37.7	42.7	36.3	49.7	23.9
Unit Area Load	lbs/acre	1.51	2.25	1.40	1.51	0.78
Adjusted Unit Area Load	lbs/acre	2.12	3.03	2.42	1.57	1.07

Note: results by sub-basin generated from structure data

Table 13
Algorithm for Calculating Structure & Farm Loads

Definitions:

Structure Effective Date = First Date in Pump Calibration File Within Current Year
Mean Positive Flow = Average Reported Flow on Days when Flow > 0

For Each Day of Year and Structure:

```
If (Calibrated Flow = -999) then
        Assume Structure Did Not Exist
        Flow = 0.

Elseif (Flow Reported) then
        Flow = Flow Reported

If (Date >= Effective Date & Conc Reported) then
                Flow Sampled = Flow Reported
                Load Sampled = Flow Reported x Conc Reported
              else
                Flow Sampled = 0
              endif

Elseif (Mean Positive Flow Defined) then
        Flow = Mean Positive Flow
Else
        Flow = Calibrated Flow
        [ This will only happen if reported flows all = 0 or missing ]
Endif
```

Totals for Year and Structure:

Flow-Weighted-Mean Conc = Total Load Sampled / Total Flow Sampled
Total Load = Flow-Weighted-Mean Conc x Total Flow

Totals for Year and Farm:

Total Farm Load = Sum of Structure Total Loads
Total Farm Flow = Sum of Structure Total Flows
Sampled Total Flow = Sum of Structure Total Sampled Flows
% of Flow Sampled = Total Sampled Flow / Total Flow

Reject Farm Data if Percent of Flow Sampled < 75%

For Farms with Loads Calculated by Difference (UAID's 3, 5, 6, & 11):

Total Farm Load = Downstream Farm Load - Upstream Farm Load
Total Farm Flow = Downstream Farm Flow - Upstream Farm Flow
% of Flow Sampled = Downstr. Farm Sampled Flow / Downstream Farm Total Flow

Table 14
Runoff Conc. vs. UAID & Water Year (from FARMSUM.XLS)

Variable Number: **16**

Flow-Wtd-Mean Concentration (ppm)

Count	88	138	172	178
Mean	0.194	0.194	0.168	0.146
10%	0.068	0.058	0.058	0.050
Median	0.172	0.155	0.125	0.114
90%	0.351	0.343	0.311	0.255

UAID	WY1994	WY1995	WY1996	WY1997
001	0.031	0.052	0.050	0.030
002	-	-	0.078	0.071
003	-	0.092	0.081	0.088
004	-	-	-	-
005	0.073	0.065	0.103	0.095
006	0.078	0.064	0.062	0.053
007	-	-	0.075	0.086
008	-	-	-	-
009	-	0.000	0.153	0.184
010	-	-	0.100	-
011	0.271	0.220	0.601	0.243
012	-	0.285	0.164	0.197
013	-	0.244	0.305	0.297
014	0.075	0.066	0.059	0.045
015	0.113	0.063	0.055	0.052
016	-	0.170	-	0.179
017	0.442	0.311	0.160	-
018	-	0.093	0.047	0.106
019	0.184	0.227	0.158	0.207
020	0.039	0.086	0.106	0.073
021	-	0.227	0.158	0.238
022	-	-	0.047	0.041
023	-	-	0.035	0.031
024	0.044	0.110	-	-
025	-	-	0.053	0.063
026	-	0.167	0.115	0.188
027	-	-	0.074	0.100
028	-	-	0.074	0.068
029	-	-	0.071	0.073
030	0.210	0.311	0.291	0.182
etc...				

Table 15
Results for Each Year and a Single Farm (from FARMSUM.XLS)

UAID: **14** <------ Enter Unit Area ID (as an integer)

Variable	Description	WY1994	WY1995	WY1996	WY1997
1	Unit Area ID Code	014	014	014	014
2	Early Baseline Indicator (not used in calculations)	Y	Y	Y	Y
3	Farm Baseline Year, if = 1994, EB assumed	-	1994	1994	1994
4	Baseline Adjusted Unit Area Load (lbs/ac-yr), before Basin Credit	-	0.774	0.774	0.774
5	Basin Credit (%) from Previous Year	-	47%	47%	47%
6	Baseline Adjusted Unit Area Load (lbs/ac-yr), after Basin Credit	-	1.460	1.460	1.460
7	Max Adj. Unit Area Load (lbs/ac-yr) from Previous Year	-	-	-	-
8	Sampled Load % for Current Year	85%	89%	99%	100%
9	Total Farm Area (acres)	1255.1	1255.1	1255.1	1255.1
10	Total Farm Runoff Volume (mgal/yr)	1131	1988	1858	1518
11	Total Load (lbs/yr)	704.5	1095	921	565
12	Adjusted Total Load (lbs/yr)	970.9	814	355	340
13	Unit Area Runoff (inches/yr)	33.19	58.33	54.53	44.54
14	Unit Area Load (lbs/ac-yr)	0.56	0.87	0.73	0.45
15	Adjusted Unit Area Load (lbs/ac-yr)	0.77	0.65	0.28	0.27
16	Flow-Wtd-Mean Concentration (ppm)	0.07	0.07	0.06	0.04
17	Onfarm Reduction (%), with Basin Credit Applied	-	0.56	0.81	0.81
18	Onfarm Reduction for Early Baseline Farm (%)	-	0.56	0.81	0.81
19	Target Adjusted Unit Area Load (lbs/yr) Required for Basin Compliance	0.77	0.65	0.28	0.27
20	Target Load (lbs/yr) Required for Basin Compliance	971	814	355	340
21	Compliance Indicator (YES OR NO)	YES	YES	YES	YES
22	AUAL Percentile Rank, Relative to Other Farms with Complete Data	22%	33%	28%	16%
23	Revised Baseline Year, to be used in Future Years	1994	1994	1994	1994
24	Revised Adjusted Unit Area Load, "", without Basin Credit (lbs/ac-yr)	0.774	0.774	0.774	0.774
25	Revised Basin Credit, ""	47%	47%	47%	47%
26	Revised Adjusted Unit Area Load, with Basin Credit Applied (lbs/ac-yr)	1.460	1.460	1.460	1.460
27	Maximum Adj. Unit Area Load (lbs/ac-yr) for Future Years	-	-	-	-

Table 16
Farm & Basin Results vs. Year (from FARMSUM.XLS)

Variable	Units	WY1994	WY1995	WY1996	WY1997
Total Number of Farms	-	188	188	188	189
Total Farm Area	acres	502259	502246	502168	502777
Total Basin Area	acres	523721	523721	523721	523721
Farms with Missing or Rejected Data					
Count	-	100	50	16	11
Area	acres	274871	200935	69957	41171
Farms with Adequate Data					
Count	-	88	138	172	178
Area	acres	227388	301310	432211	461606
Flow	kac-ft/yr	681.9	1435.1	1549.4	1293.9
Load	mt/yr	149.8	330.0	272.6	219.4
Adjusted Load	mt/yr	210.6	173.9	119.4	211.5
Farms with Data & Out of Compliance					
Count	-	0	0	0	0
Area	acres	0.0	0.0	0.0	0.0
Basin Rainfall (SFWMD)	inches	50.45	67.01	56.86	52.02
Rainfall Adjustment Factor	-	1.260	0.519	0.401	0.838
Basin Runoff	in/yr	21.81	43.03	30.62	22.81
Basin Unit Area Load	lbs/ac-yr	0.554	1.126	0.679	0.511
Basin Adjusted Unit Area Load	lbs-ac/yr	0.698	0.584	0.272	0.428
Basin Flow-Weighted-Mean Conc	ppb	112.2	115.5	98.0	98.8
Farm Runoff	in/yr	35.99	57.15	43.02	33.64
Farm Unit Area Load	lbs/ac-yr	1.449	2.409	1.388	1.046
Farm Adjusted Unit Area Load	lbs-ac/yr	2.038	1.270	0.608	1.008
Farm Flow-Weighted-Mean Conc	ppb	177.8	186.1	142.4	137.2
Observed Basin Load	mt/yr	131.9	268.0	161.8	121.5
Adjusted Basin Load	mt/yr	166.3	139.0	64.8	101.9
Basin Load Reduction	%	17%	31%	68%	49%
Basin Target Load	mt/yr	119.9	291.3	377.1	180.2
Basin Limit Load	mt/yr	182.6	439.5	543.7	240.8
Basin Compliance		YES	YES	YES	YES
Sum of Farm Loads	mt/yr	149.8	330.0	272.6	219.4
Sum of Adjusted Farm Loads	mt/yr	210.6	173.9	119.4	211.5
Farm Target Load	mt/yr	191.5	173.9	119.4	211.5
Maximum AUAL - Current Year	lbs/ac-yr	26.92	13.21	9.40	21.26
Maximum AUAL - Regulated	lbs/ac-yr	6.14	13.21	9.40	21.26
Sum of Adjusted Loads - Regulated	mtons	191.5	173.9	119.4	211.5
Regulated Load - Farm Target Load	mtons	0.0	0.0	0.0	0.0
Measured OnFarm Reductions					
Number of Farms with Baseline	-	0	87	135	167
Total Area	acres	0	226205	293230	426891
Average AUAL - Base Year	lbs/ac-yr	0.00	2.02	1.87	1.38
Average AUAL - Current Year	lbs/ac-yr	0.00	1.28	0.69	1.03
Average Load Reduction	%	0%	37%	63%	25%
Basin Credit	%	0%	47%	47%	47%
Total Load Reduction	%	0%	66%	80%	60%