City of Gastonia [logo] Wastewater Treatment	**Standard Operating Instruction – WWEMS-0100.017** **Name: DataTrend Instructions**	**Corresponding Requirements:** EMS Manual: 7-4 ISO Standard: 4.5.3 NBP Element: 12
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	Approved By: David Shellenbarger, Asst. Division Manager-Compliance Signature:	Effective Date: 04/23/04 Page 1 of 20

DataTrend
Standard Operating Instruction

1.0   General Set Up

1.1   **Purpose of Program:** DataTrend is a database program used by the Wastewater Treatment Division for storing and retrieving information on the performance and process control of the wastewater treatment system. Information such as flows, times, readings and laboratory results are included in this system. Reports for process control, industrial monitoring and state reporting can be generated from the data in this system.

1.2   **Sign In:** To use the DataTrend program, every user needs a user name and password in addition to having a computer with access to the program. All computers in the Wastewater Treatment Division that are connected to the City Network computer system have access to the DataTrend program. To access the program use the mouse to double click on the DataTrend Icon which looks like this on the computer's desktop:

DataTrend.lnk

Alternatively if the desktop icon is not available, DataTrend may also be accessed by selecting the Start/Programs/DataTrend/DataTrend pull out menus in that order. Doing either will open a sign-in window that will prompt for "User name" and "Password". These have been assigned to you and should be entered in all lowercase letters. Generally the user name is your first name and first letter of last name. (i.e. John Doe's user name would be: johnd). Passwords should have been selected by the user. To get a new password or username see the Assistant Division Manager - Compliance or the Division Manager WWT.

1.3   **Locations:** In DataTrend, locations refer to where something is being sampled or measured (i.e. Crowders Primary Digester or Long Creek Return Activated Sludge. Each location is defined with a location name that serves as a short code for the location. CRPDIG stands for Crowders Primary Digester, and LCRAS stands for Long Creek Return Activated Sludge. Locations names may be up to 12 letters long; must be all capital letters; and cannot have any spaces between the letters or numbers. The

location name should be kept as short as possible while allowing for easy identification. Each location also has a location description where the location may be described in regular words using both upper and lower case letters with spaces in-between words. As an example of this, the location name "LCINF" has a location description of "Long Creek Influent".

1.4 **Parameters:** In DataTrend, parameters refer to what is being measured at the location (i.e. total suspended solids, pH, temperature, flow, etc.). Just like the locations, each parameter is defined with a parameter name that serves as a short code for the location. For example: TSS stands for total suspended solids. Parameter names may be up to 12 letters long, must be all capital letters and cannot have any spaces between the letters or numbers. The parameter name should be kept as short as possible while allowing for easy identification. Each parameter also has a parameter description where the parameter may be described in regular words using both upper and lower case letters with spaces in-between words.

1.5 **What is a Sample Point?** All data entered into DataTrend is stored in sample points. A "sample point" is made up of two parts – a "location" of where the point is being measured (i.e. primary clarifier, monitoring well #1, Rauch Industry's discharge), and a "parameter" which is what is being measured (i.e. pH, BOD, temperature, flow, etc.). To enter or view data in a sample point, it must have all ready been defined utilizing a previously defined location and parameter.

The location and parameter names are combined with a colon to make the name for the sample point. For example: Crowders Wastewater Treatment Plant anaerobic zone B-2 has the location name "CRANA2B". The total suspended solids analysis has the parameter code "TSS". The sample point used to record a measurement of TSS on Crowders anaerobic zone 2B would be "CRANA2B:TSS". Sample point names are limited to a maximum of 15 letters; so long location names cannot be combined with long parameter names.

Each sample point also has a "description" where the sample point may be described in English using up to 50 letters and numbers. While the sample point name may be somewhat cryptic by the necessity of being short, the description should explain the sample point well enough for everyone to understand.

1.6 **Capitalization:** The "names" of all locations, parameters, calculations and sample points must always be typed in all capitals. Spaces may not be used, however numbers and the underscore symbol "_" may also be used, to define these names. The "description" for all of these, may be in a combination of capital and lower case, and may include spaces and symbols. As previously mentioned, the username and password to sign into the program must be in lower case.

1.7 **Wildcard (%):** When searching most lists in DataTrend the "%" symbol may be used as a wildcard to stand for any numbers or letters in between. A search of sample points using "CR%" would yield all sample points that begin with CR. A search for sample points using "%:BOD" would return all sample points using the BOD parameter.

1.8 **Structure of Sample Points:** Gastonia uses the following structure for sample points:
Locations
- o All locations at a wastewater facility, begin with a prefix identifying the facility: CR = Crowders WWTP, LC = Long Creek WWTP, LS = Lift Station, RRF = Resource Recovery Farm.   Following that prefix is a short code for the area being monitored (i.e. INF for influent, PPOND for polishing pond). Thus, the location for Long Creek Influent is "LCINF."
- o Industry monitoring location names begin with a P for pretreatment, then the treatment plant code and a 3-5 letter code for the industry (i.e. PCRCBP: for Carolina By-Products, which feeds into Crowders WWTP).

Parameters
- o After a colon in the sample point, the code for the parameter is listed. It will utilize the chemical symbol being analyzed if applicable. Q is used to designate flows.

Some general examples of names used are included below. For a full list of locations and parameters please refer to document # WWEMS-0102.017 DataTrend Location and Parameter Names Chart.
- o Prefixes
  - ▪ CR – Crowders WWTP
  - ▪ LC – Long Creek WWTP
  - ▪ LS – Lift Station
  - ▪ PCR – Industry for Crowders WWTP
  - ▪ PLC – Industry for Long Creek WWTP
  - ▪ QCSTD – Quality Control Standard for Parameter
  - ▪ RRF – Resource Recovery Farm
  - ▪ TL – Trunkline
  - ▪ WP – Water Plant
- o Standard Plant Locations
  - ▪ INF – Influent
  - ▪ EFF – Effluent
  - ▪ EPC – Primary Clarifier Effluent
  - ▪ ESC – Secondary Clarifier Effluent
  - ▪ MH – Manhole
  - ▪ LAPP – Land Application Sample
  - ▪ OXIC1A – Oxic Zone 1A
  - ▪ ANA2B – Anaerobic Zone 2B
  - ▪ ANO3A – Anoxic Zone 3A
  - ▪ PDIG – Primary Digester
  - ▪ HDIG – Holding Digester
  - ▪ PPND – Polishing Pond
  - ▪ RAW – Raw Sludge
  - ▪ RAS – Return Activated Sludge
  - ▪ SB – Splitter Box
  - ▪ WAS – Waste Activated Sludge
  - ▪ FLH2O – Flushing Water

- S = South
- A, B, C, D = Creek Location "A", "B" etc.
- An "S" at the end of an industry's sample location implies split or self-monitoring data where the industry sampled.
- General Rules for Parameters
  - Use Chemical Symbols for parameter being analyzed
  - Q = Flow
  - "U" on end = ug/L
  - "M" on end = mg/kg
  - "S" at beginning = soluble
  - 1, 2, or 3 at end = 1st shift, 2nd shift, 3rd shift

1.9 **Calculations:** Calculations are used to compute a result based on one or more pieces of measured data. For example calculations may be set up to total individual shift data, add TKN and NOx to determine total nitrogen, or to compute the MCRT based on the measured data. Once the calculation is set up and the measured data is put into DataTrend the desired calculation will be performed, without requiring work by hand. Calculations may be included in reports just like sample points are.

1.10 **Restrictions (Security):** Based on their job requirements, every employee has been given access to perform certain functions in DataTrend. For example some employee's may only be able to view data, others may enter it as well, certain employees can create new sample points or change calculations. If you reach a point where you do not have access, you will notice that the writing in the pull down menus are in a faint gray and you are unable to access them. If you feel your access needs to be changed, talk with your supervisor and the Assistant Division Manager - Compliance or the Division Manager WWT.

2.0 Entering Data

2.1 **Single Sample Points:** One way to enter data is by single sample point. Once signed onto DataTrend, select the "Input" menu at the top (by left click of the mouse) and then select "Single Sample Point". From there a screen will pop up asking for "Sample Point Name" or "Sample Point Description".

Enter either of these for the sample point you are looking for. (Note: it must match exactly as the sample point is listed.) The wild card symbol may be used to search for all sample points with the portion of name or description you have typed. Just enter information for either the "Sample Point Name" or "Sample Point Description" – not both.

Select the "Search" button on the right side. A list of all sample points that meet the criteria you entered will appear in the "Matching Sample Points" box. From there, right double click on the sample point you are interested in entering data in.

That will take you to the "Input Sample Point" screen asking for the "Start Date" and the "Number of Days". Enter the date you wish to enter data on, using the format 11/22/2003 (note that you should use the full four digit year). If you want to enter data for multiple days start at the first day and enter the number of days you wish to enter (Maximum of 31). If applicable the "Start Date equals Today" box may be checked to automatically select today's date. When complete select "OK"

The "DataTrend Input Form" screen appears that lists the sample point information in gray on the left and white boxes on the right below the dates you selected. The name of the input form is listed at the top. Verify that the correct input form is open before entering data. Data in a gray field indicates the data has been entered previously and you do not have the authorization to change it. Data should be entered under the appropriate date. Using the arrow keys or the scroll bar at the bottom will show the remainder of the selected dates. Make sure your data is correct before it is saved. To delete any data you just entered, click on the cell using the right mouse button. Select "Save" when finished to keep the data or "Cancel" to discard the changes. Both will send you back to the main DataTrend screen. ("Previous" and "Next" will save your data and move you to the next set of dates.)

2.2 **Input Forms:** Input forms allow data to be entered for several different sample points to be entered on the same screen. To enter information using an input form, from main DataTrend screen, select the "Input" menu at the top (by left click of the mouse) and then select "Input Sample Point Forms". From there the "Input Sample Point" screen will pop up asking for "Form Name" and the "Start Date" and the "Number of Days".

Clicking on the arrow beside "Form Name" will provide a list of all input forms you are selected as a user on. (If you are not selected as a user on a form you wish to input data on and you have access to edit input forms, you may add yourself as a user – see Section 4.3 Creating and Editing Input Forms). Select the appropriate input form. Enter the date you wish to enter data on, using the format 11/22/2003 (note that you should use the full four digit year). If you want to enter data for multiple days start at the first day and enter the number of days you wish to enter (Maximum of 31). If applicable the "Start Date equals Today" box may be checked to automatically select today's date. When complete select "OK"

The "DataTrend Input Form" screen appears that lists the sample point information in gray on the left and white boxes on the right below the dates you selected. The name of the input form is listed at the top. Verify that the correct input form is open before entering data. Data in a gray field indicates the data has been entered previously and you do not have the authorization to change it. Data should be entered under the appropriate date. Using the arrow keys or the scroll bar at the bottom will show the remainder of the selected dates. Make sure your data is correct before it is saved. To delete any data you just entered, click on the cell using the right mouse button. Select "Save" when finished to keep the data or "Cancel" to discard the changes. Both will send you back to the main DataTrend screen. ("Previous" and "Next" will save your data and move you to the next set of dates.)

2.3 **Greater Than and Less Than Signs:** The > & < signs may be used to indicate results that are recorded as greater than or less than a certain value. Special care needs to be used when these numbers are in calculations, to insure the proper value (zero, the number or ½ the value) is used to make the calculation (see Sections 3 on Reports and Section 5 on Calculations).

2.4 **Correcting errors:** To ensure data integrity, a very limited number of people have access to change data once it has been entered. If you have made an error entering data that has been saved, please see your supervisor or someone with authority to

make changes to data. The Division Manager, Assistant Division Managers, and Laboratory Supervisor have the authority to change data that has been entered.

3.0   Viewing Data & Printing Reports

3.1   **Viewing Reports:** To view previously entered data and calculated values, they must be entered into a report. Reports can be viewed by selecting "Reports" then "Display Reports" from the DataTrend pull down menus. All the previously created reports can be viewed and selected using the pull down list under "Report Name". The interval box lets you select whether you want daily information or just weekly or monthly averages. Selecting "Exception Report" will only show data outside of specified acceptable range. Selecting "Display Blank Rows" will show spaces for each day regardless of whether any data is on that report for the day. The Start and End Dates for the data must also be entered. Note that the earliest DataTrend information goes back to September 1997. Once the end date is entered, the report will show up on the screen and can be looked at using the scroll bars.

3.2   **Printing:** Once the report is on screen, it may be printed using the "Print" button at the top of the column of buttons. The program will prompt whether the output device is the "Screen" – just display a version on the computer screen, or "Printer" – to print a paper version. Note that no matter the size of the report, only the first ten columns of data will show up on a printed copy. If more columns are needed the report needs to be Exported – see Section 6 on Exporting Data.

3.3   **Graphing Data:** Data from reports can also be graphed. Simple graphs can be made directly from DataTrend once a report has been called onto the screen. Select the columns you wish to graph by clicking on the title of that column, then graph by using
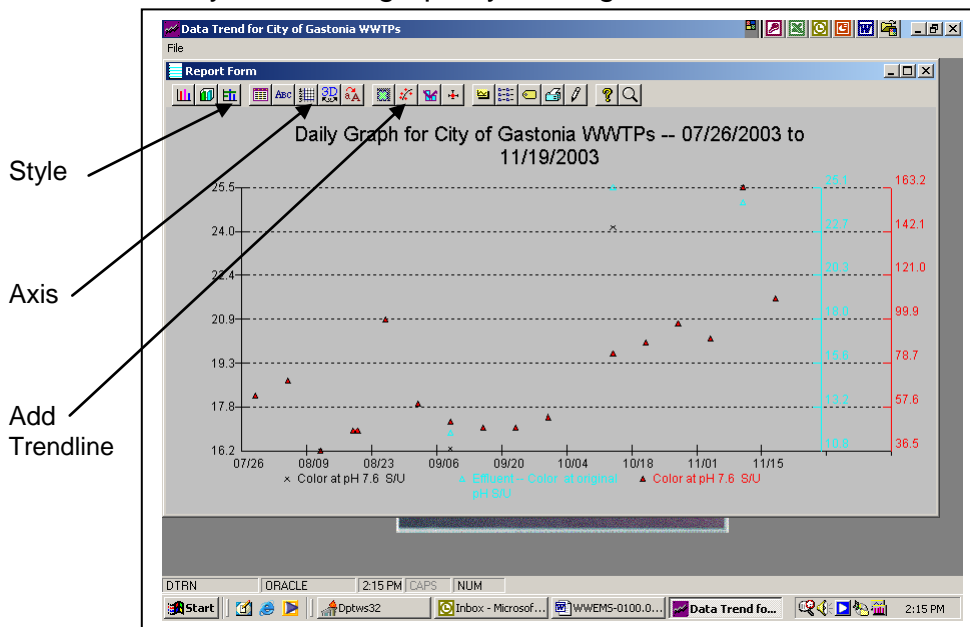
the **Plot** button. Some modifications can be made to the graphs by using the buttons at the top, such as the **Style** button to change the type of graph or the **Axis** button to

change the scale of one of the axis. Often the scale is not right and needs to be adjusted for proper viewing. A trendline may be added to the graph by selecting the **Tendline** button. More advanced graphs may be created by using the export function to put the data into Microsoft Excel. See Section 6 on Exporting Data.

3.4 **DMR's:** Data for the discharge monitoring reports (DMRs) for any month may be accessed by selecting "DMR" from the pull down screen from the main DataTrend screen. "Define Reports" allow editing of the DMR report format for those persons with access to the function. "Display Reports" allows viewing of the data. Choose the report name to view. The names are in shorthand code, for example: CRCRKDMR displays the creek monitoring portion of Crowders Creek WWTP's DMR, while LCEFFDMR displays Long Creek WWTP's effluent DMR data. By selecting the Start Date and End Date the report may be viewed. Note that only whole months may be viewed. If the month has not yet ended, the DMR report is not available. Once this information is entered the data will appear on screen. To view the data in the format of the DMR, it must be exported into a special file. Select export and wait a few moments. A screen will appear saying "The workbook you opened contains automatic links to information in another workbook, Do you want to update this workbook with changes made to the other workbook?" Select "Yes". After a few more moments the same message will reappear; select "Yes" again. Then a Microsoft Excel file will appear with the DMR data. Page Tabs at the bottom allow you to view the other pages of that portion of the DMR. For full instructions on how to print, save and submit the discharge monitoring reports, please see procedure: WWEMS-0100.004 - DMR Procedure.

3.5 **Averages:** DataTrend allows for three types of averages for data in reports:

o Average – the "Average" refers to the arithmetic mean or regular average of the data. This is the sum of the data points divided by the number of data points. Blank sample points are excluded but zeros are included in the average.

o Geometric Mean – The geometric mean is generally used when looking at fecal coliform data. All the data points are multiplied together then the nth route of the product is taken, where n refers to the number of data points. Blank sample points are excluded but zeros are included as ones in the product average.

o pH Average – the "pH average" in DataTrend refers to an average of the hydrogen ion concentrations represented by pH values. It is the $\log_{10}$ of the average of the anti-logs of the pH data points. This type of averaging pH values generally is not recognized for official reporting, and no average should usually be reported for pH values.

4.0 Creating and Editing Data Points and Forms

Note: A limited number of people have access to create and edit data points and forms.

Creating and Editing Locations: Locations can be created or edited by choosing "Edit" then Location from the main DataTrend screen. From that screen select "new" to create a new location or "edit" to modify an existing one. A screen will appear that has a place to enter the location name, description and process name. Follow the format in section 1.8 to create any new locations. Limit any sample point name to seven letters or

less. If your new location does not fit this format, contact one of the Assistant Division Managers for instruction on what location to use.

4.1 **Creating and Editing Parameters:** Parameters can be created or edited by choosing "Edit" then "Parameters" from the main DataTrend screen. From that screen select "new" to create a new parameter or "edit" to modify an existing one. A screen will appear that has a place to enter the parameter name, description, units, format, minimum and maximum value.

- o Follow the format in section 1.8 to create any new parameters. If your parameter does not fit this format, contact one of the Assistant Division Managers for instruction on what location to use.
- o "Units" refer to what units the parameter will be measured in – i.e. mg/L, degrees C, MGD, etc.
- o "Format" refers to how many places to both sides of the decimal point the parameter will be measured – 99999.99 would allow for a number up to 10,000 with two decimal places.
- o "Minimum Value" and "Maximum Value" refer to the largest and smallest value that ever should be entered for that parameter – "0" is a usual minimum value.
- o "Numeric" refers to parameters that will be entered as numbers (i.e. total phosphorus, pH) while "Text" refers to parameters which will be entered in words (i.e. ORC on site?).

4.2 **Creating and Editing Sample Points:** Sample Points are formed by joining a location with a parameter. To create or edit sample points choose "Edit" then "Parameters" from the main DataTrend screen. From that screen select "new" to create a new parameter or "edit" to modify an existing one. A screen will appear that has a place to enter the location, parameter, description, units, format, minimum and maximum value, low and high alarm, warning and target values, and detection factor for calculations.

- o "Units" refer to what units the parameter will be measured in – i.e. mg/L, degrees C, MGD, etc.
- o "Format" refers to how many places to both sides of the decimal point the parameter will be measured – 99999.99 would allow for a number up to 10,000 with two decimal places.
- o "Minimum Value" and "Maximum Value" refer to the largest and smallest value that ever should be entered for that parameter – "0" is a usual minimum value.
- o The high and low alarm levels refer to what values are unacceptable for that sample point. For effluent parameters this usually is the permit limits, for process samples it might indicate failure at that point. This field may be left blank.
- o The high and low warning levels refer to values that are dangerously high or low. For effluent parameters this might be 25% of the limit value, for process samples it might indicate a dangerous situation. This field may be left blank.
- o The high and low target levels refer to what values are ideal operating levels. What values are being aimed for? This field may be left blank.
- o The detection factor should be left blank at this point. This value is generally set on the report form, which will override the value set on the sample point. The only

exception to this is industrial monitoring sample points where "0.5" should be entered, so ½ the detection factor is used on all pretreatment reports.

4.3 **Creating and Editing Input Forms**: Input forms may be created or edited by selecting "Edit" then "Input Forms" from the main DataTrend screen. From that screen select "new" to create a new input form or "edit" to modify an existing one. A screen will appear that has a place to select the form name (all capital letters, no spaces) and description (plain English translation). By selecting "Find" sample points may be added to the input form. Sample points need to be searched for (A wild card % may be used to aid the search) then highlighted and "OK" selected. Once the input form has been created and saved the users for that form may be changed. The form should be selected (highlighted by clicking on name with mouse) and then "Users" selected. Users for the form may then be searched for and added or deleted from the input form. Only the selected users will be able to view the input form and enter data on it.

4.4 **Creating and Editing Reports**

4.4.1 Creating New Reports:

4.4.1.1 Before creating a new report, be sure to review existing reports to make certain a report that meets your needs is not already created. If you are just looking for a day or two of information looking at an input form or single sample point input may be easier than creating a new report.

4.4.1.2 Select "Define Reports" from the "Reports" menu.

4.4.1.3 Click the "New Report" button.

4.4.1.4 Enter a report name up to 12 alphanumeric characters

4.4.1.5 Enter a report description of up to 50 alphanumeric characters in the description field

4.4.1.6 Click into the "Columns" window. The "Add Column Data" button will now be active

4.4.1.7 Click the "Add Column Data" button. A dialog box titled "Find Options" will be displayed with options to select "Sample Point" or "Calculation". Select the one you wish to add. (As defined above "sample points" are values that were entered directly, while "calculations" are previously defined computations using those points.) Once the proper one is selected, click on "OK".

4.4.1.8 Select the name of the sample point or calculation by entering the name or a portion of it with the wildcard (%) and select "Search". Highlight the proper selection and click on "OK".

4.4.1.9 The summary choices for that column may then be changed. Checking the Total, Average, Geo. Mean, Avg. PH, Min, Max, or Std. Dev. will cause that data to be displayed at the bottom of the displayed report. Only one type of average may be selected for the report.

4.4.1.10 The detection factor at the bottom of the summary column may be changed here which will affect what is used for the calculation of the column total and average when a < result is in the data. By default a value of 1X of the detection limit is used. (i.e. for <0.2 -- 0.2 would be used in the calculations.) If a different value is needed, a different number

should be entered for detection factor in that column of the report. "0" may be entered in which case, 0 would be used for all "less than" results. "0.5" may be used to use a value of ½ the detection limit (required for pretreatment reporting).

4.4.1.11   A three line Column Header is automatically entered but may be customized to meet the needs of the individual report. Change the column header section as appropriate, but be sure the header accurately reflects the sample point data the column will describe. This will be displayed at the top of the column in the displayed and printed reports.

4.4.1.12   Additional columns may be added in a similar fashion. Note that the column will be added at the end or after the highlighted column in the column section. Also note that only 10 columns of data may be printed directly using a DataTrend report, and only 29 columns may be exported into Excel. Due to these limitations and depending on how the report is to be used, it may be necessary to create multiple smaller reports.

4.4.1.13   The Full Headings button may be used to provide a heading for the overall report.

4.4.1.14   Select the default settings for the report. Daily, weekly or Monthly may be selected for the type of data displayed. Weekly and monthly data are averages for those periods ignoring null values. Checking the "Exception Report" will list just those values outside of the target ranges. Checking "Display Blank Rows" will show a blank row on dates where no data is entered. Selecting "Auto Report" will allow the report to be added to the batch reports for automated reporting as discussed later.

4.4.1.15   Once the report is finished select "Save" then "Close" to exit out. The report may then be viewed using described in the "Viewing Data & Printing Reports" section earlier in this procedure.

4.4.2   Editing Reports

4.4.2.1   Many different people use specific reports for different reasons. Be careful when editing reports that you do not ruin a report someone else needs in that certain format.

4.4.2.2   Select "Define Reports" from the "Reports" menu.

4.4.2.3   Click the "Edit Report" button.

4.4.2.4   Select the drop down arrow on the "Report Name" box to select the report you wish to edit.

4.4.2.5   Anything on the report besides the Report Name may be changed in the same manner as it was created. To insert columns into a report, highlight the column data you wish to be before the column you are adding, and then select the "Add Column Data" button.

4.4.3   Batch Reports

4.4.3.1   Batch reporting allows for quick printing of multiple reports over the same time period.

4.4.3.2   Select "Reports", and "Batch Reports" from the main menu.

4.4.3.3   Hold down the "Control Key" and select the reports you wish to batch process.

4.4.3.4   Enter start and ending dates for the reports.

4.4.3.5   Specify whether the reports are to be daily, weekly, or monthly.

4.4.3.6   Specify whether the reports will have exception reporting and will display blank rows.

4.4.3.7   Click the "Display", "Print" or "Plot" buttons to activate the corresponding functions.

4.4.4   Automating Reports

4.4.4.1   Automated reports allows for multiple reports to print out automatically at a specified frequency.

4.4.4.2   To automate reports the automatic report batch must be created and the report must be specified to be in that batch. DataTrend must be open on the computer the automatic report was set on for the reports to print.

4.4.4.3   To create a new automatic report batch or set a batch to print select "Reports" and "Options" from the main DataTrend screen. On the Report Options screen, select "Generate Reports" and select the automatic report batches you wish to automatically print. To create new report batches or to change the times or intervals of the batch report select "Edit" from this screen and enter that information. When completed select "OK".
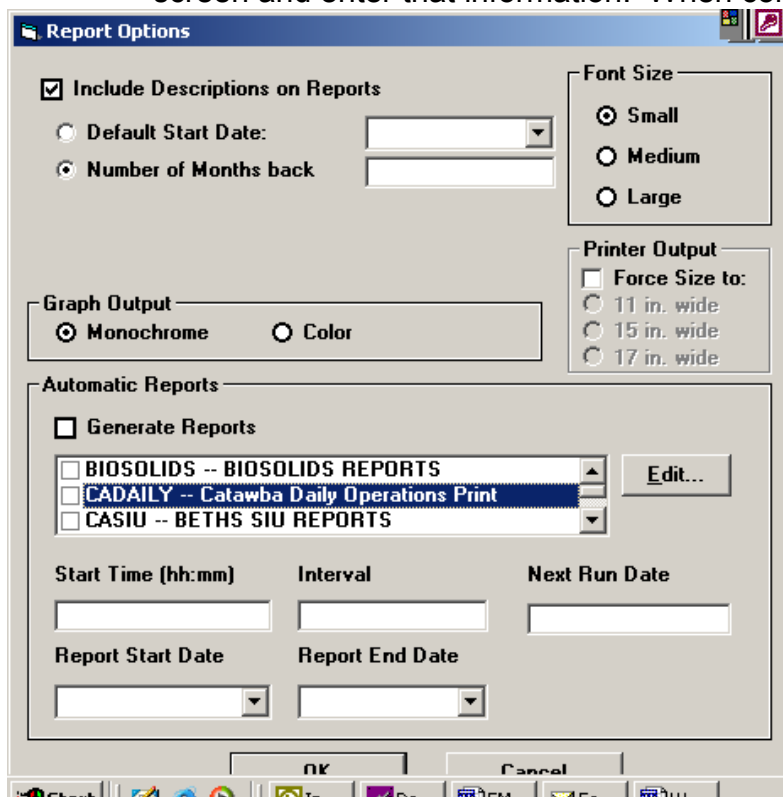
4.4.5 To modify the reports included in each automated batch select "Reports" and "Define Reports" from the main DataTrend Screen. Select "Edit Reports" and select the report you wish to add or delete from the automated batch. Check "Auto Report" and select the automatic batch you wish to add the report to.
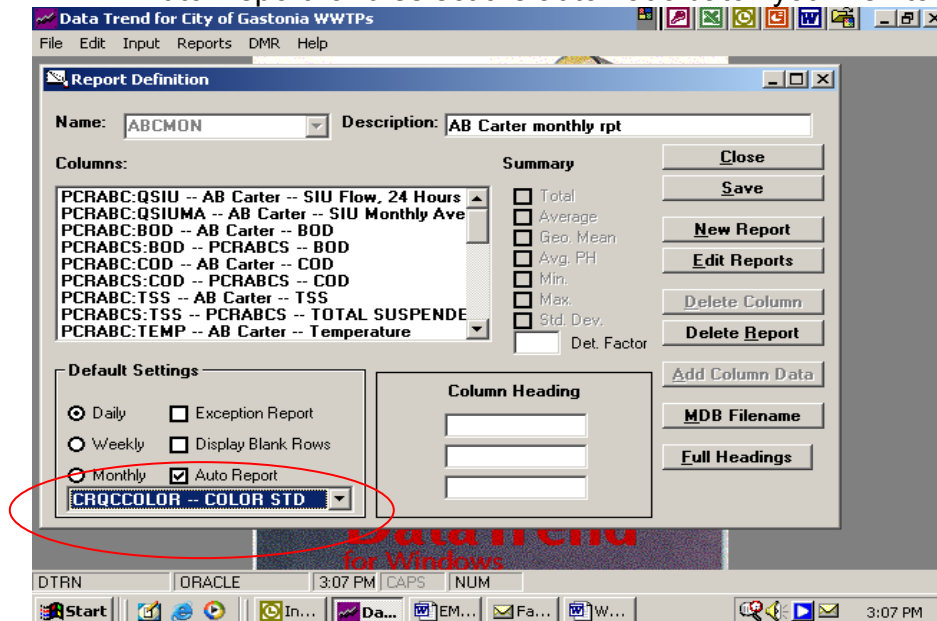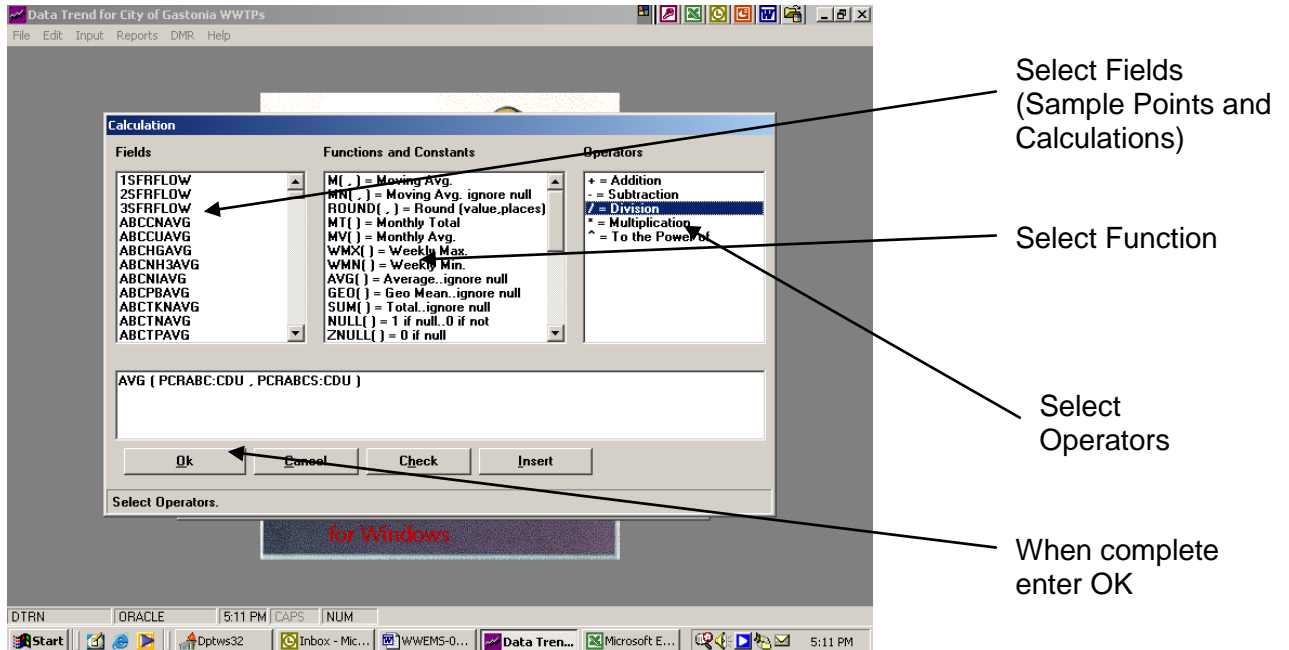

5.0 Calculations

Note: A limited number of people have access to create and edit calculations.

5.1 **Creating and Editing Calculations:** Calculations can be created or edited by choosing "Edit" then "Calculations" from the main DataTrend screen. From that screen select "new" to create a new calculation; or highlight the calculation and choose "edit" to modify an existing one. A screen will appear that has a place to enter the location name, description, units and format, as well as the formula. All calculations should be consistent in their name and formula, if you are uncertain of what name or formula to use, contact one of the Assistant Division Managers for instructions to ensure consistency.

5.1.1 Formulas are entered by selecting "Build Formula". From that screen the formula can be entered by selecting or typing in "fields" (sample points or other calculations), functions and constants or operators.

5.1.2 Operators are entered just like a math formula would be. For examples:
- SamplePoint1 + SamplePoint2
- (SamplePoint1 – SamplePoint2) / SamplePoint3
- 8.34 * Calculation1

5.1.3 Functions are entered first with the sample points in parentheses. Such as:
- SQRT (SamplePoint1)
- SUM (SamplePoint2)

5.2 **Examples of Functions:**
- **M(x,N) Moving Average** – Projects values in the forecast period, based on the average value of the variable over a specific number of preceding periods. A moving average provides trend information that a simple average of all historic data would mask. Example: M(CRINF:BOD,5) would return an average value of the Crowders influent BOD over the past 5 days.
- **MN(x,N) Moving Average Ignoring Null Values** - Projects values in the forecast period, based on the average value of the variable over a specific number of preceding periods, but ignoring any null values. Note that zero values are not null. Null values are instances where no data is present for that period.
- **MT(x) Monthly Total** – Returns the current monthly total for the current report month for the specified sample point. Example: MT(LCINF:Q) would return the current monthly total for Long Creeks Influent flow.

- o **WMX(x) Weekly Maximum** – Returns the maximum value occurring in a given 7 day period. For example, the same 7 day maximum value would be returned for every day within the 7-day period.
- o **WMNX(x) Weekly Minimum** – Returns the minimum value occurring in a given 7 day period. For example, the same 7 day minimum value would be returned for every day within the 7-day period.
- o **AVG(x) Average Ignore Null** – Returns the arithmetic average for the specified sample points, ignoring null values.
- o **SUM(x) Sum** – Returns the sum for the specified sample point, ignoring null values.
- o **NULL(x) Null** – Returns the value 1 if the specified value is null; returns the value 0 if the specified value is not null.
- o **ZNULL(x) Zero if Null** – Returns the value 0 if the specified value is null.
- o **SQRT(x) Square Root** – Returns the square root of the specified value.
- o **LN(x)** – Returns the natural logarithm of the specified value
- o **LOG(x) Logarithm** – Returns the base 10 logarithm of the specified value. The specified value must be a positive number.
- o **ABS(x) Absolute Value** – Returns the absolute value (positive value) of the specified sample point.
- o **PREV(x,N) Previous Value** – Returns the specified value N periods previous. Example: PREV(CRINF:TSS,3) returns the value for Crowders Influent TSS three periods previous.

5.3 Note that using Operators such as X + Y will only return values when both X and Y have data in them. Using the Function Sum(X,Y) will always return the sum and will count values without data as zero. Situations such as calculating total nitrogen should be done using TKN + NOx, while those such as biosolids transferred to land applications should use the Sum function.

6.0 Exporting Data
6.1 Exporting reports to Microsoft Excel: Further manipulation (e.g. more complex calculations, improved graphing capabilities, better looking reports for presentation or reporting purposes, etc…) can be performed on data that is stored within DataTrend by exporting reports to Excel.

    6.1.1 **NOTE**: As mentioned in the creating reports section of this procedure, when exporting reports on 29 columns of a report will export at a time. Any columns beyond the 29th will be missing in the exported version of larger reports.

6.2 Follow the steps in Section 3.0 of this procedure for Viewing Reports.

6.3 Once you have chosen the appropriate report name and report period then you must click the "Export" button. The "Export Type" will remain the default type "Excel (XLS)".

6.4   At this time a window will pop up where you will need to navigate to the Directory you wish to export the report to and give the exporting data a filename. Make sure you navigate to a location and that you name the file one that you can easily find. Once you have provided a path and a name click the "Open" button and the program will open the exported file in Excel.

6.5   Once the file is in Excel you may perform calculations, graphs, reporting etc…. as you would any other Excel spreadsheet.

6.6   Some of the computers, not all, have problems following data export with the general format of Excel changing the way it labels the columns in the spreadsheet and/or changing the calculation default to "Manual" instead of "Automatic".

     6.6.1   This problem is easily fixed by clicking on "Tools" on top menu and dragging down to "Options".

     6.6.2   Then choose the "Calculation" tab on the pop-up window. If the "Automatic" is not chosen then click on this option.
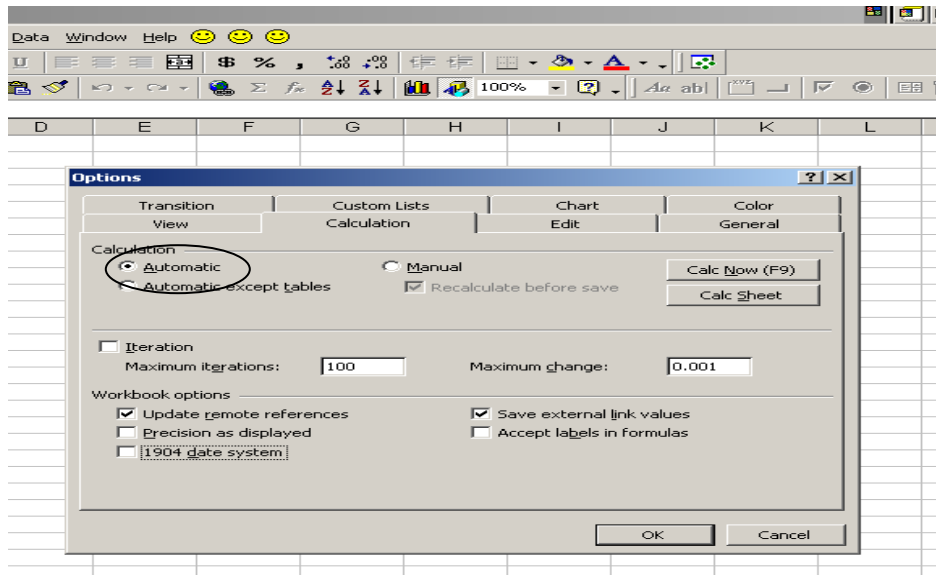
6.6.3 Then choose the "General" tab from the same pop-up window. If the "R1C1" reference style is chosen click it to turn that reference style off.
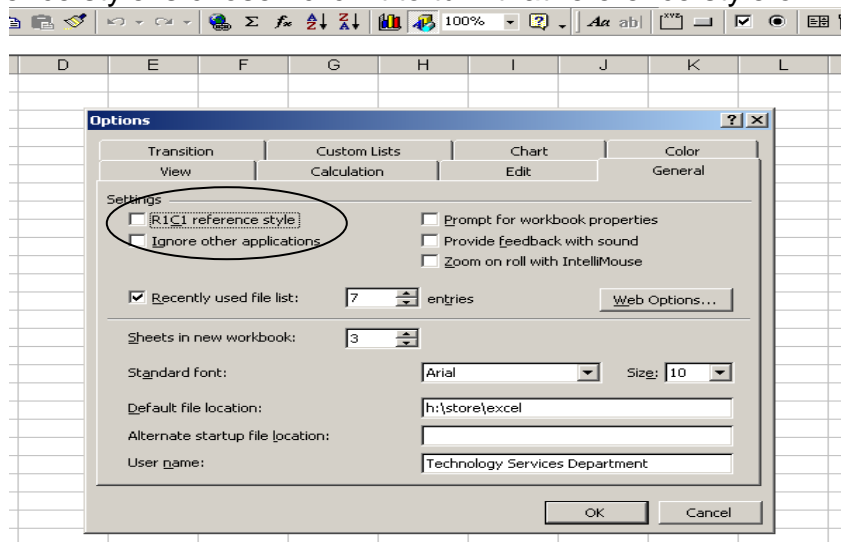
6.7 Once all changes have been made save the file as you would any other Excel spreadsheet.

6.8 There are issues that you need to think about when using exported data and using the exporting file.

6.9 If the report is a one-time report or a report that is used periodically and the format is not relevant or is simple, the method for data manipulation above is appropriate. Otherwise see Section 7 on "Specific Applications".

7.0 Specific Applications

7.1   If the data you wish to export is a routine report there are steps you can take in order to simplify the amount of time it takes to prepare this report each time you need it generated.

7.2   In this type of process, which is how Pretreatment generates all of their Industrial Monitoring reports, the exported data file is used merely as a reference file – an intermediary step in getting to the final report.

7.3   The first steps in this process are the same as you would follow for exporting any other data.

7.3.1   See Section 7 on Exporting Data and follow it through to opening the exporting file in Excel.

7.3.1.1   It is important to ensure that the name and path you designate is simple and easy to remember because each time you export this file for reporting purposes you must use EXACTLY the same name and path or the links between the files discussed later in this section will not be established.

7.4   At this time you will open the "Reporting File".

7.5   If it is the first time you are using this file then you must create a "Reporting file".

7.5.1   Creating the "Reporting File":

7.5.1.1   Create a "Reporting File" spreadsheet how you would like for your report to look. Create the Title, Column headings, Borders, choosing fonts, etc….(see below for an example)

Industrial Electroplating
July- December, 2000
Monthly Monitoring

Date	Flow	BOD	COD	TSS	Temp	pH	O & G	NH3-N	TKN	NO2+3	T-Nit	TP
Limit	0.085			200		60-90	100	400				
TRC				230		< 45	140	560				
4 cons days												
ea 6 mos	6	6	2	6		1	1	6				
01/18/01				14								
01/19/01	0.06320	282	131		12	111	<5.00	6	711			288
Total	0.06000											
Avg.	0.06000	282	131	14	12	111	*2.50	6	711			288
Min.	0.06000											
Max.	0.06000	282	131	14	12	111	*2.50	6	711			288
Std. Dev.	0.00000											

7.5.2   Ensure that the column headings are in the same order as the column headings that are in your DataTrend Report. The easiest way is to print out the exported data and use it when creating your "Reporting file".

7.5.3 At this point you need to create equations below the column headings to reference the exported data file, which will enter the actual data into your "Reporting File". See below for an example.

Status bar

Cell A7

7.5.4 Note that although Cell A7 has 01/18/01 in the cell, the status bar for that cell has an equation referencing a DTIEP file.

7.5.5 The best way to begin this is to have the exported file open at the same time you are creating the "Reporting File".

7.5.6 Place the cursor in the cell where you want the data to appear and begin typing the equation in the status bar –type " =if(" then navigate to the exporting file and click on the piece of data you wish to have in the cell you began typing the equation in, then type =”","", then navigate back to the exporting file and click on the same cell as before then hit "enter" on your keyboard.

7.5.7 At this point the "Reporting file" should reflect the same data as the exporting file for the particular referenced cell.

7.5.8 Once the cells match then remove all "$" from the equation you just created

7.5.9 Highlight the cell containing the equation and copy this equation as far as necessary to the right and as far down as is necessary to ensure that all cells containing data are referenced and all necessary data is appearing in the "Reporting File".

7.5.10 At this point formatting may need to be done on the cells to reflect the appropriate number format i.e. date, # of decimal points, etc…

7.6 If this is not the first time you are using a particular reporting file, then you should only have to save the exported file and open the previously generated "Reporting File".

7.6.1 **Remember –** It is very important that the exporting file name is EXACTLY the same and that it export to EXACTLY the same directory or there will be no links from the "reporting file" to the newly exported file.

7.6.2 If the name and path are the same and the reporting file and exported data file still have different information, ensure that the calculation is on Automatic (see Section 6.6). And/or save the exported data file and see if that fixes your problem. If problems are still occurring call Beth Eckert at extension 6035 for assistance.

7.7 At the end of a report period or once a spreadsheet is complete, you need to ensure that no more changes are made via links.

7.7.1 If you wish to continue using the reporting file format copy the worksheet with the equations.

7.7.2 Go back to the original worksheet of the report file and highlight the entire area of the worksheet that has either data or equations. Copy the highlighted section, and then click your mouse on the uppermost left cell of the highlighted section. Click on "Edit-paste special", ensure that values is chosen on the drop down menu and then click OK.

7.7.3 At this point the spreadsheet should look exactly the same as it did before, but when you click on cells that previous had equations listed in them with links to the exported data file there is now actual data.

7.7.4 The worksheet you created prior to eliminating the links is now ready to be updated with new headers for the next report period, etc… and ready for use with newly exported files for the next period.

8.0 DataTrend Problems

8.1 Just as with any computer application, problems can occasionally occur with the DataTrend program. Some of the most typical problems in the past have been

8.1.1 Problems logging onto system.

8.1.2 Run-Time Errors

8.1.3 Problems printing graphs.

8.1.4 Reports incorrectly displaying data; such as starting in the middle of a given time period.

8.2 If a user has a problem with the DataTrend Program, the following activities shall occur:

8.2.1 Exit out of all programs and restart the computer. Typically this will reset or fix many of the problems.

8.2.2 If problems still continue, user should attempt to log on to DataTrend at another workstation(s) located at the facility to determine if the problem is potentially a network/software problem or a workstation problem. At this point you should contact either of the Assistant Division Managers for the WWTD. You should be able to describe the problem and be able to indicate whether the problem was isolated to your workstation or it appears that the problem is with the network/software.

8.2.3 The Assistant Division Managers will then serve as a primary contact and assist the Database Administrator for Technology Services in resolving the problems. This contact will be Beverly Bieker at extension 6959.

8.2.4 If the Assistant Division Managers are not available, the user should contact Beverly Bieker directly at extension 6959.

8.3 If it is necessary to retrieve deleted data directly contact Beverly Bieker with Technology Services at extension 6959.

9.0 References
9.1 City of Gastonia Environmental Policy
9.2 City of Gastonia Environmental Management System Manual (document # EMS-0100.000)
9.3 ISO 14001 Standard
9.4 National Biosolids Partnership EMS Elements
9.5 DataTrend for Windows User Guide
9.6 DataTrend Location and Parameter Names Chart (document # WWEMS-0102.017)
9.7 DMR Procedure (document # WWEMS-0100.004)

10.0 Deviations from this procedure must be documented by completing a Corrective/Preventative Action Report (EMS-0101.004).

11.0 Environmental Impacts
This procedure helps ensure that correct monitoring and measuring data is recorded and able to be retrieved. Proper handling of this data is essential to the effective operation of the treatment plants, the biosolids program and the industrial pretreatment program. This data is essential to meeting legal monitoring requirements in all these areas and is necessary to limit negative and advance positive impacts on the environment.

12.0 Revision History

Revision		C/PAR #	Reason for Revision	Description of Revision
Date	**#**			
4-23-04	0	159	Need identified for procedure.	Initial version of procedure created
06/06/07	1		Corrected procedure number	Corrected procedure number in Section #3 and Section #9