

Washington State Department of Ecology

Environmental Assessment Program

Standard Operating Procedures for Collecting Stream Gaging Data from Campbell Scientific Data Loggers

Version 1.0

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Although Ecology follows the SOP in most instances, there may be instances in which Ecology uses an alternative methodology, procedure, or process.

Environmental Assessment Program

Standard Operating Procedure for Collecting Stream Gaging Data from Campbell Scientific Data Loggers

1.0 Purpose and Scope

- 1.1 This document is the Environmental Assessment Program (EAP) Standard Operating Procedure (SOP) for collecting stream gage data from Freshwater Monitoring Unit (FMU) gaging stations equipped with the Campbell Scientific CR510 Datalogger and the Campbell Scientific SM4M Memory Module.

2.0 Applicability

- 2.1 This procedure is to be followed when downloading data from EAP/FMU stream gaging stations equipped with the Campbell Scientific CR510 datalogger and SM4M Memory Module.

3.0 Definitions

- 3.1 ActiveSync—Microsoft software used for communications between Personal Data Assistants (PDA's) and other Windows-based personal computers.
- 3.2 CR510 Datalogger—The Campbell Scientific datalogger used at some EAP/FMU stream gaging sites.
- 3.3 CS I/O Adaptor—A small electronic adaptor required to allow communications between a PDA or laptop computer and a CR510 datalogger. There are two versions of the CS I/O Adaptor: the “PDA to CS I/O” version and the “Computer to CS I/O” version. The two versions can be interchangeable when properly configured with a Null Modem and Female Gender Changer attachment.



Figure 1: PDA to CS I/O Adaptor.

- 3.4 DCP – Data Collection Platform. The combination of stream gage, datalogger and telemetry equipment that makes up an automated stream gaging station.
- 3.5 HDR-GOES Radio – High Data Rate – Geostationary Operational Environmental Satellite radio used to transmit data from the gaging station to a satellite for relay to Ecology’s data management system.
- 3.6 Hydstra – The hydrologic data management software system used by Ecology’s EAP/FMU for storing, processing, and analyzing streamflow data.
- 3.7 PConnectCE – Campbell Scientific’s WindowsCE based software used for communication between a PDA and the CR510 datalogger used in this procedure.
- 3.8 PC200W – The Campbell Scientific Windows based software system used for downloading data from the CR510 datalogger using a laptop computer.
- 3.9 Primary Gage Index – The primary gage index is the base gage for the station and is directly referenced to the recording gage. The primary gage index is the most stable and reliable gage at a site. All other gages at the station are considered to be secondary gage indices.
- 3.10 Secondary Gage Index – Secondary gage indices are used to confirm the primary gage index. The secondary gage can be used to estimate the value of the primary gage if the primary gage is damaged or missing.
- 3.11 Recording Gage – Typically an automated bubbler or pressure transducer that measures and records the stage to an electronic data logger maintaining a continuous record of stage through a specified period of time. The bubbler or transducer is calibrated to match the primary gage index.
- 3.12 SM4M Memory Module – A 4 megabyte memory module which serves as a long-term backup to the CR510 datalogger.
- 3.13 Storage Module System (SMS) – The Campbell Scientific software used for downloading data from the SM4M Memory Module with a laptop computer.

- 3.14 USB/Serial Autosync Cable – This cable is a standard accessory for PDA’s to allow communication with a desktop or laptop computer using ActiveSync software.



Figure 2: USB/Serial Autosync Cable.

- 3.15 Y-Cable – The Campbell Scientific 9-pin serial cable that connects the CR510 datalogger and the SM4M memory module to the HDR-GOES Radio. The Y-Cable terminal that connects to the GOES Radio is the point at which the downloading connection is made using the CS I/O [Adaptor](#) described above.

4.0 Personnel Qualifications/Responsibilities

- 4.1 Personnel using this SOP should have training and field experience in making stream gage site visits, recording data, and operating personal computers, PDA’s, and related electronic equipment. No special certifications are required.
- 4.2 Users of this SOP will typically be working in the Environmental Specialist or Hydrogeologist job classifications.

5.0 Equipment, Reagents, and Supplies

- 5.1 These procedures require: A PDA or palmtop computer loaded with “[PConnectCE](#)” software version 1.1 or newer. The PDA should also be equipped with a USB/Serial Autosync Cable;
- 5.2 A laptop computer loaded with Campbell Scientific Storage Module Software ([SMS](#)) and [PC200W](#) software; and equipped with a 9-pin serial cable;
- 5.3 A Campbell Scientific “PDA to CS I/O” adaptor or a Campbell Scientific “Computer to CS I/O adaptor;
- 5.4 A Null Modem and (female) Gender Changer.

5.5 Copies of the standard Ecology form ECY 070-183: “EAP-FMU Stream Gauge Logger Notes” (see Attachment A) for recording times, gage readings, and actions taken while at the gage site. This form is usually printed on RiteintheRain™ paper for durability outdoors; and

5.6 A Day of Year Calendar (see Attachment B).

6.0 Summary of Procedure

6.1 This SOP describes the following downloading procedures:

6.1.1 Downloading data from the CR510 Datalogger using a PDA. This is the most frequently used of these procedures and is used at each station once every six weeks during routine site visits.

6.1.2 Downloading data from the SM4M Memory Module using a laptop computer. This procedure is used once a year to capture the entire record for a Water Year that has just ended. This method is also used occasionally if the CR510 datalogger’s record has been lost for some reason.

6.1.3 Downloading data from the CR510 Datalogger using a laptop computer. This is a backup means of downloading the CR510 logger used when the PDA download method is not possible.

6.2 Downloading data from the CR510 Datalogger using a PDA:

6.2.1 This is the most frequently used of these procedures and is typically used at each station once every six weeks during routine site visits. This portion of the Procedure requires:

6.2.1.1 A PDA or palmtop computer loaded with “PConnectCE” software version 1.1 or newer. The PDA should also be equipped with a USB/Serial Autosync Cable.

6.2.1.2 A Campbell Scientific “PDA to CS I/O” adaptor or a Campbell Scientific “Computer to CS I/O adaptor to be used with a Null Modem and (female) Gender Changer.

6.2.1.3 Copies of the standard Ecology form ECY 070-183: “EAP-FMU Stream Gauge Logger Notes” for recording times, gage readings, and actions taken while at the gage site.

6.2.1.4 A Day of Year Calendar (Attachment B) for verifying dates of downloaded data.

6.2.2 Disable ActiveSync on your PDA.

6.2.2.1 Start the procedure by disabling ActiveSync on the PDA. On some PDA models ActiveSync takes over as soon as a connection is made with the datalogger. Disabling ActiveSync gives the operator better control of communications with the logger.

- 6.2.2.2 To disable this feature open ActiveSync on the PDA and select “Menu” on the blue bar at the bottom of the screen. Open the “Connections” menu option. In the Connections window be sure that the box labeled: “Synchronize all PC’s using this connection:” is NOT checked. See Figure 3.

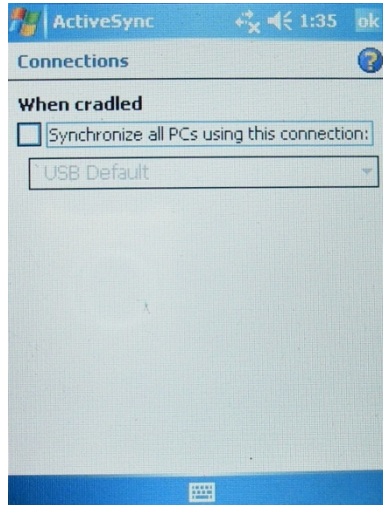


Figure 3: Disable ActiveSync by de-selecting the “Synchronize all PCs...” box.

- 6.2.2.3 Finally, exit ActiveSync. The “Synchronize all PC’s” option must be reactivated to resume normal operation when docking with another PC.
- 6.2.3 Connect PDA to the CR510 Datalogger.
- 6.2.3.1 Locate the CR510 Data Logger, HDR GOES Radio, and SM4M Memory Module within the white instrument enclosure on the Data Collection Platform (DCP). The white enclosure is opened by releasing two latches along the right side of the box. See Figure 4 and Figure 5.



Figure 4: Campbell Scientific Data Collection Platform (CSI DCP) with the blue Hydrological Services bubbler system on the right, and white enclosure containing CSI electronics components on the left. (Photo by Washington Dept. of Ecology)

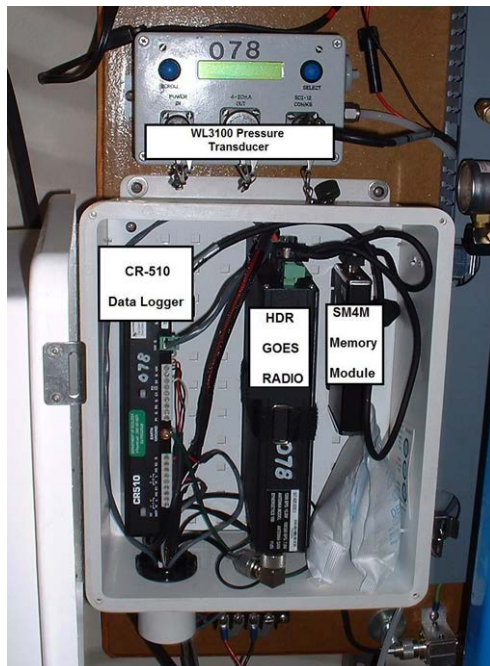


Figure 5: Labels show the location of CR510 Data Logger, HDR GOES Radio, and SM4M Memory Module within the white instrument enclosure. (Photo by Washington Dept. of Ecology)

6.2.3.2

Release the Velcro strap securing the GOES Radio to its mounting bracket and disconnect the 9-pin “Y-Cable” from the “CS I/O” port on the top of the GOES Radio. Re-secure the Velcro strap around the radio and connect the Y-Cable to the end of the “PDA to CS I/O” adaptor marked “Datalogger.”

6.2.3.3

Connect the 9-pin end of the USB/Serial Autosync Cable to the “PDA” end of the adaptor. If you are using the “Computer to CS I/O” version of the adaptor you must first connect a Null Modem and (female) Gender Changer to the “Computer” end of the adaptor. Finally, connect the opposite end of the Autosync Cable to the PDA. See Figure 6 and Figure 7.



Figure 6: CR510 Datalogger and HDR GOES Radio connected by the "Y" Cable.



Figure 7: CR510 Datalogger, HDR GOES Radio, CS I/O Adaptor, and PDA with cable connections made for downloading.

6.2.4

Connect with the CR510 Logger using PConnectCE.

6.2.4.1

Open PConnectCE on the PDA. PConnectCE is divided into three main sections for work involving Stations, Data, and Programs. The toolbar at the bottom of the screen identifies which section of PConnectCE is open. See Figure 8.



Figure 8: PConnectCE open to Station Window. Image courtesy of Campbell Scientific, Inc.

6.2.4.2 Open the Station Window to view a list of the Station ID's that have been entered into the PDA you are using.

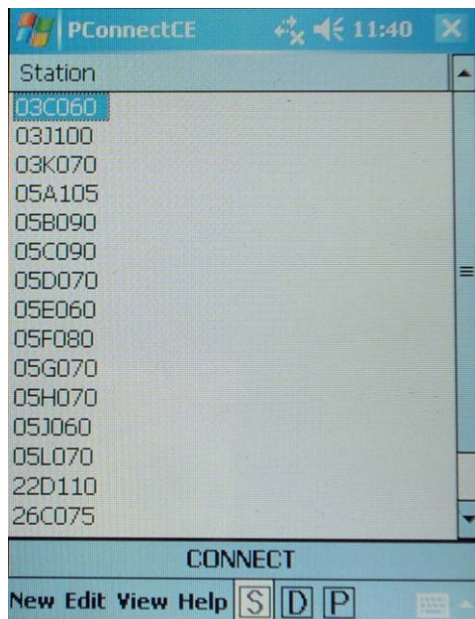


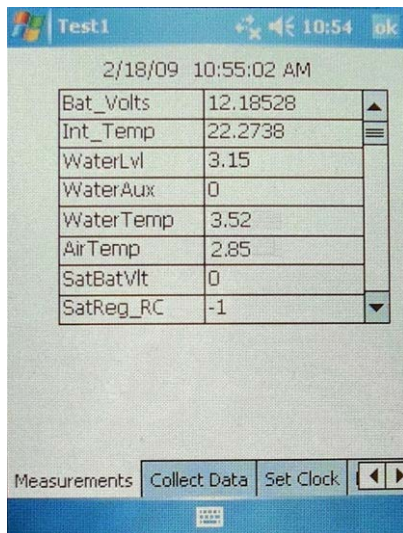
Figure 9: Close-up of the PConnectCE Station Window populated with a list of Ecology Station ID's that use Campbell Scientific dataloggers.

6.2.4.3 From the list, select the station whose data is to be downloaded.

6.2.4.4 If the station to be downloaded is not listed, click “**New**” at the bottom of the screen to create a new Station entry. On the screen that appears, enter the Station ID and specify CR500/510 as the datalogger; then close and save the record.

6.2.4.5 NOTE: At this point the Campbell Scientific system starts to apply a station name to the data record. The CR510 datalogger stores the data records but does not assign a station name or ID to that record. The Station ID is entered in the data file name by PConnectCE upon downloading. If an incorrect Station ID is selected when connecting to the datalogger, then the downloaded data record will receive an incorrect station identifier name.

6.2.4.6 After selecting the correct Station ID from the list, click the "Connect" bar near the bottom of the Station screen. Once the connection is established, the "Measurements" screen should appear showing the logger's current date and time and a table of data from the most recent quarter-hourly scan from the DCP. See Figure 10.



The screenshot shows a handheld device screen with a blue header bar containing the text 'Test1', signal strength icons, a battery icon, and the time '10:54' with an 'ok' button. Below the header, the date and time '2/18/09 10:55:02 AM' are displayed. A table with 8 rows and 3 columns is shown. The first two columns contain sensor names and their corresponding values. The third column contains small icons: an upward arrow for the first row, a hamburger menu for the second, and a downward arrow for the last. At the bottom of the screen, there are three buttons: 'Measurements', 'Collect Data', and 'Set Clock', followed by left and right arrow navigation buttons.

Parameter	Value	Icon
Bat_Volts	12.18528	▲
Int_Temp	22.2738	☰
WaterLvl	3.15	
WaterAux	0	
WaterTemp	3.52	
AirTemp	2.85	
SatBatVlt	0	
SatReg_RC	-1	▼

Figure 10: PConnectCE "Measurements" screen. The values shown in this example are the results of the scan taken at 10:45 AM on 2/18/2009.

6.2.4.7 At times PConnectCE may display numbered lines on the Measurements screen rather than the labels shown in Figure 10. If that occurs, the following line numbers correspond to the most important data values that we track at Ecology's gaging stations:

- Line 1 = Battery Voltage (volts DC)
- Line 3 = Water Level (Gage Height in feet)
- Line 5 = Water Temp (degrees C), and
- Line 6 = Air Temp (degrees C).

6.2.5 Record current data to the Logger Notes form.

6.2.5.1 Record the date and time of the most recent scan in the appropriate spaces on the EAP-FMU Stream Gauge Logger Notes form (See Attachment A).

6.2.5.2 Record the indicated "WaterLvl" from line 3 of the Measurements table in the "LOGGER" box of the form.

- 6.2.5.3 Record the Water Temp and Air Temp values in the appropriate spaces of the Logger Notes form.
- 6.2.5.4 As soon as possible obtain a reading from the Primary Gage Index and any necessary Secondary Gage Indices for the station and record the values in the appropriate boxes on the Logger Notes form. (See EAP SOP 042 Measuring Gage Height of Streams for instructions for obtaining these readings.)
- 6.2.6 Download Logger Data to PDA.
 - 6.2.6.1 To navigate to the tabs for “Collect Data”, “Set Clock” and other available functions in the PConnectCE Measurements Screen use the left and right arrows on the tab bar near the bottom of the screen (see Figure 10).
 - 6.2.6.2 NOTE: Avoid entering or making any changes in the “Flags/Ports”, “Transfer Program” or “Terminal” windows. Making changes in these areas of PConnectCE can corrupt the logger program and cause errors or a total shutdown of the datalogger.
 - 6.2.6.3 Click on the “Collect Data” tab near the bottom of the Measurements screen. The Collect Data screen will appear giving the last filename used for data collected from this station and offering three options for what data is to be collected from the logger. See Figure 11.

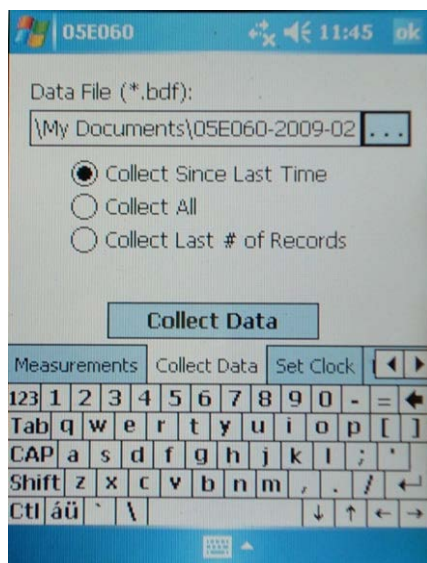


Figure 11: PConnectCE “Collect Data” screen.

- 6.2.6.4 Modify the filename for the data file to be stored in the PDA’s “My Documents” folder. Use a filename that conforms to the Stream Hydrology Technical Coordination Team (SH-TCT) file naming convention of “*StationID-yyyy-mm-dd.bdf*.” For example, a download from station # 05A105 on 2/19/2009 would have a path and filename of “\My Documents\05A105-2009-02-19.bdf.” The file extension “.bdf” refers to a Binary Data File. To make these changes, click within the text of the filename and use the PDA’s onscreen keyboard to rename the file. Filename changes can also be made by clicking the “...” button to open a “Save As” screen.

- 6.2.6.5 Select the appropriate data collection option to be used.
- 6.2.6.5.1 The “Collect Since Last Time” option is roughly equivalent to the “NEW” download from a Design Analysis datalogger. This option may be used if you are sure that the PDA you are using was used for the last download; and that no other downloads have been done using this station name and this PDA since that download. If this is the first time this PDA has been used to download this station, it will download all of the data in the CR510 datalogger.
- 6.2.6.5.2 The “Collect All” option should be used if you cannot verify the conditions for a “Since Last Time download.” Using the Collect All option usually creates the need for more editing when the data file is imported to Hydstra.
- 6.2.6.5.3 The “Collect Last # of Records” option is used if you know the specific number of records needed. This option is useful for system testing and troubleshooting.
- 6.2.7 Download the data.
- 6.2.7.1 Once the path and filename have been specified and the data collection option has been chosen, click the “Collect Data” button. Pop-up windows will display progress as data is downloaded and will advise when data collection is finished.



Figure 12: PConnectCE window indicating that a download is complete.

- 6.2.7.2 Close the pop-up window that states “Data has been successfully collected.” and close the connection to the datalogger by clicking the small “ok” symbol in the upper right corner of the “Collect Data” screen. This will return you to the original Station Window shown in Figure 9.
- 6.2.8 Verify download and back up data file.

- 6.2.8.1 Switch from the Station Window to the Data Window by clicking the large “D” at the bottom of the screen. The Data File list should appear showing all of the “.bdf” files in the My Documents folder (see Figure 14). Confirm that the data file has been stored with the filename specified earlier.
- 6.2.8.2 A second file should also be present on the data file list having the same filename, but with the characters “-2” added just before the “.bdf” file extension. The second file contains GOES diagnostic data and will be deleted a little later.
- 6.2.8.3 The contents of the data file can be viewed by clicking on the filename in the data file list. The vertical and horizontal scroll bars make it possible to view all parts of the file to verify what has been downloaded. Use the “Day of Year Calendar” as needed to verify dates.

(1)	(2)	(3)	(4)
15	2009	55	1145
15	2009	55	1200
15	2009	55	1215
15	2009	55	1230
15	2009	55	1245
15	2009	55	1300
15	2009	55	1315
15	2009	55	1330
15	2009	55	1345

Figure 13: Viewing the contents of a data file using PConnectCE.

- 6.2.8.4 After a brief check of the data; close the file and return to the data file list by clicking the “OK” symbol in the upper right corner of the screen.
- 6.2.8.5 Make a backup copy of the data file onto the PDA’s SD Card. Use the stylus to click and hold on the filename in the data file list; then use the “Save As” function in the pop-up box to place the backup file on the SD Card.

- 6.2.8.6 The GOES diagnostics file may be deleted at this time. The GOES file appears on the data file list having the same filename as the data file, but with the characters “-2” added just before the “.bdf” file extension (See Figure 14). To delete the file from this list, click and hold the stylus on the filename and select “Delete” in the small box that appears.

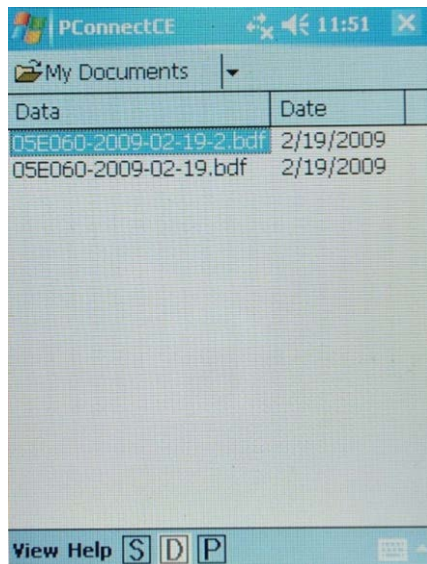


Figure 14: Data File List with GOES diagnostics file highlighted for deletion.

- 6.2.9 Terminate logger connection and secure the station.
- 6.2.9.1 Once satisfied that the data file has been saved and backed up to the SD card, close PConnectCE using the “X” symbol in the upper right corner of the screen.
- 6.2.9.2 Disconnect the ”PDA to CS I/O” adaptor from the Y-Cable.
- 6.2.9.3 Reconnect the Y-Cable to the CS I/O port on the top of the GOES Radio and secure the radio to its mounting bracket using the Velcro strap. Close the white instrument enclosure and secure the station.
- 6.2.9.4 Finally, go to the Running Programs list in the Memory area of the Settings folder for your PDA. Click the “Stop All” command to minimize battery usage; then turn off the PDA’s power switch.
- 6.3 Downloading data from the [SM4M](#) Memory Module using a laptop computer and [Campbell Scientific SMS](#) software.
- 6.3.1 This procedure is used once a year to capture the entire record for a Water Year that has just ended. This method is also used occasionally if a part of the CR510 datalogger’s record has been lost for any reason. This portion of the procedure requires:
- 6.3.1.1 A laptop computer that has been loaded with the Campbell Scientific SMS software.

- 6.3.1.2 A Campbell Scientific “Computer to CS I/O” adaptor or a “PDA to CS I/O” adaptor used with a 9-pin Null Modem and (female) Gender Changer.
- 6.3.1.3 A standard 9-pin serial cable.
- 6.3.1.4 Day of Year Calendar (See Attachment B).
- 6.3.2 Connect the laptop computer to the CR510 datalogger.
 - 6.3.2.1 Release the Velcro strap securing the GOES Radio and disconnect the “Y-Cable” from the “CS I/O” port on the top of the GOES Radio. Then re-secure the radio with the Velcro strap.
 - 6.3.2.2 Connect the (9-pin) Y-Cable to the end of the “Computer to CS I/O” adaptor marked “Datalogger”. If you are using the “PDA to CS I/O” version of the adaptor you will need to attach a Null Modem and (female) Gender Changer to the PDA end of the adaptor. Finally, complete the connection to the laptop using the 9-pin serial cable.
 - 6.3.2.3 Open the Campbell Scientific SMS software on the laptop. Click the appropriate file tabs to bring SMS to the "Setup" window of the section for "SM4M/SM16M" Memory Modules.
 - 6.3.2.4 Confirm that the COM Port Setup window is set for "COM1" and a Baud Rate of 9600. Check the "Via" box on left side of the setup window and check "CR510" in the adjacent scroll-down box.
 - 6.3.2.5 Select "Auto" as the Target Address. See Figure 15 for correct “Setup”.

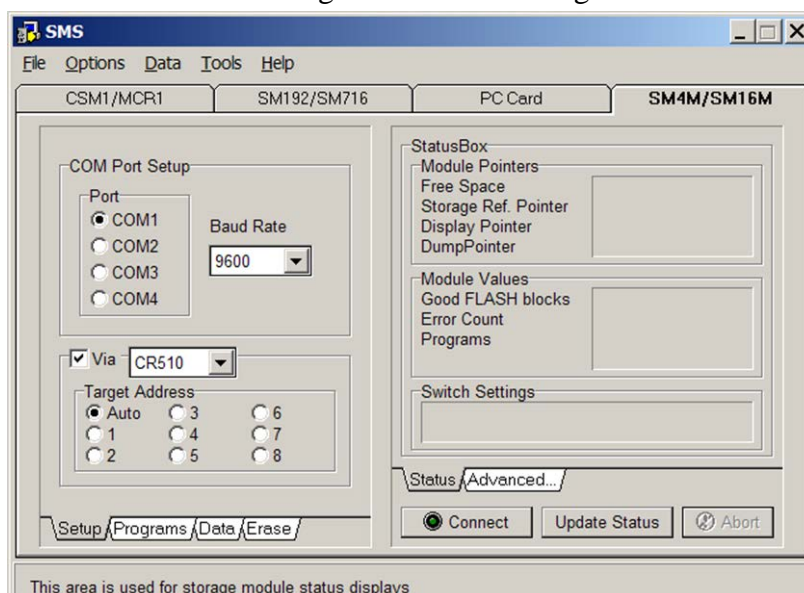


Figure 15: The SMS program Setup window configured for downloading from the SM4M Memory Module on an Ecology Campbell Scientific gaging station.

6.3.2.6 Once the correct setups are confirmed, click the "Data" tab at the bottom of the "Setup" window.

6.3.2.7 With the Data window open, set the File Format to "Comma separated".

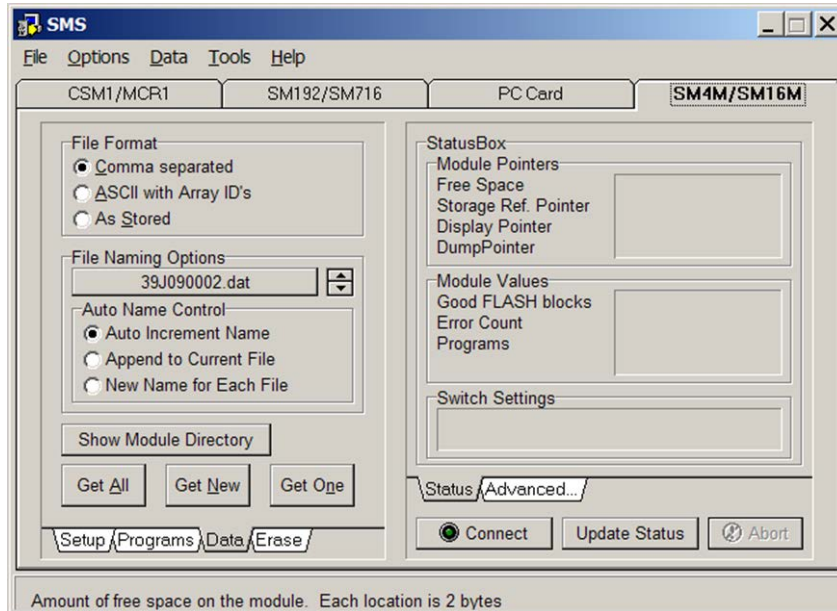


Figure 16: Preparing the SMS program Data window for connection with the SM4M Memory Module.

6.3.2.8 Click the data file name bar under "File Naming Options" to open a window titled "Next Datafile Name".

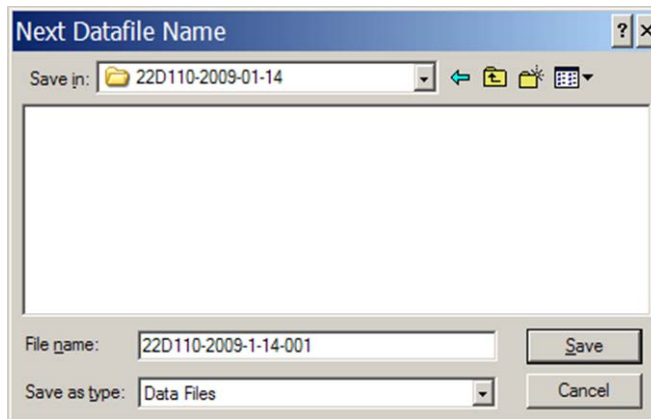


Figure 17: The "Next Datafile Name" window set to begin an SM4M download from station 22D110 on 1/14/2009. The first file in the download sequence will carry the name "22D110-2009-1-14-001.dat". The second file will be "22D110-2009-1-14-002.dat", and so on.

- 6.3.2.9 Use the Next Datafile Name window to set up a folder and filename each time you download an SM4M module. Most SM4M downloads will generate multiple files, numbered sequentially. This window allows you to create a path and name for the folder and for the first file in the download sequence. Since the SMS software does not recognize stations or maintain a list of station names, you must identify the station within the path and filename.
- 6.3.2.10 Name the folder and datafile starting with the SH-TCT file naming convention of "StationID-yyyy-mm-dd". Add three digits (usually "000" or "001") at the end of this string to allow for numbering the sequential data files. Upon clicking "Save" the SMS program will ensure that the last three characters of the name are numeric and will add the ".dat" file extension to the string you have defined. Keep in mind that the total space allowed for path/file name is limited to about 60 characters beyond the "My Documents\" folder name. Beyond that length SMS will truncate the path/filename string without warning. See Figure 17.
- 6.3.2.11 After clicking Save to close the Next Datafile Name window, select "Auto Increment Name" in the Auto Name Control window. See Figure 16.
- 6.3.3 Downloading SM4M Memory Module Data.
- 6.3.3.1 NOTE: The SMS software offers various options for viewing and selecting specific portions of the data record for downloading while in the field. However in most cases it is more practical to download the entire record and discard the un-needed portions after returning from the field. This SOP uses that approach.
- 6.3.3.2 Start the download by clicking the "Get All" button in the lower left corner of the SMS "Data" window. The "Connect" button near the bottom of the program window will change to "Disconnect" and deactivate as SMS opens the connection with the module. A red "Abort" button will also be enabled and scroll bars at the bottom of the program window will track the progress of the download. When the download is complete the Abort button will disappear and the green "Disconnect" button will be enabled.
- 6.3.3.3 Save a backup copy of the downloaded file(s) to a flash card, thumb drive or other secondary storage medium.
- 6.3.3.4 Check the downloaded data file(s) for completeness using a text program such as Notepad or Wordpad. Use the "Day of Year Calendar" (see Attachment B) as needed to verify dates for the logged data.
- 6.3.3.5 If the download just completed was an end of Water Year download you should erase the data from the memory module once the download and backup are complete. While connected to the module with the SMS program click the "Erase" tab at the lower left side of the screen. With the "Erase" screen open, click the "Erase Data" bar near the top left side of the screen. The erasing process may take one or two minutes and is tracked by a red scroll bar along the lower right edge of the window. See Figure 18.

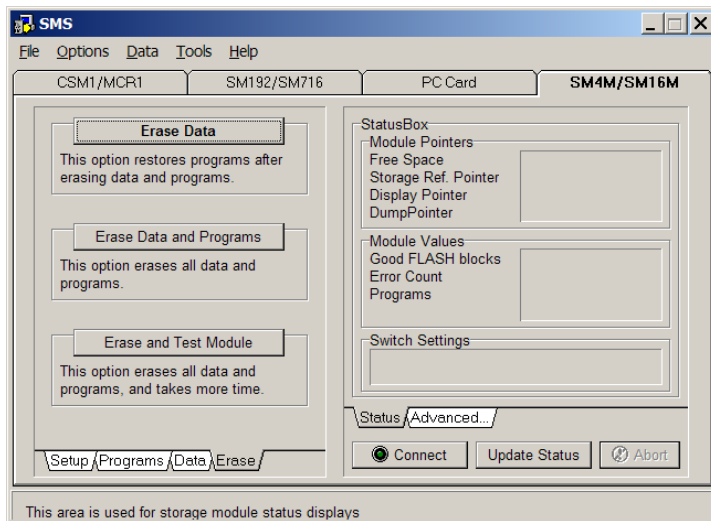


Figure 18: SMS “Erase” screen.

- 6.3.4 Disconnect logger connection and secure the station.
 - 6.3.4.1 After the erase function is finished click the green "Disconnect" button near the bottom of the SMS program window; then exit the SMS Program.
 - 6.3.4.2 Disconnect the “Computer to CS I/O” adaptor from the Y-Cable. Reconnect the Y-Cable to the CS I/O port on the top of the GOES Radio, secure the radio to its mounting bracket using the Velcro strap, and securely close the white instrument enclosure and the station.
- 6.3.5 Additional SM4M Memory Module Notes.
 - 6.3.5.1 Whenever possible, avoid moving a memory module from one station to another. If it becomes necessary to replace a Campbell Scientific DCP at a station with another Campbell Scientific DCP, the memory module should be removed from the original DCP and reinstalled in the replacement DCP so that the module remains at the same station. This minimizes the risk of mixing data from more than one station on a single module. It may be helpful to mark the module with the ID number for the station to which it is assigned.
 - 6.3.5.2 If an SM4M module must be moved to a new station, the data from the original station should be downloaded and erased before starting the data record for the new station. Remove any old station ID numbers from the module case before installing a module in a new station.
 - 6.3.5.3 When replacing a Campbell Scientific DCP or any of the major components of a DCP, record all serial numbers and Ecology applied numbers for the original and replacement equipment so that the information can be entered into the tracking system for gaging equipment.

- 6.4 Downloading data from the CR510 Datalogger using a laptop computer and Campbell Scientific PC200W software.
- 6.4.1 This is a backup means of downloading the CR510 logger used when the PDA download method is not possible. This portion of the procedure requires:
 - 6.4.1.1 A laptop computer that has been loaded with PC200W.
 - 6.4.1.2 A Campbell Scientific “Computer to CS I/O” adaptor or a “PDA to CS I/O” adaptor used with a 9-pin Null Modem and (female) Gender Changer.
 - 6.4.1.3 A standard 9-pin serial cable.
 - 6.4.1.4 A Day of Year Calendar (See Attachment B).
- 6.4.2 Connect the laptop to the CR510 datalogger.
 - 6.4.2.1 Release the Velcro strap securing the GOES Radio and carefully disconnect the “Y-Cable” from the “CS I/O” port on the top of the GOES Radio. Re-secure the radio with the Velcro strap.
 - 6.4.2.2 Connect the (9-pin) Y-Cable to the end of the “Computer to CS I/O” adaptor marked “Datalogger”. Connect the 9-pin serial cable to the end of the adaptor marked “Computer.” If you are using the “PDA to CS I/O” version of the adaptor you will need to attach a Null Modem and (female) Gender Changer to the PDA end of the adaptor. Finally, complete the connection to the laptop using the 9-pin serial cable.
 - 6.4.2.3 Open PC200W on the laptop. The program should open to the Setup page, showing an array of datalogger icons labeled with station ID’s for some of the sites in the FMU network. A scroll bar at the bottom of the window allows you to view all of the stations that have been set up on this laptop. See Figure 19.

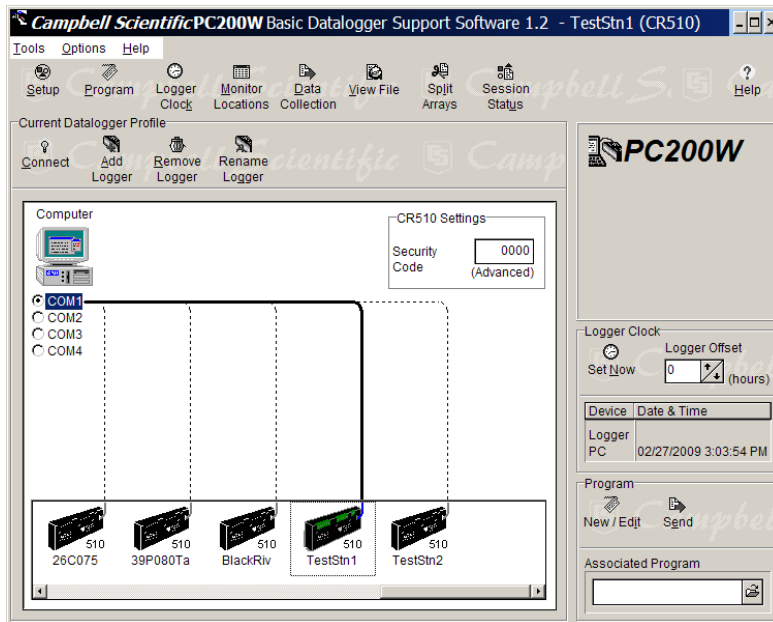


Figure 19: PC200W Setup screen.

6.4.2.4 Select the icon for the station to be downloaded.

6.4.2.5 If the desired station is not shown, click the “Add Logger” icon from the toolbar in the upper half the PC200W setup screen. The “Add logger” window will appear. See Figure 20.

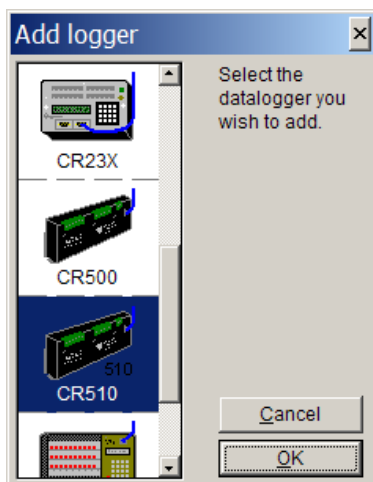


Figure 30: PC200W “Add logger” window.

6.4.2.6 In the small “Add logger” window, select the CR510 from the list of dataloggers and click “OK”. A new CR510 icon will appear in the Setup screen. See Figure 21.

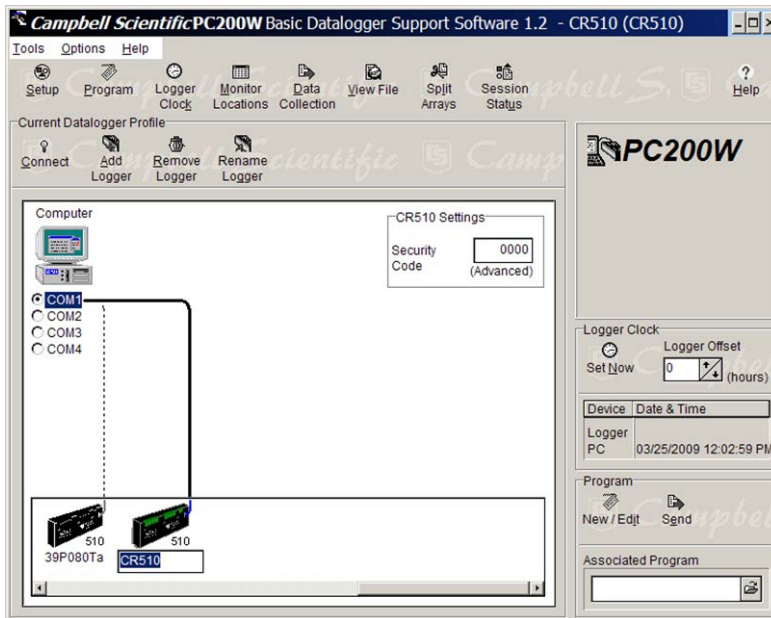


Figure 21: Adding a new station in PC200W.

6.4.2.7 Rename the new CR510 icon for the correct station ID and ensure that COM1 is the selected port.

6.4.2.8 With the correct station ID selected, click the “Monitor Locations” button in the toolbar above the stations window. As communication with the logger opens, a table should appear showing data stored during the logger’s most recent scan. A small text display of “Logger time” should also appear above the upper right corner of the viewer window. This continuous display of logger time is an indicator that the connection with the datalogger is active. See Figure 22.

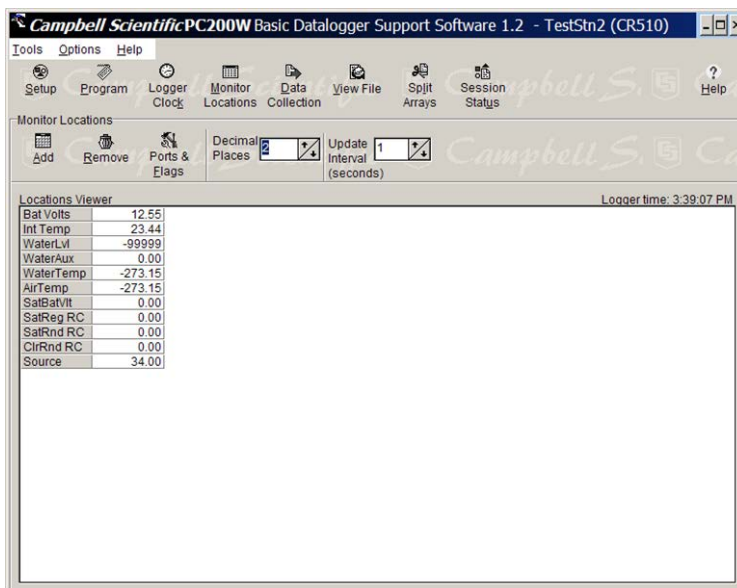


Figure 22: PC200W “Monitor Locations” screen.

- 6.4.3 Record current data to the Logger Notes form.
- 6.4.3.1 Record the date and time of the most recent scan in the appropriate spaces on the EAP-FMU Stream Gauge Logger Notes form (See Attachment A). Also record the indicated “WaterLvl” from line 3 of the Measurements table in the “LOGGER” box of the form. As soon as possible obtain a reading from the Primary Gage Index and any necessary Secondary Gage Indices for the station and record the values in the appropriate boxes on the Logger Notes form. (See EAP SOP 042 Measuring Gage Height of Streams for instructions for obtaining these readings.)
- 6.4.4 Download logger data to laptop.
- 6.4.4.1 Click the “Data Collection” button on the PC200W toolbar to select options for the download.
- 6.4.4.2 In the “What to Collect” area on the left side of the screen specify how much data you wish to download. See Figure 23.

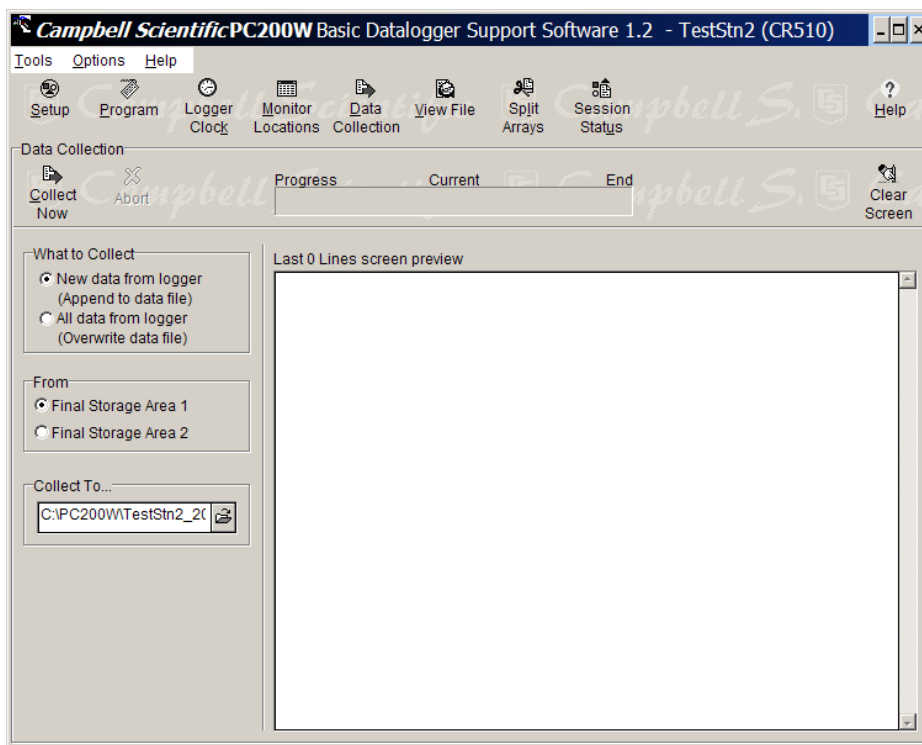


Figure 24: PC200W "What to Collect" selections.

- 6.4.4.2.1 “New data from the logger” may be used if you are sure that the computer you are using was also used for the previous download; and that no other downloads have been done using this station name and this computer since that time.
- 6.4.4.2.2 “All data from the logger” should be used if you cannot verify these conditions. Using this option usually creates the need for more editing when the data file is imported to Hydstra.

6.4.4.3

Select “Final Storage Area 1” in the “From” window on the left side of the screen. Use the small “Collect To...” window on the lower left side of the screen to assign a path and filename consistent with the file management system for downloaded data. Clicking the drop-down symbol on the “Collect to...” box will open the following window to simplify the naming of the path and filename. See Figure 24.

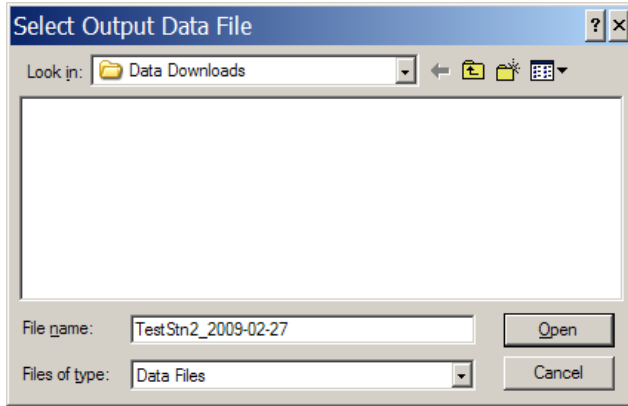


Figure 25: Naming the PC200W Data File.

6.4.4.4

After specifying a file name, click “Open” to return to the Data collection window (Figure 23).

6.4.4.5

Click the “Collect Now” button on the left side of the Data Collection toolbar to start the download. You will see lines of data scroll by as they are saved (see Figure 25). Once the download is finished you may use the scroll bar on this window to confirm that the file is complete and accurate. Use the Day of Year Calendar (Attachment B) to verify dates in the file.

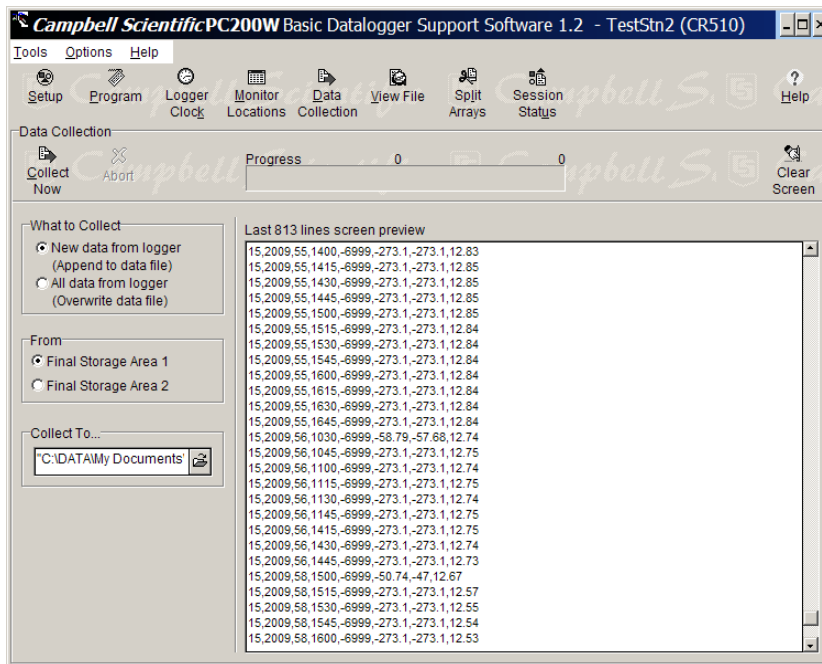


Figure 26: PC200W Data Collection in progress.

- 6.4.4.5 To close the connection to the datalogger click the “Setup” button on the left side of the Toolbar; then click the “Dis-connect” button on the second line of the toolbar.
- 6.4.4.6 Save a backup copy of the downloaded file to a clearly identified location on a flash card, thumb drive or other secondary storage medium.
- 6.4.5 Close logger connection and secure the station.
- 6.4.5.1 Close PC200W and disconnect the “Computer to CS I/O” adaptor from the Y-Cable. Reconnect the Y-Cable to the CS I/O port on the top of the GOES Radio and secure the radio to its mounting bracket using the Velcro strap.
- 6.4.5.2 Close the white instrument enclosure and secure the station.

7.0 Records Management

7.1 Datalogger Files

- 7.1.1 Datalogger files that have been downloaded to a PDA using PConnectCE will automatically go through a file conversion and transfer to become “.dat” files in the “c:\Campbellsci\” folder of the PDA’s host computer during the next docking operation.
- 7.1.2 As soon as possible upon returning from the field these data files and any files downloaded directly to a laptop should be moved to the “Data” section of the appropriate Station folder within the Environmental Assessment Program’s “H:\FLOWS\Projects\...” directory for storing streamflow data.

7.2 SHU Stream Gauge Logger Notes

- 7.2.1 While at the station to download logger data, the station operator should also make a complete record of the visit on the “SHU Stream Gauge Logger Notes” form according to the procedures outlined in the Station Visit SOP.
- 7.2.2 Proper records of logger gage height and of the primary gage reading (with accurate times for these readings) are essential for making any necessary adjustments to the datalogger record downloaded through this procedure.

8.0 Quality Control and Quality Assurance Section

- 8.1 The station visit records made on the SHU Stream Gauge Logger Notes form (Sec.7.2) serve as a QA record for validation of the logger data collected through this procedure. Specifically, the difference between the observed value of the primary gage height reading and the gage height value recorded in the datalogger gives a correction factor for the logged gage height at that particular date and time. This correction factor can then be applied as a time-weighted correction to larger segments of the gage height record downloaded from the datalogger through this procedure.

9.0 Safety

- 9.1 Personal Flotation Devices are required for persons working in or near streams or large bodies of water.
- 9.2 All EAP safety policies are followed when obtaining stage heights. Refer to the EAP Safety Manual (pages 1-37 and 2-7) for further information about working in and around [streams](#).
- 9.3 Always consider the safety and traffic situations when obtaining gage heights from a bridge and take appropriate actions including suspension of the activity if unsafe conditions exist. Consult the EAP Safety Manual (pages 1-31) for further guidance regarding [bridge](#) safety.
- 9.4 When operating laser levels, do not stare into the beam or direct the beam at other persons. Check the path of the beam and ensure there is no danger of inadvertently pointing the beam at people in the vicinity.

10.0 References

- 10.1 Campbell Scientific Instruction Manual: [PConnectCE for Pocket PC Handheld Software Support for Campbell Scientific Dataloggers](#). Version 2.33. Campbell Scientific, Inc. (CSI), Logan, Utah.
<http://www.campbellsci.com/documents/manuals/pconnectce-pocket-pc.pdf>
- 10.2 Campbell Scientific Instruction Manual: SM4M/SM16M Storage Module. Revision 3/01. Campbell Scientific, Inc., Logan, Utah.
<http://www.campbellsci.com/documents/manuals/sm4m-16m.pdf>
- 10.3 Shedd, J., 2008. Standard Operating Procedure (SOP) for Stream Stage Height Determination, Version 1.0. Washington State Department of Ecology, Olympia, WA. SOP Number EAP042. . www.ecy.wa.gov/programs/eap/quality.html
- 10.4 Safety Manual for the Environmental Assessment (EA) Program. Washington State Department of Ecology, Olympia, WA.
<http://aww.ecology/programs/eap/Safety/FieldOpsandSafetyManual2009.docx>

Attachment A:



Washington State Department of Ecology

EAP-FMU Stream Gauge Logger Notes

Sta. Name _____

Sta. No. _____ Party _____

DATE					
TIME (PST)					
LOGGER					
STAFF					
WIRE WEIGHT					
CHECK BAR					
TAPE DOWN					
CORR. FACTOR					
CORRECTED TD					
TD RP ELEVATION:					
CORRECTED td					
=WS ELEV@TD					
LASER: STADIA ROD READING					
- WATER SURFACE, ROD READING					
= DIFFERENTIAL, LASER TO WATER SFC					
LASER BEAM ELEVATION					
- DIFFERENTIAL					
= STAGE					
WATER TEMP				ELEVATION	READING
THERMISTER			LL RM1		
AIR TEMP			LL RM2		
THERMISTER			LL RM3		

ECY 070-183 (Rev. 7/08)

Batt V _____ Min _____ Max _____

Reset Stats Y/N Batt replaced Y/N

GOES Time OK Y/N

Data downloaded Y/N .NEW file erased Y/N

Desiccant condition _____ Changed Y/N

CSG checked Y/N

HWM _____ ft on stick + Ref Elev _____ ft

= HWM Elev _____ ft. Cleaned Y/N

Added cork Y/N

Remarks: _____

Attachment B:

DAY OF YEAR CALENDAR																															
(Add 1 to unshaded values during leap years.)																															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
FEB	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60		
MAR	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
APR	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	
MAY	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
JUN	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	
JUL	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212
AUG	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243
SEP	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	
OCT	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304
NOV	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	
DEC	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365