SubChem Systems, Inc.

CNES

OPERATING MANUAL

Version: 1.1
Date: 070209

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1) INTRODUCTION

a) Overview

The Counter Narcotics Environmental Sensor, CNES is a submersible environmental monitoring package designed for the purpose of data collection for research and analysis for detection of narcotics production. This analyzer is designed to be rapidly deployed to measure and log the following:

- pH
- Redox, Oxidation Reduction Potential
- Temperature
- Dissolved Oxygen and Oxygen Saturation
- Kerosene
- CDOM
- Optical Backscatter
- Chlorophyl
- Depth

The above parameters are believed to be crucial to the detection of narcotics production. The primary objective of the CNES is to log this data during production to provide data for detection algorithm development.

The CNES can be deployed in lakes, rivers, estuaries, and other shallow water coastal marine waters. The CNES may be deployed alone or co-deployed on a variety of observation platforms and sensor systems for vertical or horizontal profiling or time series measurements.

b) System Components

The CNES is comprised of several components:

1. SIIS2: The SubChem Instrument Interface System. The SIIS is basically a data handler and sensor controller for onboard logging and power management. This controller can be programmed for more advanced autonomy. This also contains a lithium battery pack for untethered and/or moored applications.
2. An electro-polished stainless steel frame.
3. SBE 27 with ORP sensor
4. Wetlabs ECOPUCK
5. Cyclops 7 fluorometer. This fluorometer is used primarily for the detection of kerosene. It has three gain settings, 1X, 10X and 100X. Currently, it is set for 100X to provide the greatest range possible. For finer range in lower concentrations, the gain settings can be changed at the factory.
6. AANDERAA Oxygen Optode 3835
7. The LabView Graphical User Interface (MS Windows compliant) operating

on a host computer (computer not included).

8. A Pelican Case for storage and shipping.
9. A Deckbox with test cable for power, communications, and charging.

Constituent	Parameter	Range
pH	Acidity or Basicity	0~7
ORP	Oxidation Reduction Potential	-1250mv~1250mV
DO(Sat)	O_2 Concentration	0~500uM
DO(%)	Air Saturation	0~120
Temp	Temperature	0~36ºC
CO	Kerosene	10~2000ppb *(high gain)*
CDOM	Color dissolved organic matter	0.3~375ppb
NTU	Optical turbidity	0~25m^{-1}
CHL	Chlorophyll Concentration	0.02~50.0ug/l
D	Depth	0~60dBar 0~60M

TABLE 1: Parameters recorded by the CNES analyzer.

2) TECHNICAL DESCRIPTION

The baseline CNES comes with a Deck Box capable of supplying 12V 60W power from a standard 120VAC 50/60Hz outlet. DC power options are also available on request. A multi-conductor cable connects the CNES to the deck box that provides DC power and a data communications interface with the host computer (MS Windows XP). The power supply cable has a keyed connector on the case mating end to provide an easy connection to the main panel for operation. The power supply is then plugged directly into a standard wall outlet. A submersible test cable is also supplied with the CNES. This test cable has a keyed plug on the Deck unit side and has an Impulse MCBH-8M on the CNES mating side.

The baseline CNES 8-pin bulkhead connector has the following pin outs:

Pin	Description
1	Ground
2	+12 VDC
3	RS232 TX (From CNES)
4	RS232 RX (To CNES)
5	Charger (-)
6	Charger (+)
7	Not Connected
8	Not Connected

Table 2: CNES bulkhead pinout.

A serial DB9 male to female cable is supplied with the CNES as well. The software for the CNES, ChemView, is a stand-alone executable (developed with National Instruments, LabView^{TM}) and graphical user interface (GUI) that facilitates user-friendly remote control of all CNES functions. The data acquisition rate is one reading per second.

Communication is accomplished either by RS232 with the user laptop or host platform. Running the supplied ChemVIEW software, the user laptop communicates on an available COM port with the following settings:

Baud	115200
Data bits	8
Parity	None
Stop bits	1
Flow Control	None

Some deck boxes have extra serial connector ports for serial communication with other third-party components (i.e CTDs, other sensors, or deployment platforms).

Accommodations for ancillary instruments are made upon customer request. An AC to DC power supply, located in the deck box, remotely supplies the power requirements for the CNES. The voltage and power outputs of the main power supply and the length and gauge of the conducting wires in the sea cable are designed to account for any voltage drop due to resistance losses over the length of the underwater cable. DC-DC converters convert the unregulated underwater DC supply into stabilized power within the CNES.

The CNES currently contains a 11.1V 6600mAH rechargeable lithium battery pack. In its suspended or sleep mode, it will draw only 128uA. In its low power mode, it will draw 22mA. When sampling with all sensors enabled, it will draw up to 300mA.

Endurance Example

Cold Start Delay of 60 seconds
Sampling for 15 seconds
4 times daily

CNES will sample for approximately 220 days

Equation for calculating endurance:

Cs = Cold Start Delay
Sa = Sampling duration
T = Samples per day
Ah = Equivalent Amp hours

Ah = $[86400 - T(Cs + Sa)] * 1.483e^{-9} + T(Cs + Sa) * 3.5875e^{-6}$

Operational Hours = $6.6 / Ah$

3) GETTING STARTED

Description: The ChemVIEW CD provided with the CNES contains the host software programs and default configuration file (CNES.CFG) with parameters specific to your instrument and factory default information. The CNES.CFG file will be explained in detail later in this manual. This software is to be installed on a host PC (MS Windows 2000, or XP operating systems recommended) with an operational RS232 DB9 Serial Port or serial port adapter.

The host program, called ChemVIEW, contains the run-time engine, and the ChemVIEW Application.

Installation Procedure:

1. Insert the ChemVIEW CD into an available CD drive.
2. The CD should automatically load.
3. Click on the link for “Install ChemVIEW”.
4. If prompted to run/save/cancel, click on “Run” in the one or two windows.
5. Click “NEXT”.
6. Follow the on-screen instructions to auto-install the run-time engine, and the ChemVIEW application into the default directory or browse to desired location.
7. Click “NEXT”.
8. Click “NEXT.
9. Application will install. This may take up to several minutes.
10. Click “FINISHED”.
11. Refer to section 4 of this User’s manual for proper operation of the Analyzer.

4) OPERATION

a) Startup

At the start of this procedure, the CNES is not connected and the Deck Unit is opened as shown in Figure 1.

1. Click on the following:
   START MENU
   \Programs
   \Chemview
   \Chemview.exe

Figure 1: CNES Deck Unit.

2. The Chemview application load and you will be prompted to select one of two options, Test Mode and Plotter. Plotter will be discussed later in this manual.
3. Click on Test Mode.
4. A new Configure Serial Port window will pop up with a pull down menu on the left side labeled “Select Serial Port”. Select the appropriate serial port from the pull down menu. Most computers with a 9 pin serial port built in will default to “ASRL1::INSTR”.
5. Using the pull down menu on the right, select the serial baud rate too which you will communicate with the CNES. The default baud rate is 115200.
6. Click OK when finished.
7. Connect the serial cable female end to the laptop or user computer.
8. Connect the serial cable male end to the Deck unit panel COM port labeled “HOST”.
9. Connect the power supply connector to the Deck unit panel “120 VAC” connector.
10. Connect the power supply to a 120VAC 50/60Hz wall outlet.
11. Connect the supplied submersible test cable to the Deck unit panel “CNES” connector.
12. Connect the MCBH-8F wet connector socket to the CNES bulkhead connector plug.

13. ChemVIEW should have loaded the RESPONSE tab at this point.
14. Turn power ON using the main orange power switch.
15. Remove the SIIS magnet to enable startup of the CNES.
16. If everything has been connected appropriately, you should see data appear in the CNES RESPONSE text box while all the plots to the right are updating once per second.
17. NOTE: Several responses can be seen. These indicate that there was a clean start and the CNES is time stamped and synchronized with the host platform.
18. The CNES is now operating and at idle.

b) Navigating ChemView

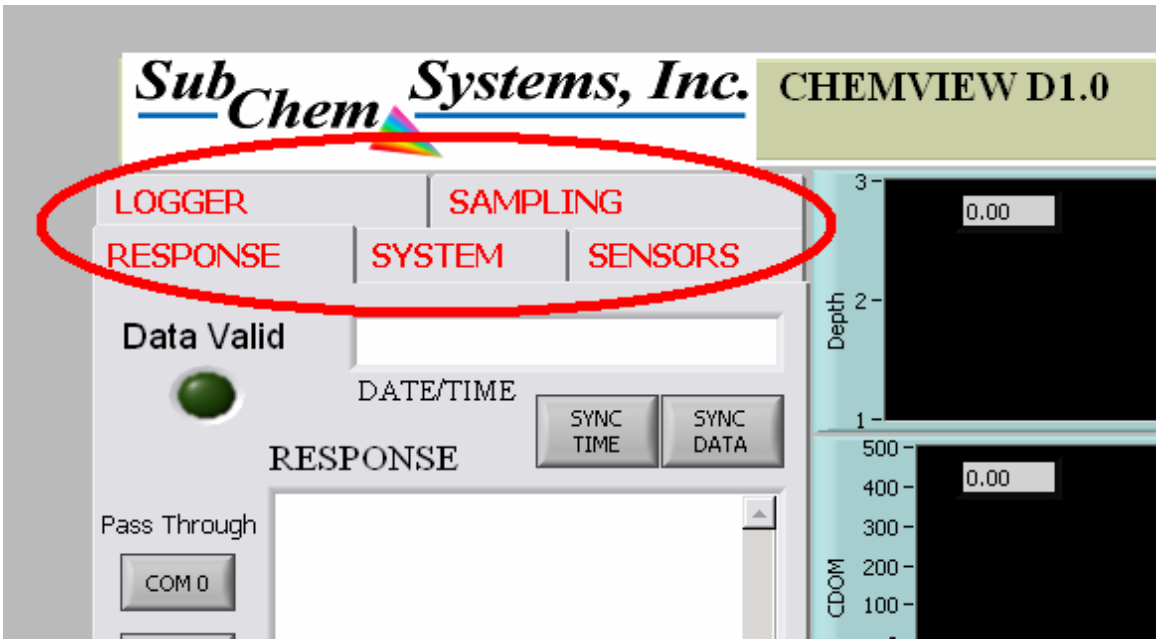


Figure 2: ChemVIEW Tabs are located in the red circled area of Test Mode.

The SubChem Systems ChemVIEW software is meant to be as self explanatory as possible to provide easy use of the instrumentation. The following "TAB" information will help provide a synopsis of the functions available to the operator under each ChemVIEW Tab (see figure 2):

Response Tab (Figure 3): This tab provides the operator a set of functions to view the serial communication from the instrument. This will include the 1Hz data stream as well as the acknowledge commands and error messages.

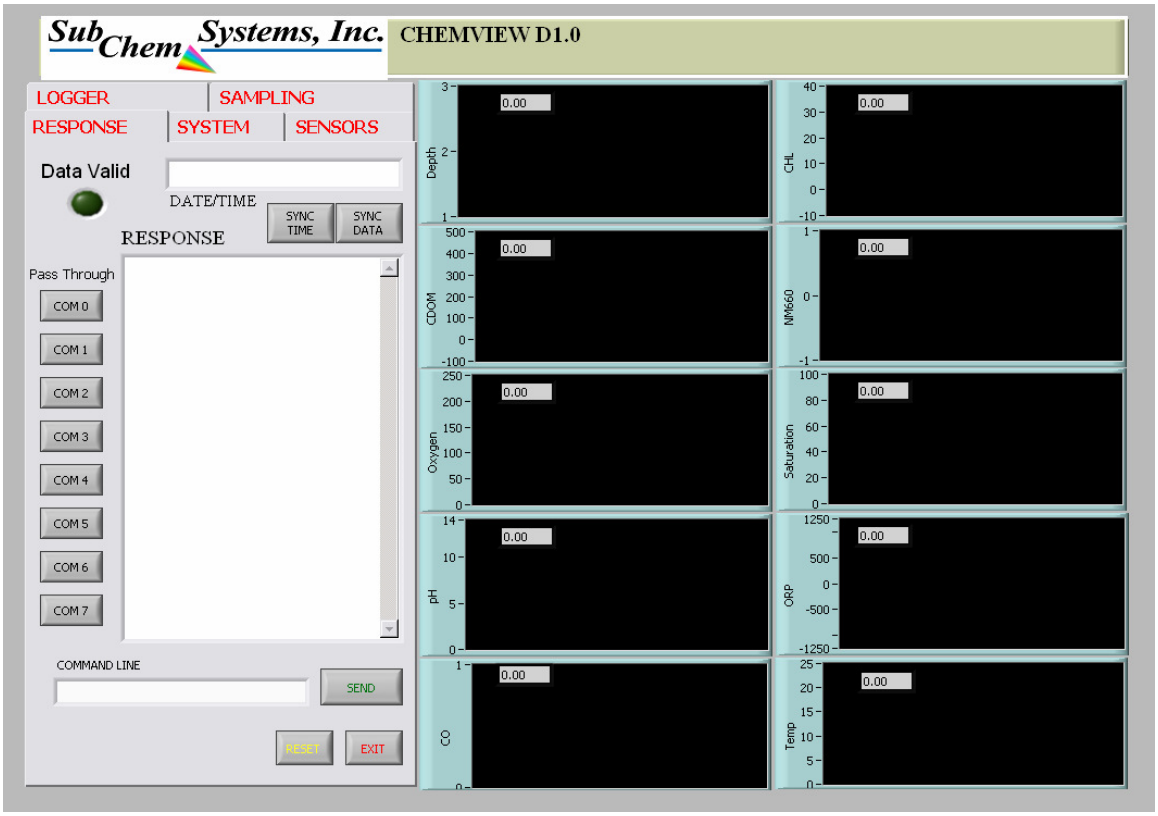


Figure 3: Response Tab.

The Response Tab contains the current date and time from the CNES in the "Date/Time" text box.

SYNC TIME button: This synchronizes the instrument with the operator's computer. After the button is pressed the local host time is sent to the CNES.

SYNC DATA: This button is used to synchronize the data to the specific mode you are operating in. Use this button when switching between Test Mode and Auto Mode.

SEND button: On occasion, it may be necessary to manually send a command to the CNES. This is more or less the command line for the CNES. Type in the command into the text box and then press SEND.

PASS THROUGH: The user may communicate directly to any of the instruments by pressing the Pass Through button on the appropriate COM Port. Check CNES.INI for a description of which instrument is on each COM Port. Once directly connected to a serial instrument, type '#' in the Command Line text box and press SEND to disconnect.

NOTE: To enable data output of the sensor you wish to connect to, you must enable power to the sensor first. Therefore, when attempting to connect, send the $PSCSA,TM* command by pressing the SYNC DATA button first. Then send

the pass through command.

RESET button: The reset button is provided to allow the operator to bring the instrument to the command prompt. This will only be necessary for troubleshooting.

EXIT button: This will end the Test Mode session and bring you back to the point where you can select which mode to operate in.

Logger Tab (Figure 4): The Logger tab is meant to give the operator the means to log the data coming from the instrument.

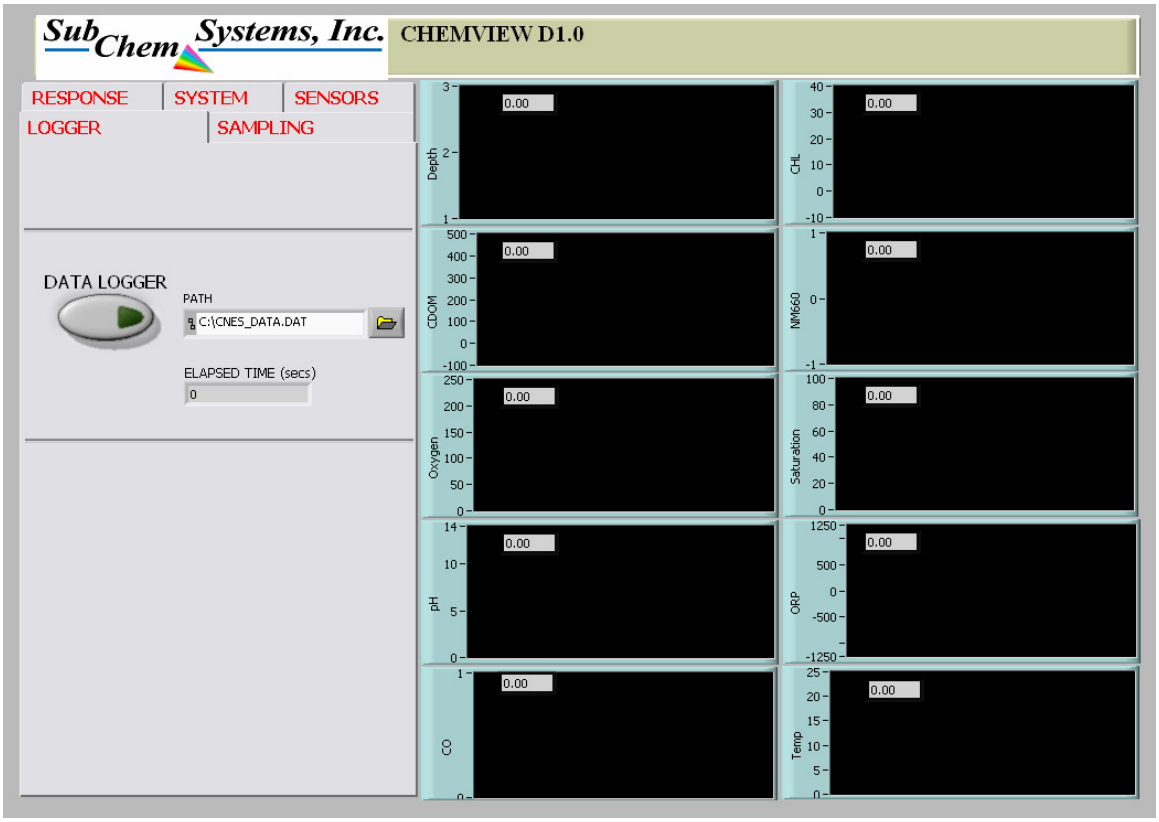


Figure 4: Logger tab.

DATA LOGGER button: When the Data Logger button is pressed, it will illuminate green and the ELAPSED TIME text box will start to increment in seconds of the total logging time. A *.DAT file will be written to the C:\ as show in the PATH box. Prior to pressing the Data Logger button, the operator can browse to a new log file directory location.

NOTE: The SIIS logs all of the data internally once the Cold Start Delay has completed. The Logging capability of Chemview D1.0 does not account for this.

Sensors Tab (Figure 5): The Sensors Tab is meant to relay to the operator all the CNES log and digital signals and other ancillary sensor values from the instrumentation. Such values will include Depth (m), CHL (ug/l), CDOM (QSDE), NM660 turbidity (m^-1), Oxygen (umol), Saturation (%), Temperature (℃), pH, ORP (mV), and CO. If certain equipment is not present, then the values should remain 0.

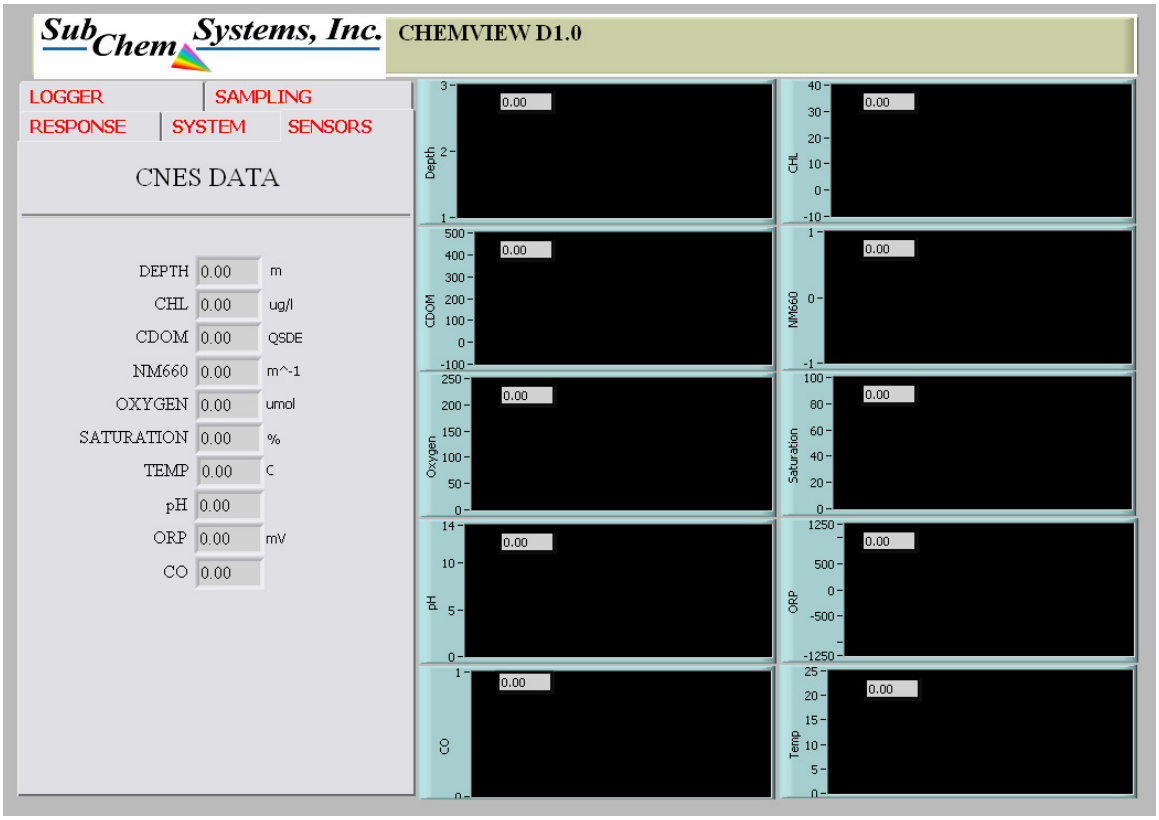


Figure 5: Sensors Tab.

System Tab (Figure 6): The systems tab provides the operator with the low level hardware functions to the instrumentation. It is under this tab that the operator is able to switch power to each instrument on and off and put the CNES into low power mode and sleep mode. Any buttons or switches that are visible but faded are available to the operator if the hardware is present.

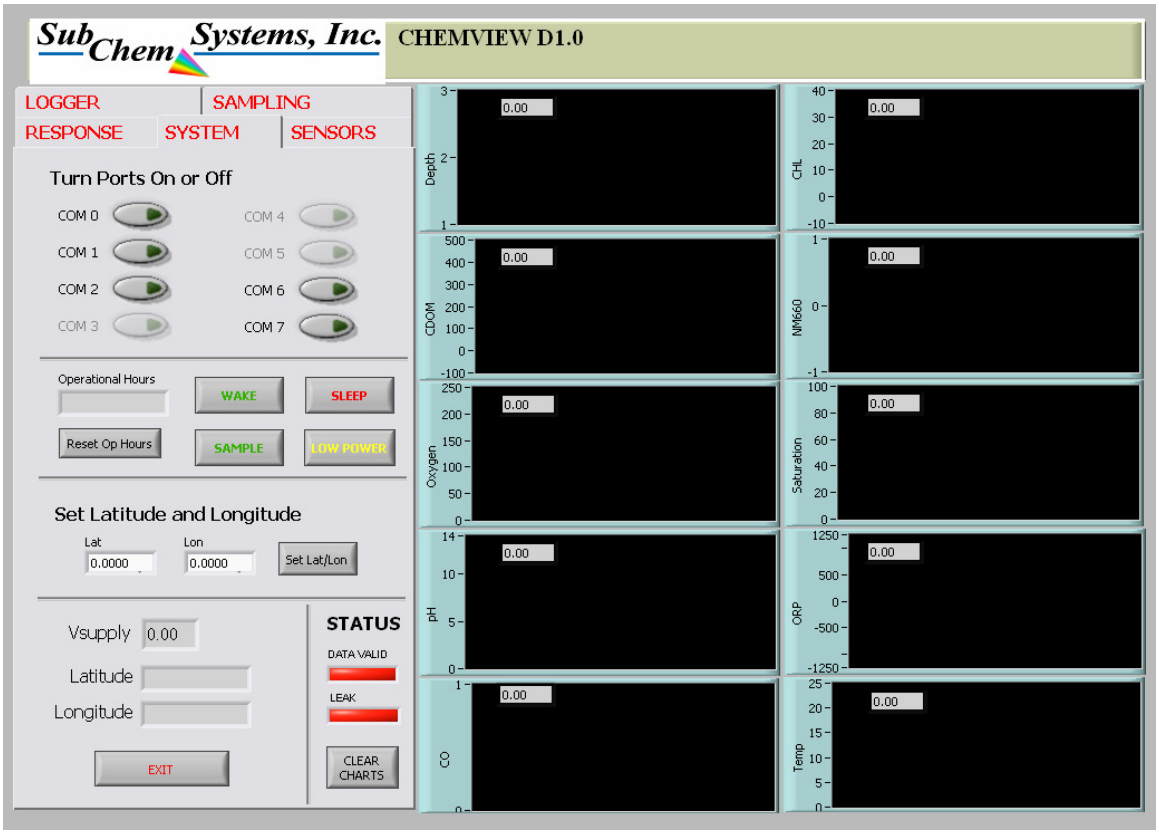


Figure 6: System Tab.

Turn Ports On or Off: Toggle these switches to power on and off instrumentation associated with the appropriate COM Ports.

Reset Op Hours: Pressing the Reset Op Hours button will reset the operation hours of use logged on the CNES. The OP HOUR counter is an onboard odometer used to determine the amount of time the instrument has been in use. The value of Op Hours is displayed above the Reset Op Hours button, labeled Operational Hours.

WAKE: This button will wake the CNES from a Low-Power mode or a sleep mode.

SLEEP: The Sleep button will set the CNES to a low power sleep mode and stop sampling. The instrument will draw approximately 120uA. Once in sleep mode, the next command sent will wake the CNES. A pop-up dialogue will alert the user when the CNES has been taken out of sleep mode.

LOW POWER: This button will set the CNES to a low-power mode but not to sleep. Sampling will cease.

SAMPLE: Pressing this button will tell the CNES to start its continuous sampling routine.

Set Latitude and Longitude: This button will set the Latitude and Longitude position for the data logger. This enables the future use of a GPS with the instrument upon customer request for an integrated GPS.

Status Indicators: These values will go green when valid. The Data Valid indicator will flash once per second. The Leak indicators should appear green. If not, consult the factory. When at idle, this value will remain red.

Sampling Tab (figure 7): The Sampling tab allows the operator the ability to start sampling after a specified delay. The user may choose to start sampling now or in a specified number of seconds, minutes, hours, or days. Pressing the GO button next to the sampling will command the CNES to start sampling after the delay.

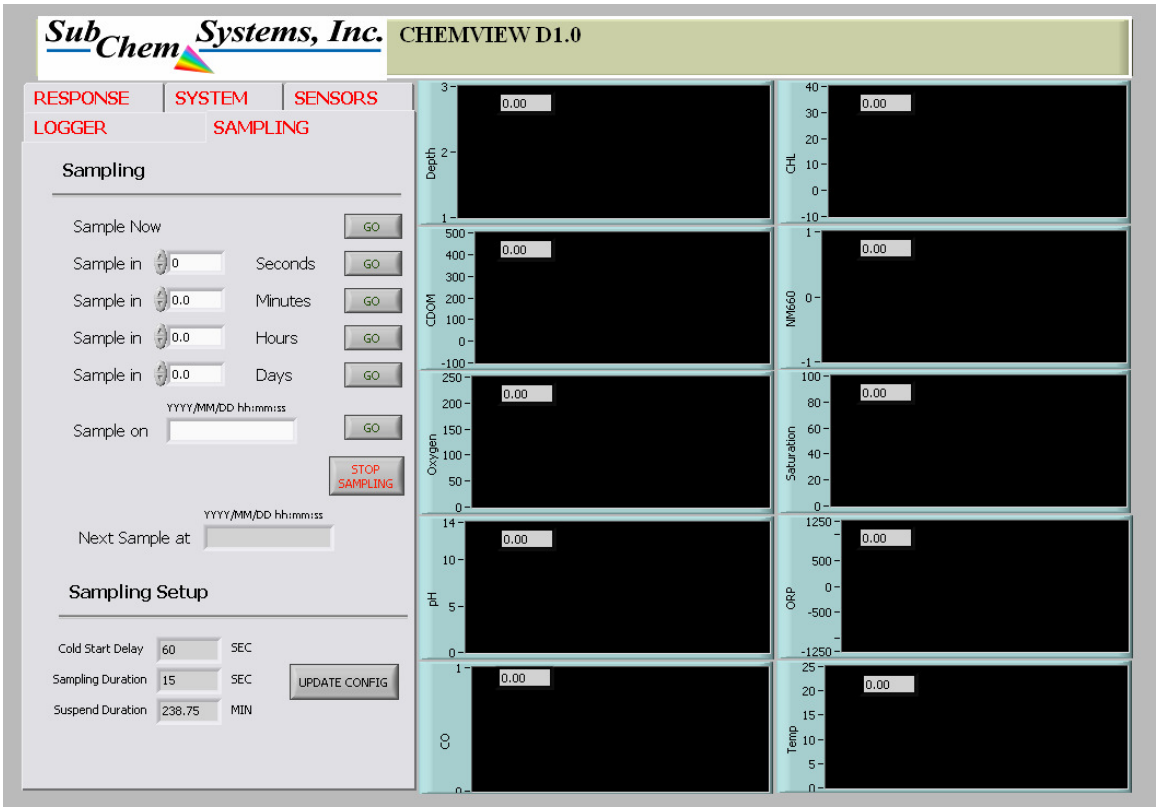


Figure 7: Reagents Tab.

Once the GO command is sent, the CNES will perform intermittent sampling with a suspended power state in between samples. The following sequence is performed:

1. GO command is received
2. CNES waits desired time delay

3. After delay has lapsed, CNES will send the enable power message, “$PSCSA,TM,PWRENABLED*”
4. 1 Hz data message can be seen in the Response tab
5. After the cold start delay has lapsed, the CNES will send the log start message, “$PSCSA,TM,LOG_START*”
6. After sampling duration has elapsed, the CNES will send the log stop message, “$PSCSA,TM,LOG_STOP*”
7. The CNES will send a message containing the current time and the delay until the next sample. The time of the next sample is displayed in the Next Sample At indicator box in YYYY/MM/DD hh:mm:ss format.
8. The CNES will be in a low-power mode until either woken up or until the next sample.

UPDATE CONFIG: Sampling parameters from CNES.CFG such as the Cold Start Delay, Sampling Duration, and Suspend Duration are displayed in the Sampling Setup section on the Sampling tab. Pressing the UPDATE CONFIG button will read and display the sampling parameters from CNES.CFG.

Additional tools are available in the pull down menus above the tabs. Locate the pull down menu labeled Tools. Available tools include:

File Transfer: Use this tool to upload and download single files to the CNES such as the CNES.CFG and CNES.INI files.

Zero Pressure Sensor: Selecting this tool will effectively normalize the pressure transducer to ambient pressure. Make sure that the CNES has been at idle long enough for the pressure transducer value to stabilize. Then use this tool.

c) Transferring files with the CNES

The operator is able to send and receive single files to and from the CNES using the file transferring capabilities built into ChemVIEW. This was meant to allow the operator the ability to modify the CNES.CFG, CNES.INI and CNES.SSF files for specific deployments. Batch file transferring is used to download entire data sets. When sampling in Test Mode, the CNES will generate ASCII DAT files. For each sample taken, if configured for intermittent sampling, the CNES will generate a single file. Over the course of several weeks, the CNES may generate several tens or hundreds of files.

Test Mode File transferring

Receive a file:

1) Follow section 4.0 to arrive at Test Mode with the CNES operating at idle.
2) Using the Tools pull down menu, select File Transfer.

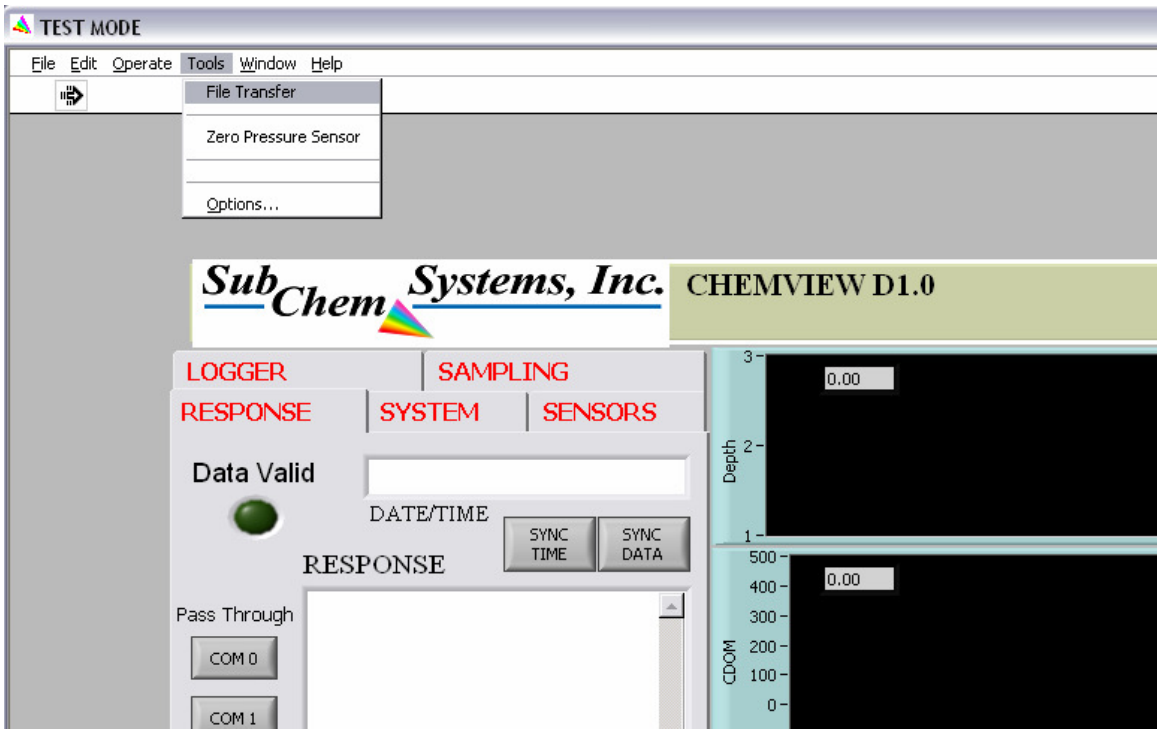


Figure 8: File transferring pull down menu.

3) You should observe a directory listing in the text box from the CNES displaying the files located on the root C:\ drive.

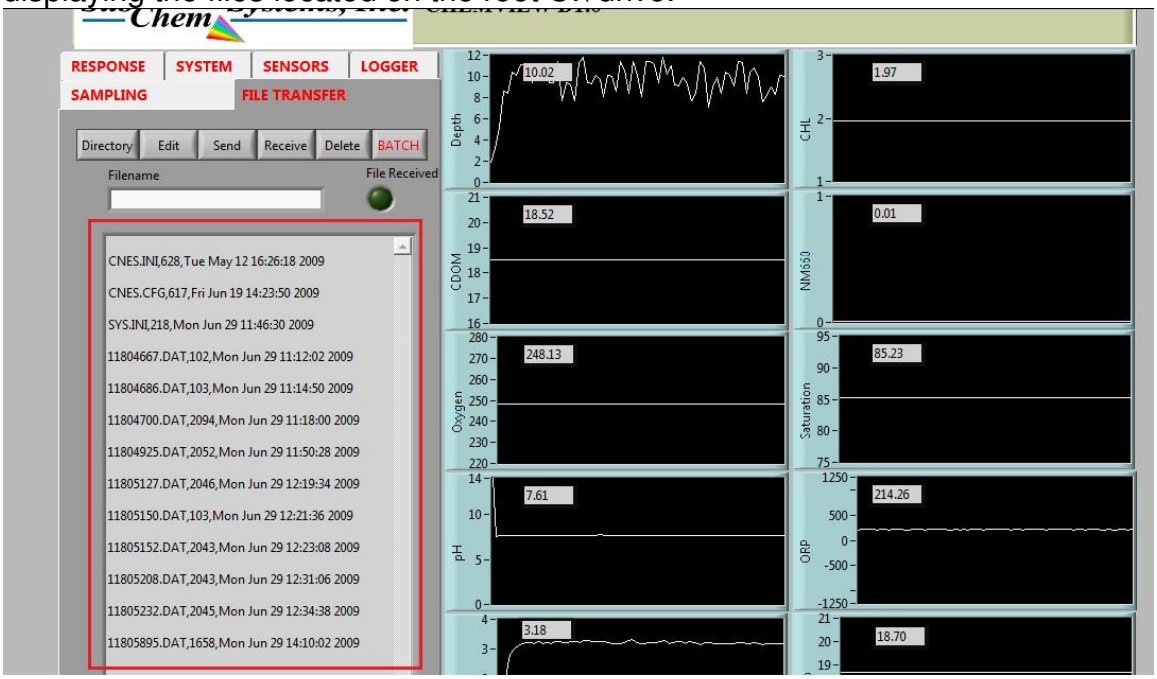


Figure 9: File directory listing from the CNES.

4) You can, at any point, click on the Directory button to re-display this information.

5) To download the CNES.CFG file, type file name into the text box.

6) Then click the Receive button.
7) The CNES.CFG file should take a few seconds to download.
8) You will be prompted with a Save As dialog box. Navigate to the ChemVIEW Support folder on your computer and then click the “Select Cur Dir” button.

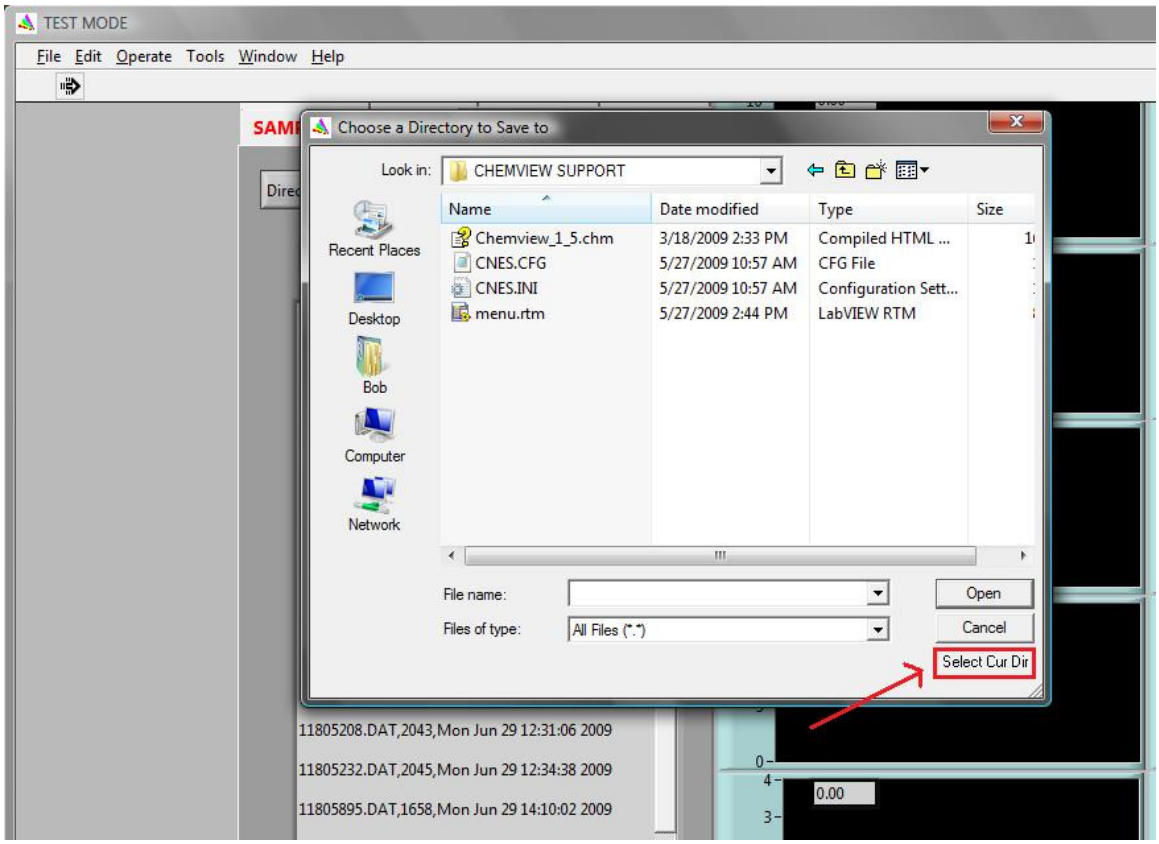


Figure 10: Dialog box Select Current Directory button.

9) Once complete, a window will appear stating the download was successful and you will be prompted with the option of editing the file or continuing.

Edit a file:

1) If you’ve recently received a file, you can edit the file right after the download is successful.
2) Or, simply click on the Edit button. You will be prompted to locate the file to edit and your computer’s notepad will appear containing the file.

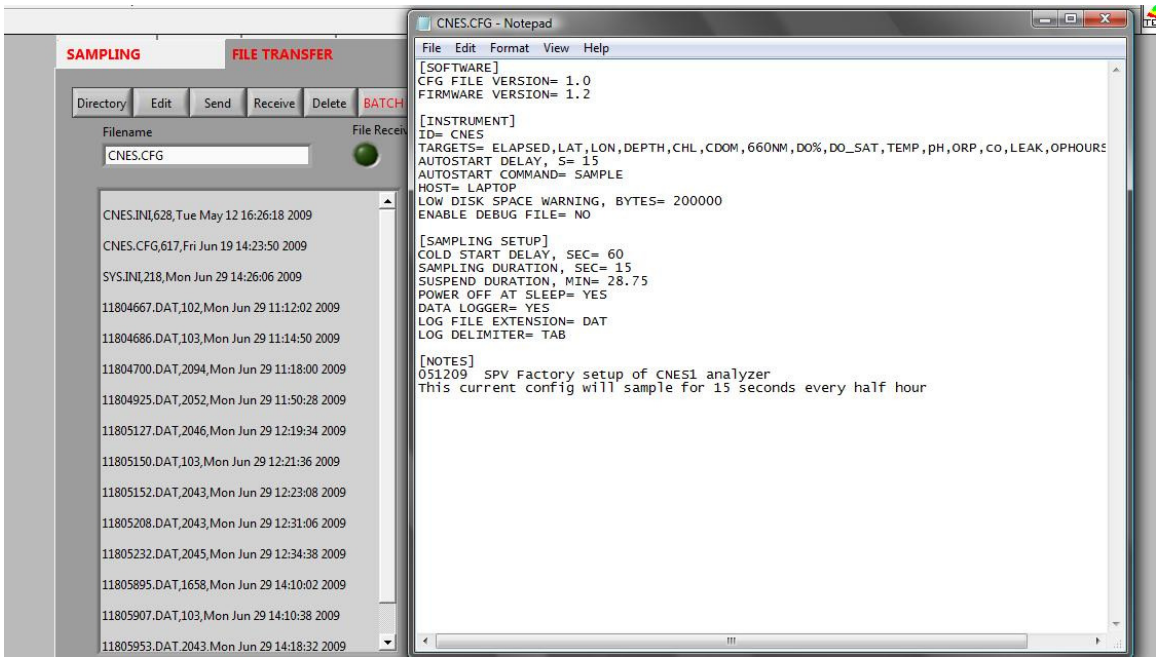


Figure 11: An example of file editing. After clicking the Edit button, the operator can select the file to edit. Once selected, ChemVIEW will open NOTEPAD to edit the file.

Sending a file:

1) Click on the Send button.
2) A window will launch asking that you Open the file.
3) Navigate to the file you would like to send to the CNES then double click on the file name.
4) The File should upload to the CNES.
5) A window should appear stating the file has been successfully transferred.

To delete a file:

1) Enter the file name to be deleted into the filename text box.
2) Click on the Delete button.
3) You will be prompted to verify you really want to delete the file.
4) Click Ok.

Once you upload a CNES.CFG or CNES.INI, the CNES will reboot. The CNES recognizes these files as system files and will reboot to update with its new parameters. To exit from file transferring, simply click on any of the other Tabs.

d) Configuration

On the root drive of the instrument “C:\”, several files can be seen. One of which is a file named CNES.CFG. This file is used to configure the hardware of SubChem System controller based instruments. This file can be updated to suit the needs of each intended deployment. There are many parameters

which are factory set and will likely not be modified by the operator. This section will make those distinctions.

[SOFTWARE]
CFG FILE VERSION= 1.0 This holds the configuration file version currently in use. Pervious and future version may differ.
FIRMWARE VERSION= 1.2 This holds the current firmware version in use.

[INSTRUMENT]
ID= CNES This holds the instrument ID.
TARGETS=
CTIME,LAT,LON,DEPTH,CHL,CDOM,660NM,DO%,DO_SAT,TEMP,pH,ORP,co,LEAK,OPHOURS,VSUPPLY
It is in this line that the target data to be measured are called out. This represents the format of the data output in the log file.

AUTOSTART DELAY, S= 15
AUTOSTART COMMAND= SAMPLE
HOST= LAPTOP
LOW DISK SPACE WARNING, BYTES= 200000
ENABLE DEBUG FILE= NO

[SAMPLING SETUP]
COLD START DELAY, SEC= 60 This specifies the duration of time in seconds needed for proper sensor warmup.
SAMPLING DURATION, SEC= 15 This specifies the duration of sampling.
SUSPEND DURATION, MIN= 238.75 This specifies the time between samples.
POWER OFF AT SUSPEND= YES Specify whether the system is suspended between samples.
DATA LOGGER= YES Set data logging capabilities on/off
LOG FILE EXTENSION= DAT Specifies the file extension of the output log file.
LOG DELIMITER= TAB Specifies the delimiter between fields in the output log file.

[NOTES] In this section, you can type any text you want to make notes on the file. For example, the deployment time and revision of the file can be contained here as well as the author and a description of the test.

Example of a CNES CNES.CFG File

```
[SOFTWARE]
CFG FILE VERSION= 1.0
FIRMWARE VERSION= 1.2

[INSTRUMENT]
ID= CNES
TARGETS=
CTIME,LAT,LON,DEPTH,CHL,CDOM,660NM,DO%,DO_SAT,TEMP,pH,ORP,co,
LEAK,OPHOURS,VSUPPLY
AUTOSTART DELAY, S= 15
AUTOSTART COMMAND= SAMPLE
HOST= LAPTOP
LOW DISK SPACE WARNING, BYTES= 200000
ENABLE DEBUG FILE= NO

[SAMPLING SETUP]
COLD START DELAY, SEC= 60
SAMPLING DURATION, SEC= 15
SUSPEND DURATION, MIN= 238.75
POWER OFF AT SUSPEND= YES
DATA LOGGER= YES
LOG FILE EXTENSION= DAT
LOG DELIMITER= TAB

[NOTES]
051209        SPV Factory setup of CNES1 analyzer
```

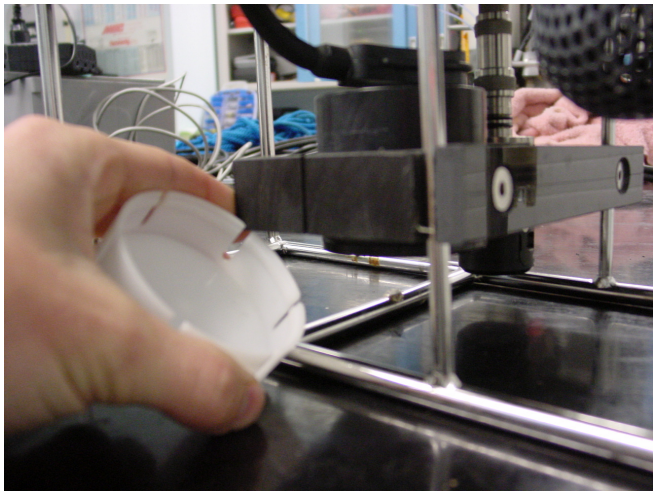
In the event there is a problem with instrument operations as a result of modifying the CNES.CFG file, delete the file. Navigate to the RESPONSE tab and press the RESET button. Then enter the following text at the command line, “C:\DEL CNES.CFG”. Restart the instrument and the default CNES.CFG file should be loaded.

e) Fixed Moored Deployment

To deploy the CNES is fairly straight forward:

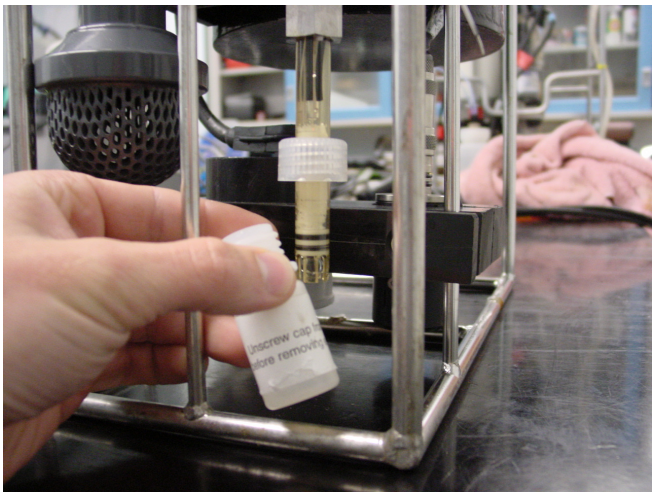
1) Once the CNES has been properly configured for sampling, determine the operational depth of the CNES.
2) Attach the anchor line and surface float lines to the bottom and top of the CNES frame respectively.
3) Ensure that the SIIS magnet is installed.
4) Remove the deck cable and attach the dummy plug to the SIIS end cap.

NOTE: If the CNES is programmed to sampling immediately, you can use this to determine that it is operating prior to deployment without connecting with the tether.



5) Remove the white ECOPUCK cover.

6) Remove the SBE 27 pH probe guard.



7) Remove the SBE 27 pH probe bottle.

NOTE: When removing the probe bottle, the bottle is removed from its lid. The lid remains on the probe.

8) Remove the SIIS magnet.
9) Verify that the ECOPUCK lights are flashing.

The CNES is now ready for deployment.

When recovering the CNES, always place the SIIS magnet in the cradle. This will stop the internal logger and halt any sampling. Once on deck, always install the SBE 27 pH probe bottle and ECOPUCK cover. The probe bottle should have an acidic buffer solution in it that will ensure the probe does not dry out and remains clean. The ECOPUCK cover will prevent the ECOPUCK LED face from getting scratched.

f) Batch File transferring

Receive a data set:

1) Follow the steps outlined in section 4.0.
2) Click on the Batch button and a new window will appear as in Figure 12.
3) To receive the DAT files on the CNES after a deployment, click on the GET FILE(S) button.

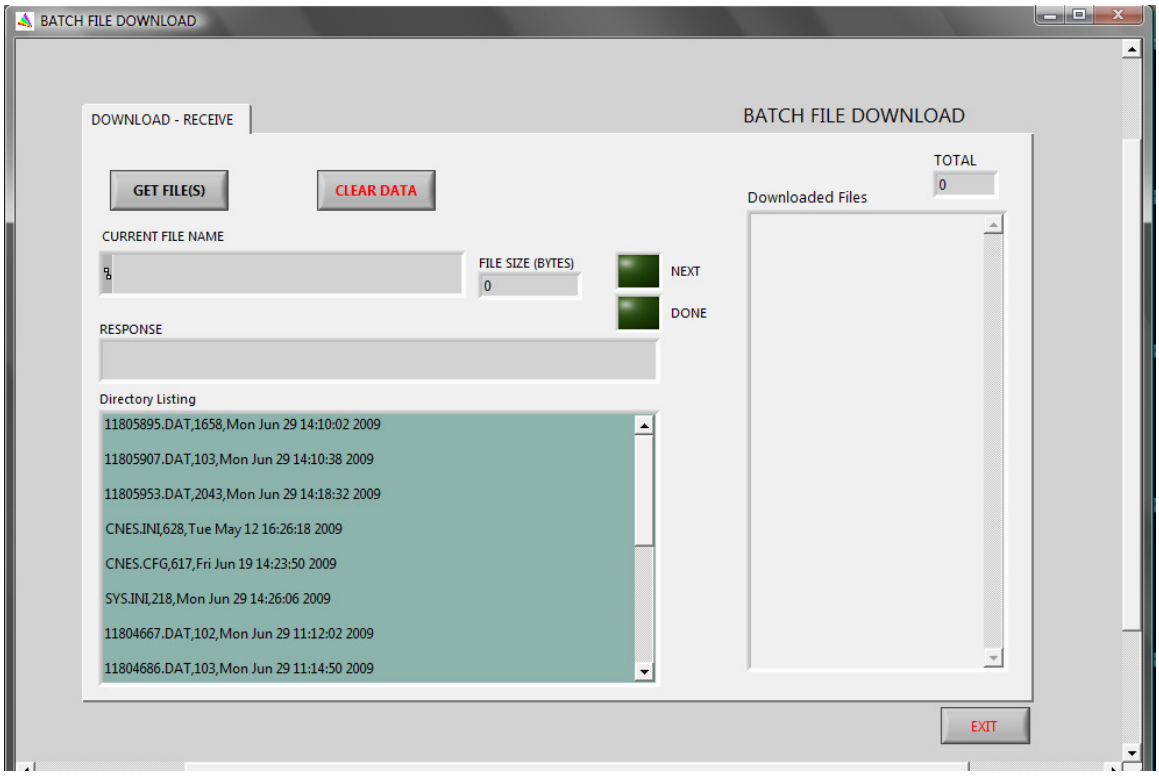


Figure 12: The Batch file download window

4) Next, you will be prompted to locate the directory to store the data set. Navigate to that directory then click the Select Cur Dir button.

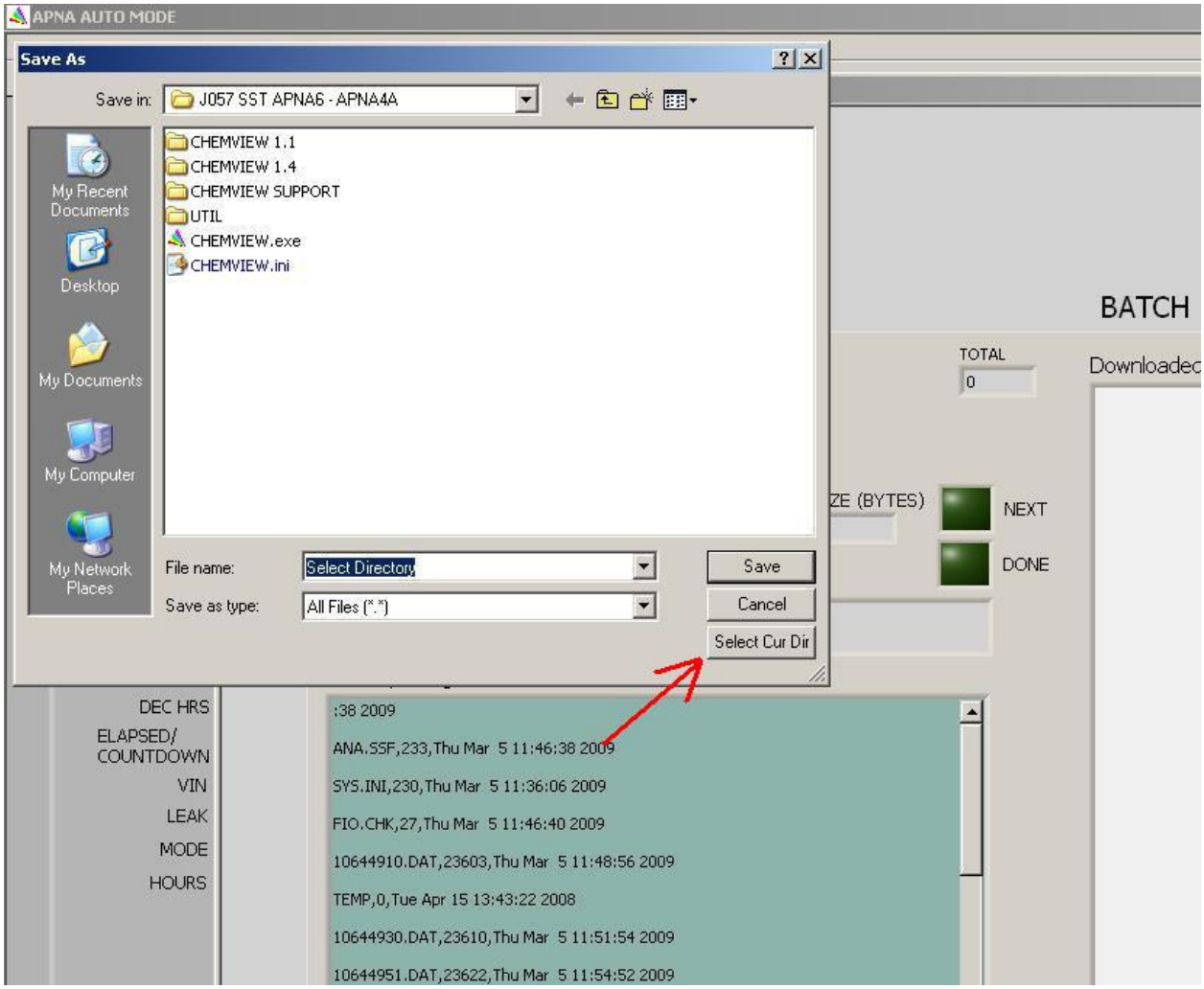


Figure 13: Batch file downloading select current directory button.

5) The data set will now be downloaded. As each file is downloaded successfully, it will be listed under the Downloaded Files list box.
6) Once the data set has been downloaded, a new window will appear stating that the Batch File Download is complete.

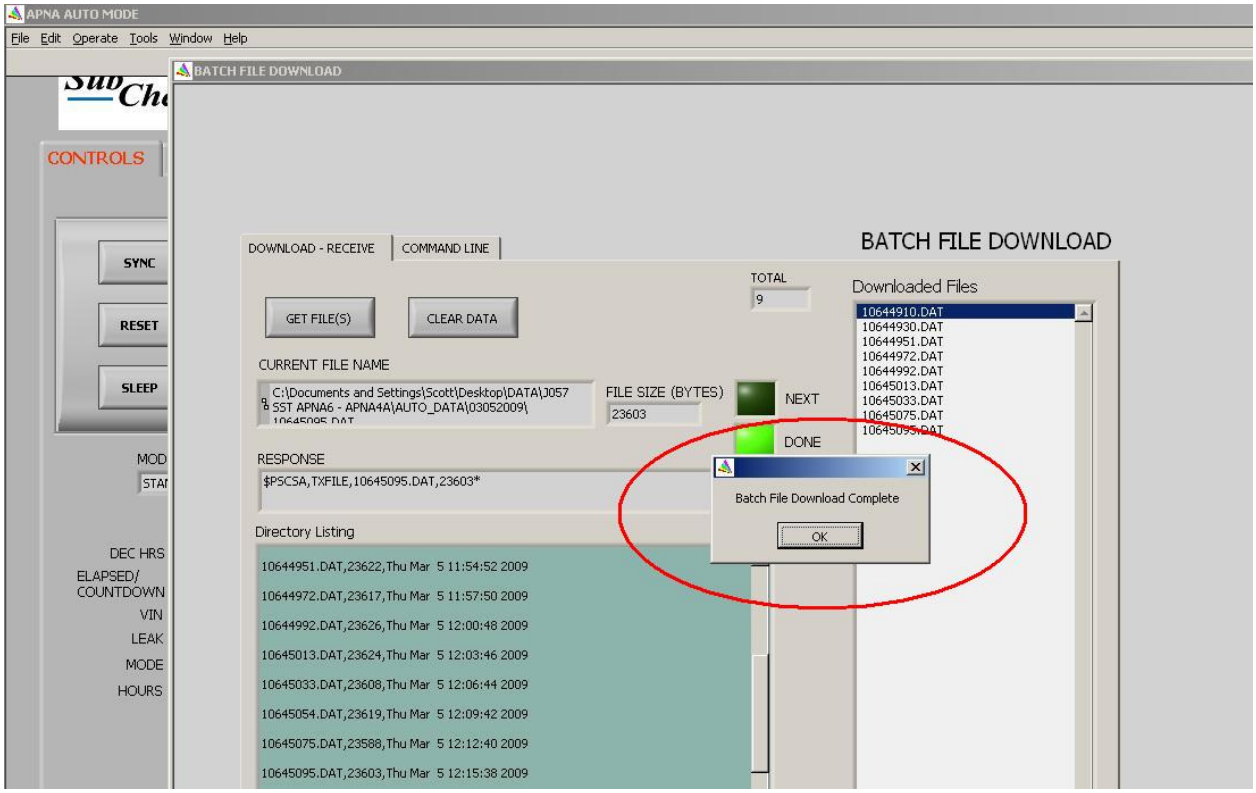


Figure 14: Batch file download complete.

g) Plotter Operation

The Plotter was designed to be a tool to observe the raw data as downloaded from the CNES. Operators can get an initial assessment of the performance of the CNES to aid in decision-making to either recovery or re-deploy the CNES. The plotter incorporates the ability to view all the parameters recorded in the CNES DAT files as well as compare and contrast plots. Please note, the CNES is not needed for this application and can therefore remain off or can otherwise be used elsewhere.

To open the Plotter application, click the following:

START MENU
\Programs
\Chemview
\Chemview.exe

A window will appear prompting the operator to select the CNES operation mode. At this point, click on the PLOTTER button. The PLOTTER application will now load.

To view a recently downloaded data set:

1) In most cases, ChemVIEW will create a folder called AUTO_DATA. Data sets retrieved will be date stamped in an additional folder with DAT files within. To facilitate looking at multiple data sets, the user can set the working directory to a folder containing many data sets by clicking on the folder icon next to the 'Choose Working Directory' path indicator. Then navigate to the folder of interest and press 'Select Cur Dir' once in the folder. See Figure 15 for help.
2) Next the user may click on 'New File', 'Prev File', 'Next File', 'First File', or 'Last File' to load a data set. Pressing 'New File' will allow the user to navigate to the desired file to open and load. Pressing 'Prev File' or 'Next File' will open and load the previous or next data file in the current working directory without opening a dialogue box. Likewise, pressing 'First File' or 'Last File' will open and load the first or last file in the current working directory.

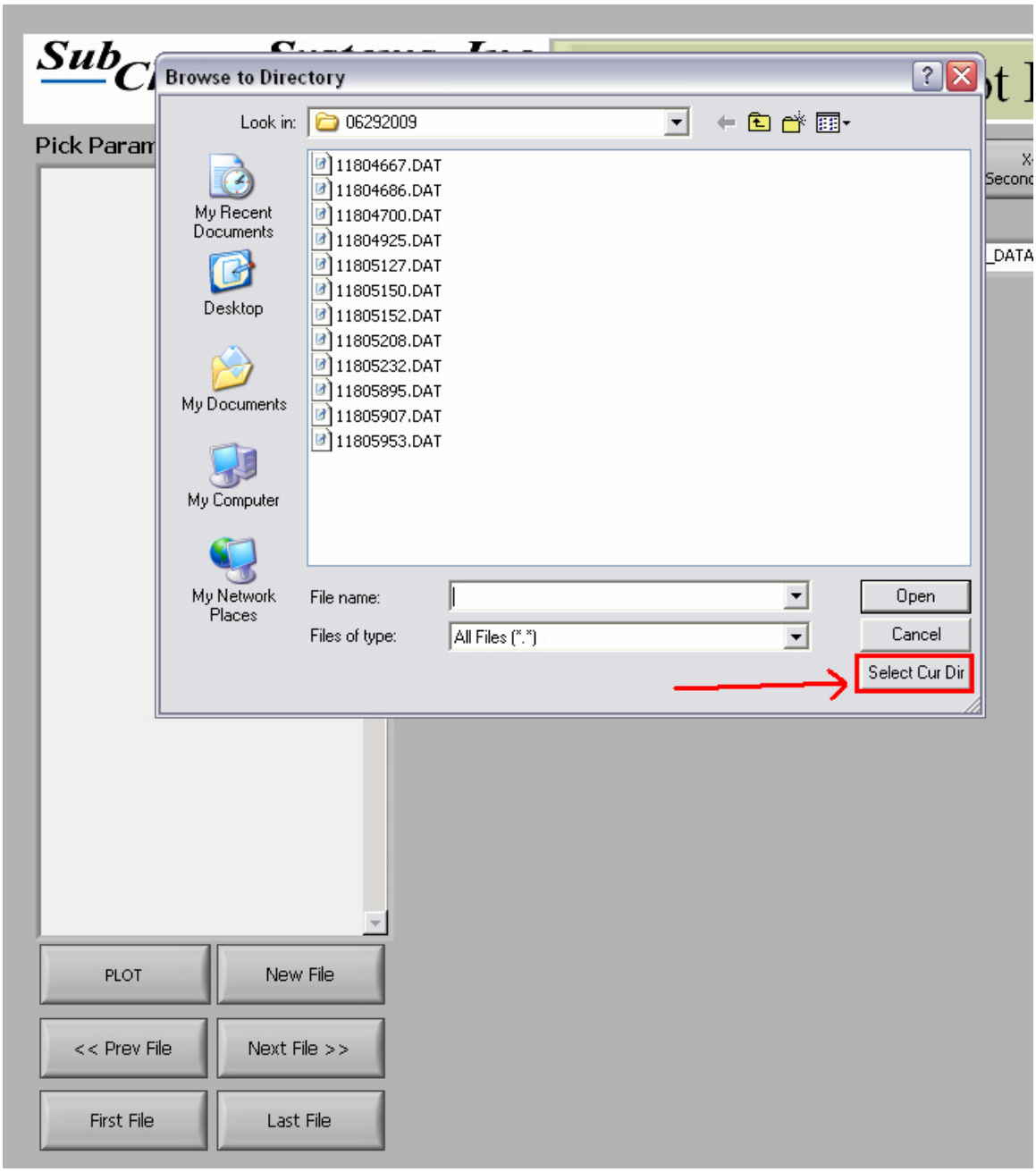


Figure 15: The PLOTTER application allows the user to navigate to a working directory

Each DAT file is named with a specific naming convention unique to when it was recorded. The PLOTTER application will decode this file name and display the information contained within.

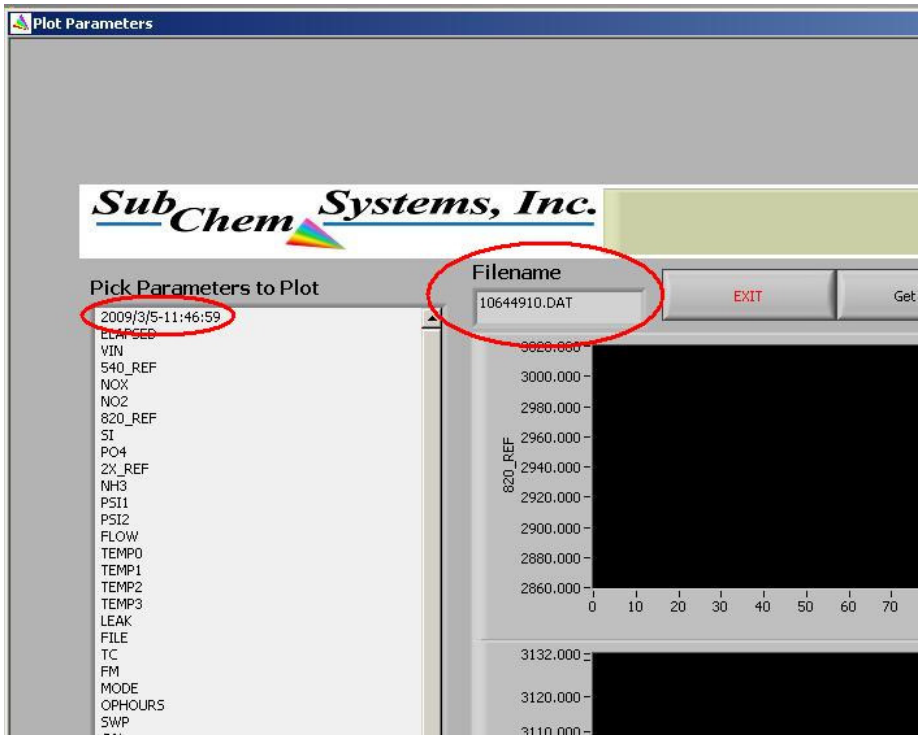


Figure 16: The PLOTTER application decodes the file name to display the start Date/Time of each file.

The parameters recorded in the DAT file will be listed in the list box labeled “Pick Parameters to Plot”. Select a parameter to plot by clicking the parameter once to highlight it. Then click the PLOT button beneath the list box to plot the values. To plot two parameters together, select both by holding the SHIFT key, and clicking on both parameters. Then click the PLOT button. A second plot with appear with the values from the second parameter. Up to 13 parameters at a time may be plotted. If three or more parameters are selected for plotting, a single plot with all of the selected parameters will be generated, with a legend to label each parameter.

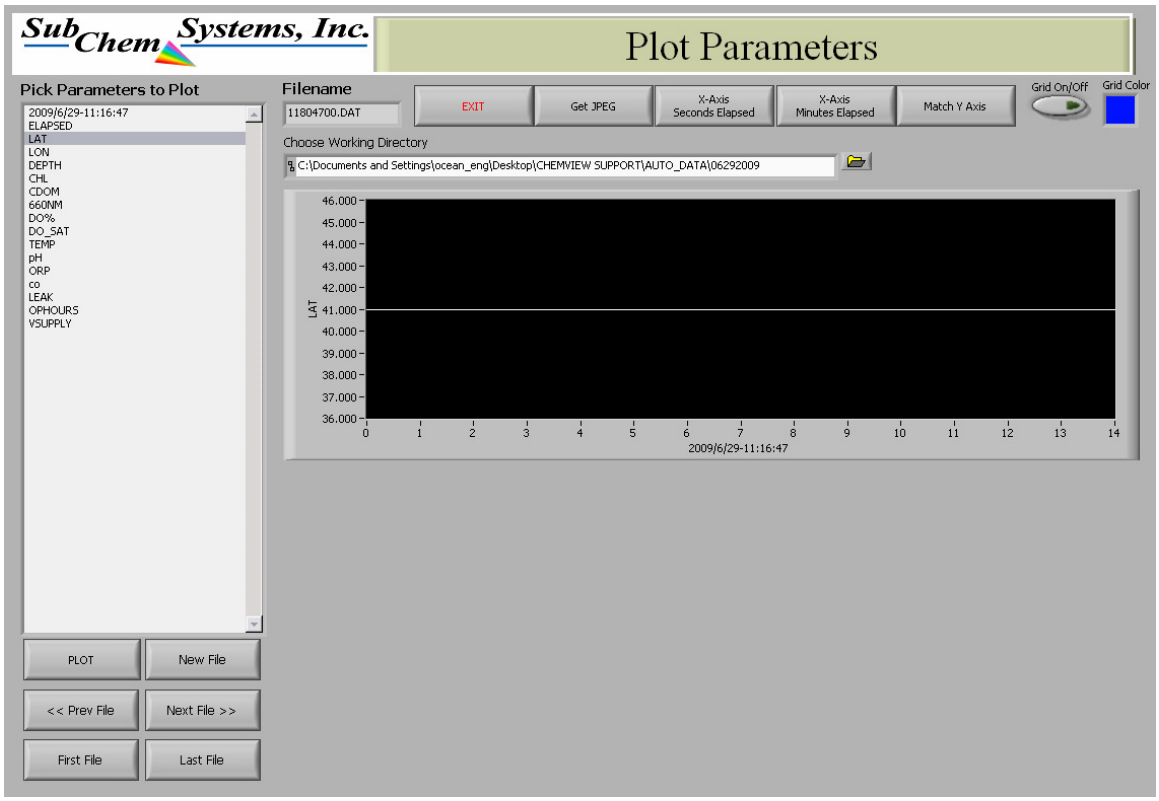


Figure 17: The PLOTTER application plotting a single parameter.

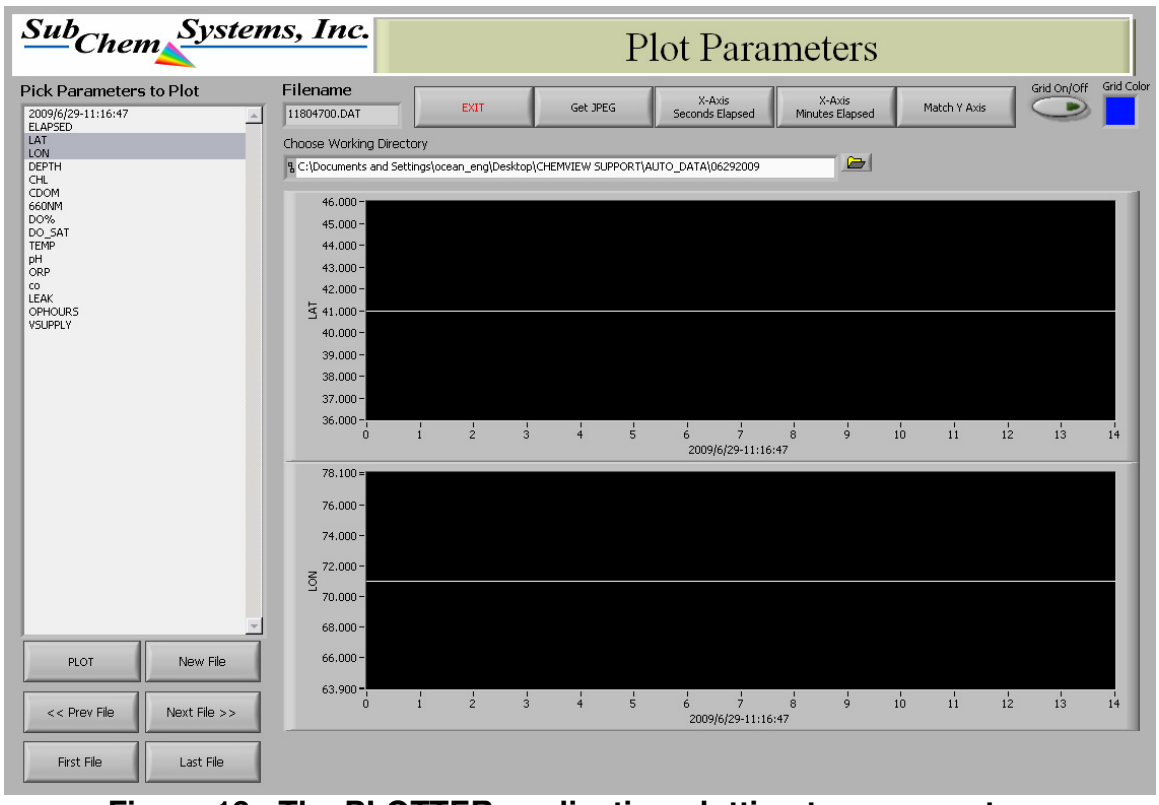


Figure 18: The PLOTTER application plotting two parameters.

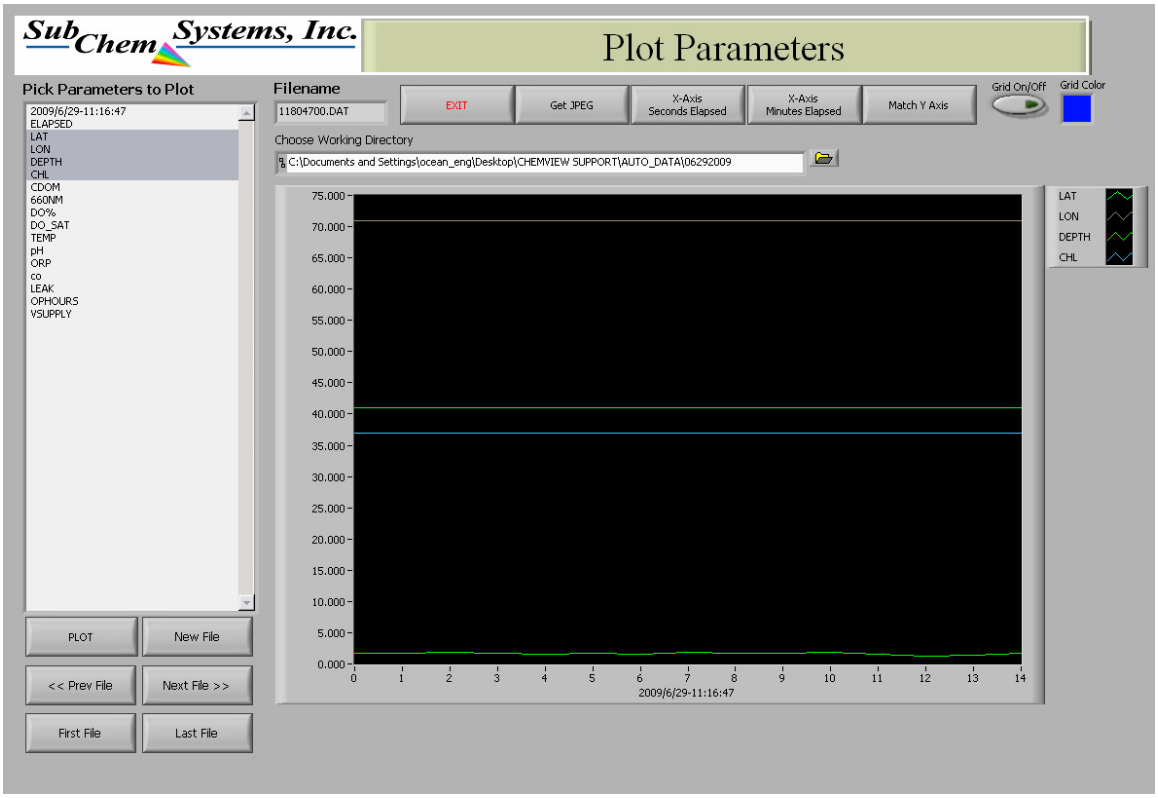


Figure 19: The PLOTTER application plotting four parameters.

Once values appear plotted, several features are now available to enhance the plots. Above the plots are several buttons:

EXIT button: This button will exit the PLOTTER application and bring the operator back to the mode selection window.

Get JPEG button: This button will store the two plots as individual JPEG files. Click on the Get JPEG button and a Save As dialog box will appear. Enter a name for the plot(s). For example, enter the file name too which the plots were derived then the parameter plotted (i.e. 10644910_PSI1.DAT). If creating JPEG images of two plots, enter the second plot name first.

X-Axis Seconds Elapsed button: This button converts the time axis to elapsed seconds since the start of the file.

X-Axis Minutes Elapsed button: This button converts the time axis to elapsed minutes since the start of the file.

Match Y Axis button: This button will match the y axis of the second plot to the first plot.

To adjust the scale on the x or y axis, double click the top and/or bottom numbers of the scale, once they are highlighted, you can edit those numbers.

Grid On/Off button: This toggle button will enable and disable a grid. Once enabled, the grid will overlay on all plots.

Grid Color: Click on the color to bring up a color palette to change the grid color.

New File button: This button is located underneath the parameter list box. Once clicked, a new DAT file can be selected.

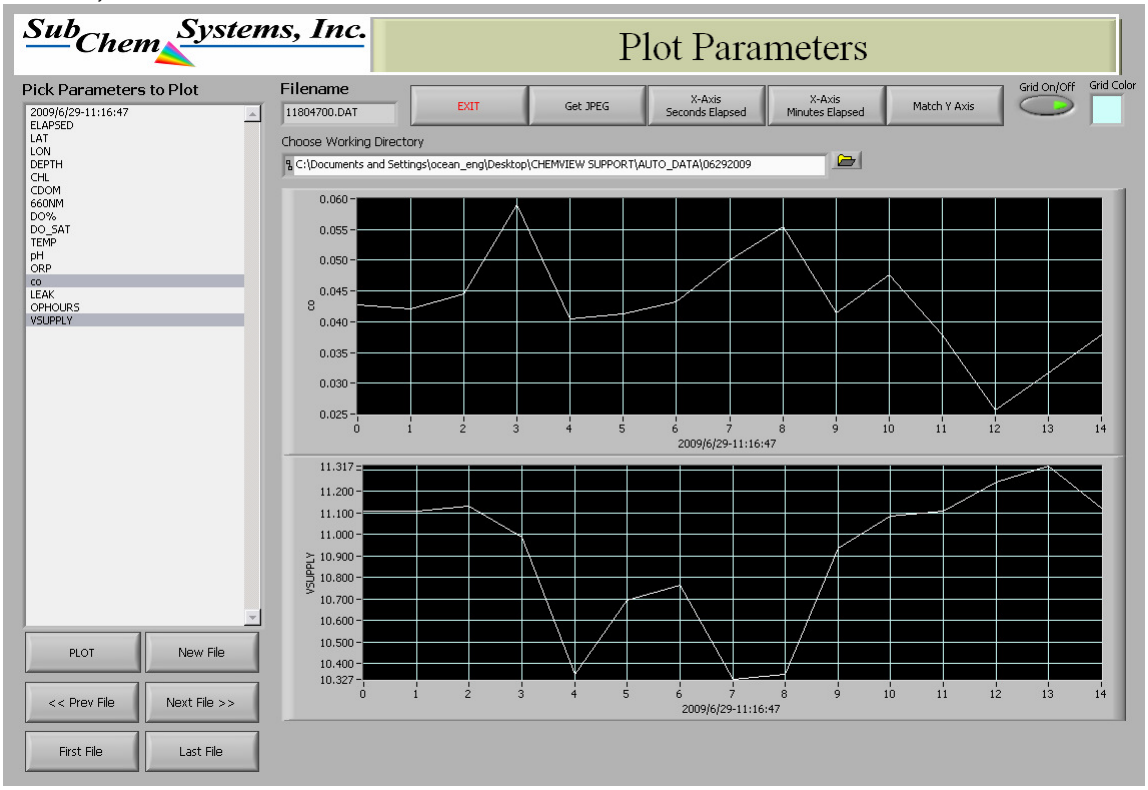


Figure 20: An example of the PLOTTER application plotting two parameters with grid overlay.

h) Charging

The CNES is equipped with one 11.1V lithium battery pack. The battery is assembled with a built in printed circuit board and poly-switch fuse for added protection. It can be charged directly from the CNES deck box. The CNES deck box has a built in low current smart lithium battery charger. The charger and battery are equipped with over charge and over discharging cut off circuits. The battery will have a maximum of 13V and a cut off voltage of 7.2V.

To charge the CNES simply connect the CNES to the deck box as outlined in section 4. Verify that the charger switch is in the ON position. Then switch the deck box to the ON position. Anytime the deck box is ON while the charger switch is ON, the CNES will be charging regardless of the SIIS magnet position.

The SIIS controller is designed to switch the power supply from the battery to the deck box if the deck box power is on.

NOTE: The CNES can run off the battery and connect to the deck box for communication only. This is a good way to check the charge of the battery using the VIN value in ChemVIEW. The battery will take approximately 6 hours to recharge after being fully depleted.

5) SOFTWARE WARRANTY

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