

DR DAS Open AQM/CEM  
Environmental Data Collection  
And Management System

**SiteView HMI**

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# **SiteView HMI Manual**

## **1.0 Overview**

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The SiteView HMI is an MS Visual Basic 6.0 Project application designed to support the following functions:

- Collection of analog, discrete, and calibration data from PLCs, data loggers, and files. These are termed *physical points*. The definitions for monitor points are in tables within the Site Manager application. Site Manager is an MS Access mdb that is linked to the system SQL Tables. Through the graphical user interface of the Site Manager program, all station, monitor, calibration and communication settings are created.
- Communication with a variety of data loggers, PLCs, I/O Devices and Servers in support of data exchange.
- Storage of collected point data in MS SQL tables. Table structures for analog and digital points, calibration and alarms are defined in the Site Manager application. The date/time field, station and monitor number are used as indexes to the data tables.
- Computation of points representing mathematical and logical processing of physical points, with storage of the resultant calculation in data tables using a structure similar to physical data. These points are termed *computed points*. Computations can include consideration of calibration results. The definition of the calculations to be performed is again contained in SQL tables linked to the Site Manager application.
- Graphical presentation of collected and or computed points in multi-point trend plots. The multi-trend display supports up to 16 points of mixed time bases (plot 1 min, 5 min and hourly values in same plot). Real-time and historical data sets can be displayed.
- Tabular and graphical display of *points*. These points are typically presented on “User Developed” displays within the SiteView HMI application. Typical presentations are one or more VB forms that show physical values and one or more VB forms that display computed points that have been created to evaluate ambient or source compliance criteria. A point consists of a value and a value status code (i.e. 134.5 B). Analog values in tables always have a companion status code stored in the field adjacent to the value field. For active points, a plot of the last 60 values can be selected. From the popup trend form of the last 60 points the user may display, as applicable, the digital states, calibrations and alarms for that specific point. This centralized point information makes it very easy and intuitive for operators to examine values causing alarms, acknowledge the alarms and review calibration and system state information that can contribute to an understanding of the cause of the value.

The main SiteView HMI form is shown below. It is a MS Multiple Document Interface form or MDI. It is on this form that all the menus and toolbars are defined.

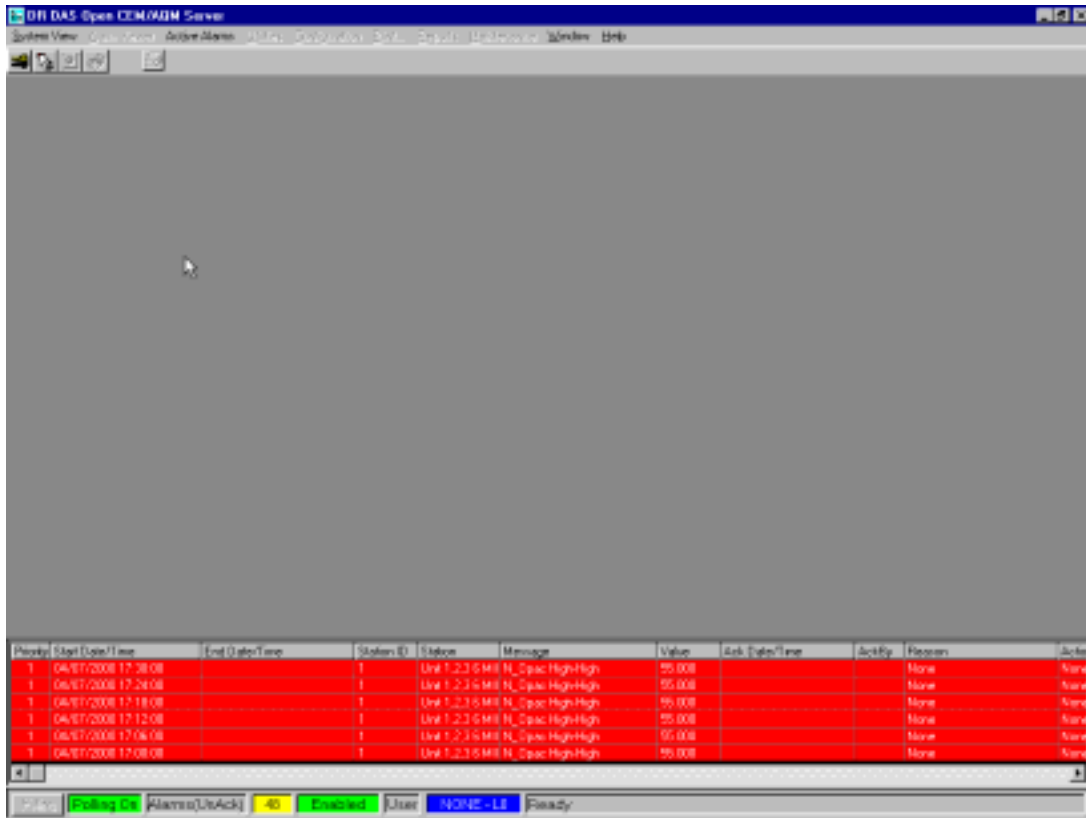


Figure 1a – MDI Form

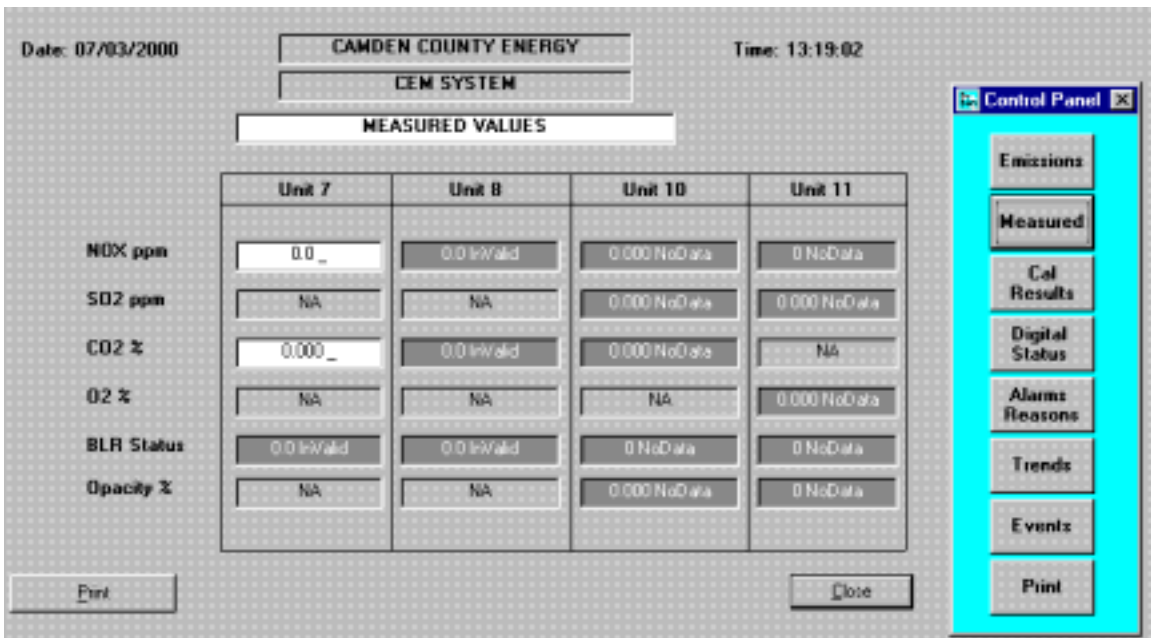


Figure 1b –Current Conditions Display with Quick Access Panel

When SiteView HMI starts, a User Login of “None” with a Security Access Level of 0 is in place. The User ID and Current Security level is shown in the blue field. Without any login the program will perform data collection and display readings to operators. No login is required to view Alarms but an “Operator” Level-1 login is required before an alarm can be acknowledged. Please refer to the discussion of alarms and security elsewhere in this document.

Polling Status is shown at the left in the bottom status bar. The green “Polling On” indicates that polling is enabled. After login at an appropriate security level the toggle button at the left of the Green Polling On will allow toggling between Polling On and Off. An Off status is displayed in red.

The status of alarms is displayed in two locations. The yellow field at the bottom of the screen indicates the number of unacknowledged alarms. If there are unacknowledged alarms the yellow field will blink and the SoundBlaster card of the PC will play an audio indication. The sound played is a .wav file called alarm.wav located in the project subdirectory. Replace this wav file with another to change the sound.

The display of the most recent 6 active alarms can be toggled on and off by the menu item Active Alarms at the top of screen. An active alarm is one for which the alarm condition continues to exist. An active alarm may have been acknowledged or not. Acknowledged, active alarms will be dimmer than unacknowledged alarms.

The green “Enabled” field indicates that alarm evaluation is enabled for all stations included in the system. If alarms are disabled for any station, this field is red and says “Disabled”. The status of alarm evaluation and polling can be viewed in detail from the Station Viewer form. See a later discussion on this topic. Two toolbar items are active upon startup. These are Login and Control Panel which are the first and second buttons from left to right in the toolbar.

The initial presentation display in SiteView is built to convey the “Whole Story”. It may show all the key parameters for an emissions monitoring system or a statewide air quality monitoring network as seen below. Stations and or parameters are color coded: white – OK, gray – invalid or missing data, red – alarm, and yellow – warning. With one glance you can determine if there are any network issue.

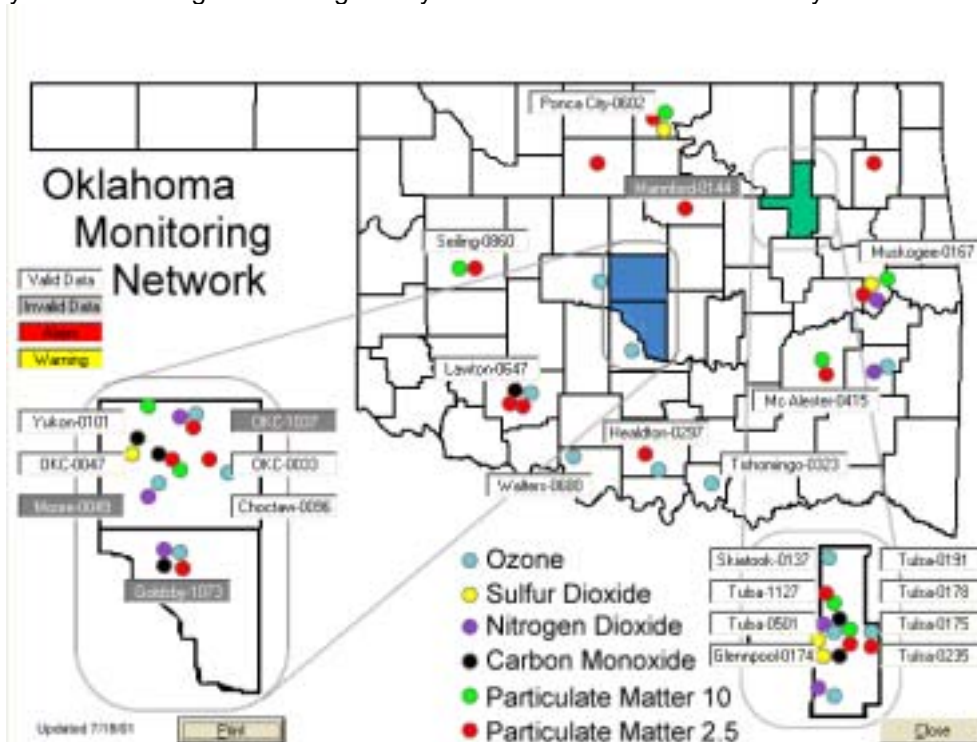


Figure 2a Network Status Display

From the display you can quickly drill down to investigate issues. Clicking on a station name in a network application presents station details and current parameter values. A parameter is shown with a value and a value status code (i.e. 134.5 B). Parameter values in tables always have a companion status code

stored in the field adjacent to the value field. The values shown on the Station form (see below) are also color-coded.

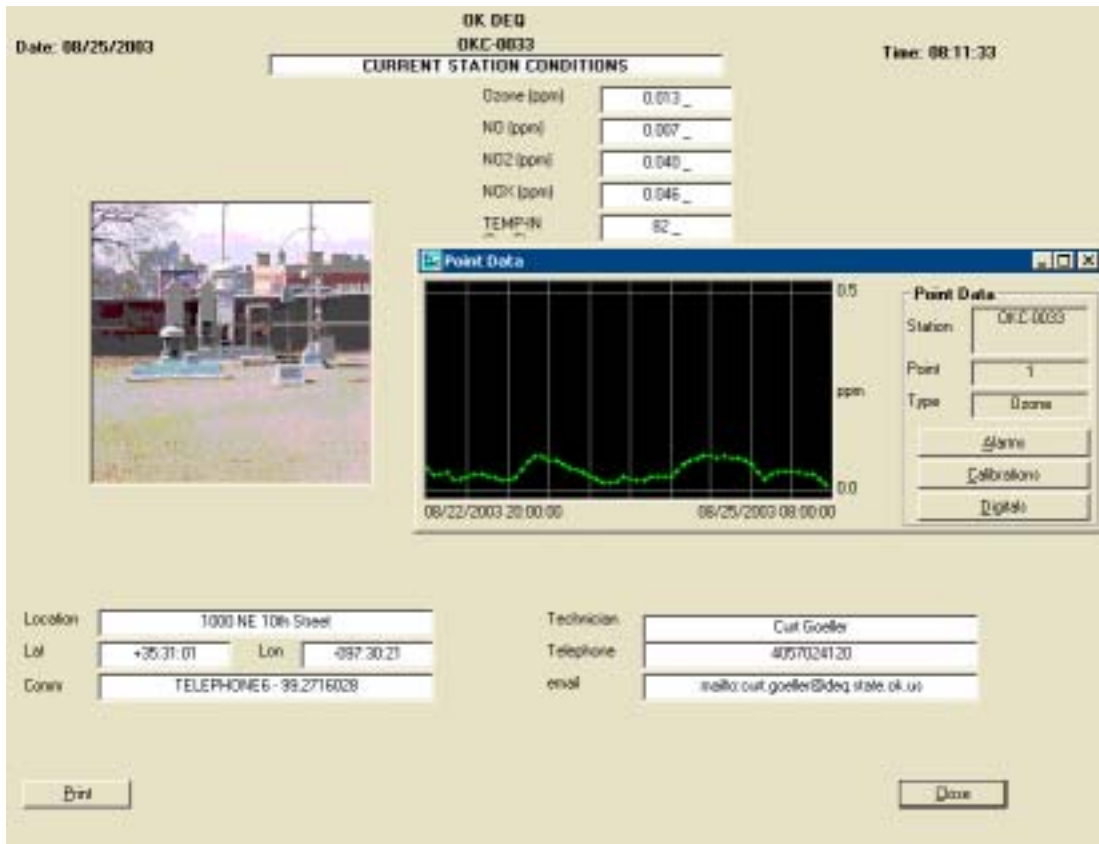


Figure 2b - Station Status Display

Clicking on a parameter value in the station form displays a pop-up trend of the last 60 values. Invalid data is shown in red.

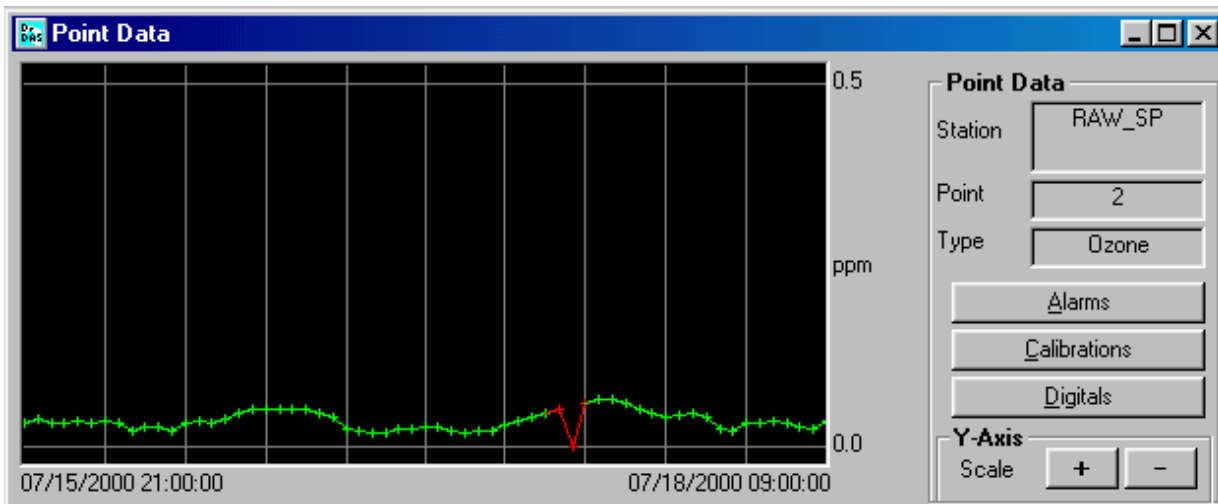


Figure 2c - Parameter Display

To login click the first toolbar button or select System View/Login from the menu.

The Login dialog box will appear.

The image shows two overlapping dialog boxes. The left dialog box is titled "LOG IN" and contains fields for "Operator Name" and "Password". Below these are buttons for "Log OUT", "Log IN", "Security", and "Ok". At the bottom, it shows "CURRENT LOG IN" information: "Operator Name" is "DRDAS" and "Access Level" is "3". The right dialog box is titled "Security Administration" and displays user details for "BCH": "OPName" is "BCH", "Access Level" is "1", "Password" is "BCH", "UserID" is "1", "Last Modified" is "7/21/99", and "Modified By" is "DRDAS". It also features a "Select User" dropdown menu and buttons for "Add Person", "Delete", and "OK".

Figure 3 - Login

Enter the operator name and password. Both are case sensitive. Then click Login. Remember to logout when you are no longer responsible for the system. Automatic logout is performed if no mouse or keyboard activity is logged in an hour. This time is adjustable in the C:\VBE\envi\Project\sysdata.mdb Access database table AppConfig's Field named LogOff. If you have logged in at security level 3 you can add or delete users and modify passwords and access levels.

## 2.0 Normal Operations

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Routinely the system will be collecting data from all data sources included for the system. When data is being collected or calculations are being performed the process is called polling. The polling is performed for each station whenever the current computer time is greater than the time the system has computed for the next poll to occur. The time of the next poll is the date/time stamp of the last data collected for a station plus the station data interval plus the polling offset established when configuring the station in the Station Manager program. In addition 30 sec is always added to the time determined for the next poll. For example a station collecting 5-minute interval data every 5 minutes with an offset of two minutes that last collected data time stamped 04/05/2000 12:05:00 PM would be polled at 04/05/2000 12:12:30 PM.

## 2.1 Station Viewer

To view the current status of each station, use the Utilities menu to access the Station Viewer.

Station Number	Station Name	Status	Polling	Alarms	Interval	Last Successful Poll	Next Poll Scheduled
1	Unit 1,2,3 & MIN	UP	OFF	DN	6	04/08/2000 19:00:00	04/08/2000 19:07:30
2	Unit 1,2,3 Backup	UP	DN	DN	60	04/08/2000 19:00:00	04/08/2000 19:07:30
3	AQ Site 1	UP	OFF	DN	5	05/04/2000 09:40:00	05/04/2000 09:46:30
4	Reritech Level 20	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
5	Reritech Level 19	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
6	Reritech Level 18	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
7	Reritech Level 17	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
8	Reritech Level 16	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
9	Reritech Level 15	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
10	Reritech Level 14	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
11	Reritech Level 13	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
12	Reritech Level 12	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
13	Reritech Level 11	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
14	Reritech Level 10	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
15	Reritech Level 09	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
16	Reritech Level 08	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
17	Reritech Level 07	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
18	Reritech Level 06	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
19	Reritech Level 05	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
20	Reritech Level 04	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
21	Reritech Level 03	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
22	Reritech Level 02	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
23	Reritech Level 01	UP	OFF	DN	15	03/31/2000 12:30:00	03/31/2000 12:46:30
24	West Site SO2	UP	OFF	DN	5	03/31/2000 12:30:00	03/31/2000 12:36:30
25	Unit 1,2,3 1 MIN	UP	OFF	DN	1	04/07/2000 17:34:00	04/07/2000 17:35:30
26	airhead	UP	OFF	DN	1440	06/24/2000 00:00:00	06/25/2000 00:01:30

Figure 4 – Station Viewer

On this screen you can see the last successful poll of data for each station and the next time for which a poll is scheduled. You can stop polling for a single station by clicking on the station number and clicking on the Polls Enabled toggle at the top of the form. You can toggle on and off alarm evaluation using the Alarms Enabled toggle. A station may be downed using the Station Up toggle.

A station that has not been polling will, upon being returned to an On polling state, attempt to recover all available data from the last poll. The retrieval of any data will update the last and next poll times. If a device is being polled directly by the SiteView HMI application the data set available for collection will be governed by the size of the data buffer. If the data recovery is done on data stored in a temporary data table (as is the case with polling ESC, Odessa, Campbell and Envidas Data Loggers) by a separate data collection program, all data found in the table will be collected.

If Alarms Enabled is checked, alarms are evaluated for all alarm conditions defined in the system for each value collected or calculated. If polling is being turned on after being off for a long while, Alarm Evaluation can be temporarily turned off.

A down station status indicates that a station's data is not required. This would be the case if the station were decommissioned or were out of service for a season or the period of a unit overhaul. A down station may or may not be actively polled. In some instances the station may be down but polling of the station is still desired to monitor station conditions (security, AC, calibrations if being run etc).

Within the SiteView HMI program of the DR DAS Open CEM/AQM system, calculations that depend on data from another station will not be performed beyond the date time of the current data collected from the stations upon which the calculated station is dependent. Thus, if you cease polling a station, all stations dependent on this station's data will also not be polled. This is not always desirable. By placing the independent station in a down status, the dependent station(s) will still poll, i.e., update their calculations. The values created in the dependent station will follow these rules.

If the independent station is down and not being polled, the independent station will set its calculated value to 0 and D status. If the station is being polled the dependent value will be the independent value with the status changed to D.

The station status of down must only be set for physical stations. These stations, if polled, will have data recorded normally. The data will not have a D status assigned. In the system philosophy, the D status is assigned only in an "Adjusted" station that has been established as the edited data companion station of a physical station. Since an adjusted station is by definition dependent on one and only one physical station the values in it will be the same as the physical station with a status of D if the physical station is being polled. If not being polled the values will all be zero with a status of D. In all cases other calculated stations which are dependent on an adjusted station, will be allowed to calculate to current time when physical stations are down.

A single calculated station may be re-polled starting at a user-defined date and time up to the current time. Select the station by clicking on the Station ID, check Specify Time and enter a date and time in the Start Time field. The format must be MM/DD/YYYY HH:MM:SS XM. Click Poll This Station when the entries have been made.

More than one station may be re-polled. Check Specify Time and enter a date and time in the Start Time field. The format must be MM/DD/YYYY HH:MM:SS XM. Click Poll Multiple Stations and select the station to be re-polled from the display shown below:

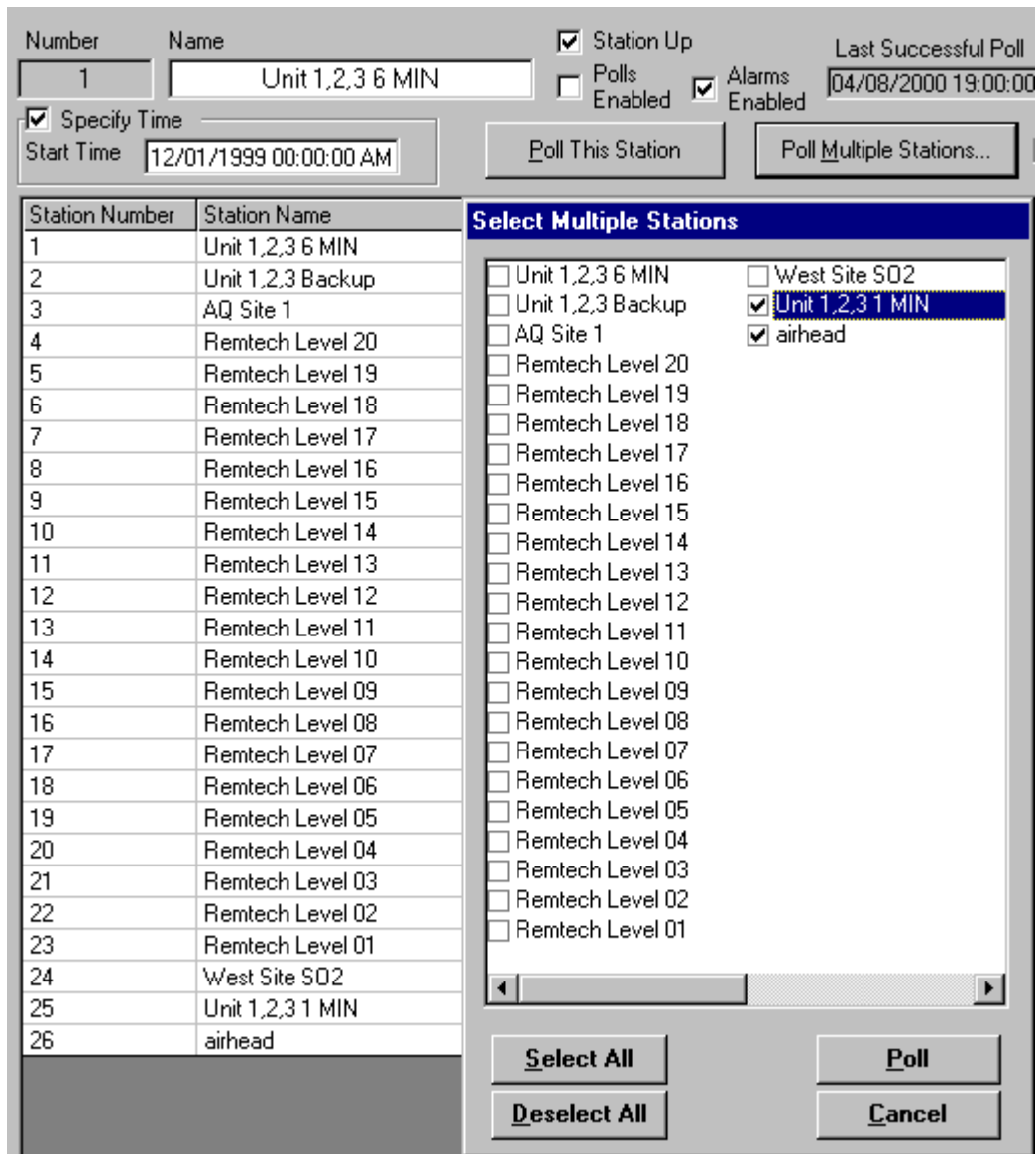


Figure 5 – Poll Multiple Calculated Stations

If the most recent data that is scheduled to be collected is not obtained the poll is automatically rescheduled for several minutes later. Other stations that are scheduled to be polled proceed as normal. If the station is rescheduled more than 6 times, a Failure to Collect Data event is logged and the event is displayed in a PopUp form called Event Viewer.

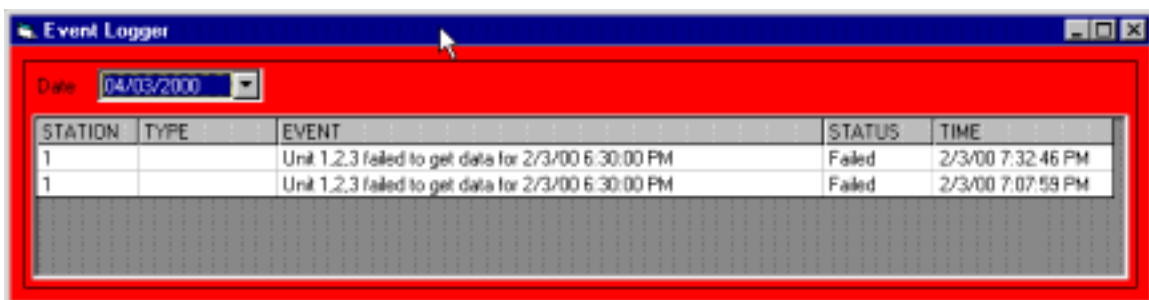


Figure 6 – Event Viewer

The Event Logger function is accessed from the Utilities menu. When the Event Logger is opened it will display events from the current day. A combo box on the Event Logger form allows selection of logs from previous days.

Several system events log activity to the Event Logger. The primary events logged are repeated failures to collect data. During program startup and operation error messages are also logged to the event file. After the program starts the Event Viewer window will open showing the nature of any problem encountered.

Error in accessing data from the database are logged to the event window. If SiteView is connected to the Enview database over a network connection and the server connection was broken "Failed ODBC" connection messages would appear. If the connection is restored SiteView will recover automatically.

The daily event files are stored in C:\VBENVIEW\PROJECT\EVENTDATA\.

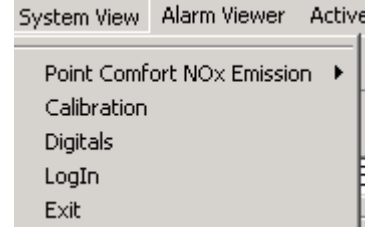
The path to these files is user-configurable in the AppConfig table of the Sysdata.mdb database located in C:\VBENVIEW\PROJECT\. The field name for this path is EVENTDATAPATH.

If the application is running in Client Mode, the user can specify that the path to EVENTDATAPATH is any drive that exists on, or is mapped to, the client PC. For example, if the client application needs to show the events from the NT Server the server's C: drive should be mapped onto the client PC as drive S: and S: entered in the SERVERPATH field of the AppConfig table in the sysdata.mdb database.

## 2.2 System View Menu

Under the menu item System View are items that open forms to display calibrations and digital points for physical stations. System Login and Current Conditions, as well as the program Exit, can be accessed here.

Examples are shown below:



### 2.2.1 Viewing Calibrations

Enview 2000 - [Last Calibration]

System View Alarm Viewer Active

Point Comfort NOx Emission Calibration  
Digitals  
LogIn  
Exit

8C HYDRO - BURBANK THERMAL GENERATING PLANT  
CONTINUOUS EMISSION MONITORING SYSTEM  
CALIBRATION SUMMARY SCREEN

Date: 05/27/1999 Station: 02 Time: 11:00:37

Station	Monitor	Units	Date	Start	End	Reference	Result	Diff	SP	Flag	Type
Unit 2 - 5 min raw	NOx	ppm	05/27/1999	07:30:00	07:32:00	0.00	0.10	0.10	0.70		
			05/27/1999	07:32:00	07:35:00	206.00	198.10	6.90	6.90		
	CO	ppm	05/27/1999	07:30:00	07:32:00	0.00	3.00	3.00	3.00		
			05/27/1999	07:32:00	07:35:00	798.00	809.00	14.00	14.00		
			05/27/1999	07:30:00	07:32:00	0.00	-0.07	-0.07	-0.70		
			05/27/1999	07:35:00	07:37:00	0.04	0.05	0.05	0.50		
Unit 3 - 5 min raw	NOx	ppm	05/27/1999	00:00:00	00:00:00	0.00	0.00	0.00	0.00		
			05/27/1999	00:00:00	00:00:00	0.00	0.00	0.00	0.00		
	CO	ppm	05/27/1999	00:00:00	00:00:00	0.00	0.00	0.00	0.00		
Unit 4 - 5 min raw	NOx	ppm	05/27/1999	07:30:00	07:32:00	0.00	0.00	0.00	0.00		
			05/27/1999	07:32:00	07:35:00	207.00	200.30	6.70	6.70		
	CO	ppm	05/27/1999	07:30:00	07:32:00	0.00	1.00	1.00	1.00		
			05/27/1999	07:32:00	07:35:00	804.00	798.00	6.00	6.00		
			05/27/1999	07:30:00	07:32:00	0.00	-0.02	-0.02	-0.20		
			05/27/1999	07:35:00	07:37:00	7.00	0.01	0.06	0.00		
Unit 5 - 5 min raw	NOx	ppm	05/27/1999	07:30:00	07:32:00	0.00	0.00	0.00	0.00		
			05/27/1999	07:32:00	07:35:00	200.00	202.10	2.10	2.10		
	CO	ppm	05/27/1999	09:03:00	09:05:00	0.00	0.00	0.00	0.00		
			05/27/1999	09:05:00	09:08:00	200.00	202.50	2.50	2.50		
			05/27/1999	07:30:00	07:32:00	0.00	2.00	2.00	2.00		
			05/27/1999	07:32:00	07:35:00	799.00	801.00	2.00	2.00		
CO	ppm	05/27/1999	09:02:00	09:05:00	0.00	-1.00	-1.00	-1.00			
		05/27/1999	09:05:00	09:08:00	799.00	798.00	-1.00	-1.00			
		05/27/1999	07:30:00	07:32:00	0.00	-0.21	-0.21	-2.10			
		05/27/1999	07:35:00	07:37:00	0.00	7.07	0.19	-1.00			
Unit 6 - 5 min raw	NOx	ppm	05/27/1999	09:03:00	09:05:00	0.00	-0.14	-0.14	-1.40		
			05/27/1999	09:08:00	09:10:00	0.00	-0.02	-0.04	-0.40		
	CO	ppm	05/27/1999	07:30:00	07:32:00	0.00	-0.90	-0.90	-0.90		

Buttons: Add, Done

Footer: Polling: [Polling On] UnAcknowledged Alarms: 1 Security Level: 0 Ready

Figure 7 - Calibration Display for Current Day with Station and Monitor Filters

Users can filter calibrations to see calibrations from specified stations or monitors. In some cases the calibration results have to be edited or inserted manually. Double-click on any record to edit an existing calibration event. Click on the Add Calibration button to add new calibration information.

## 2.2.2 Viewing Digitals

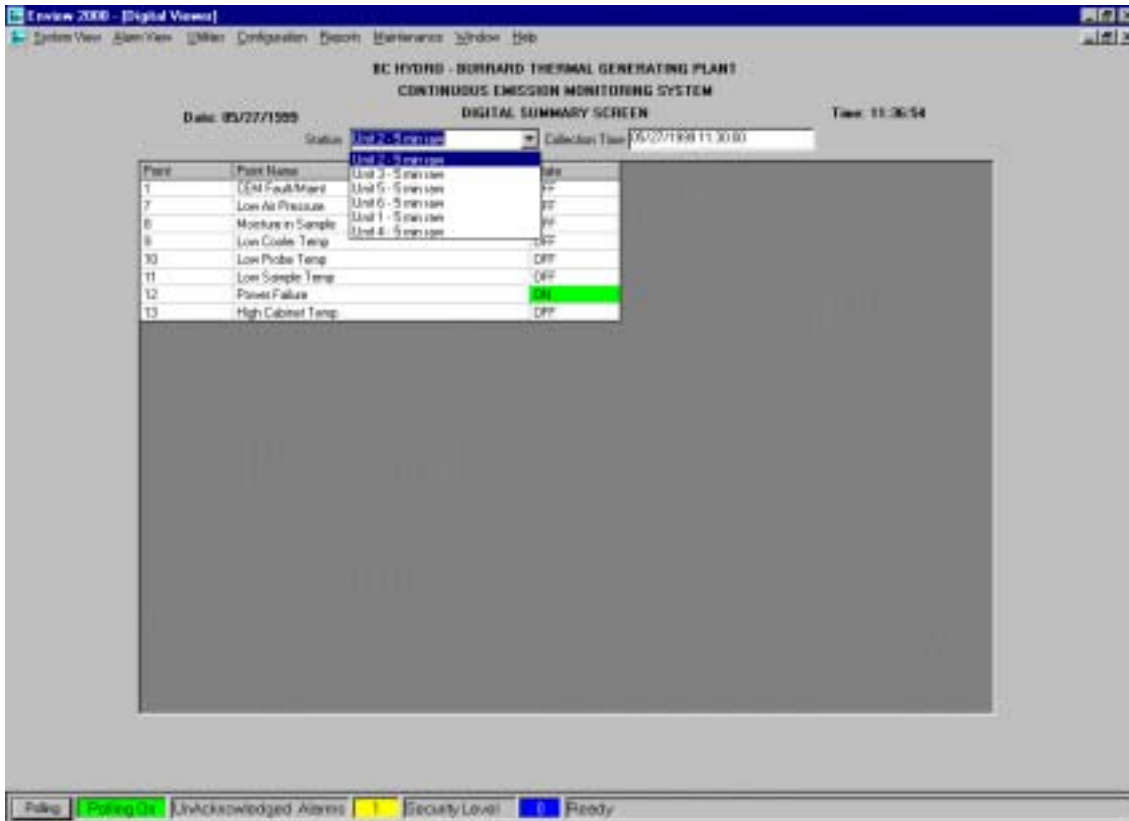


Figure 8 - Digital States Indicate CEM System Conditions Affecting Data Values

Filters can be invoked to view digital from any or all stations. Only physical stations have digital points.

The items under System View vary from one installation to the next to address project-specific requirements. If Enview 2000 is included in the system, a menu item to start that program is included. Systems using CyberNode Thin Web servers for data acquisition include menu items to launch IE4 and connect to the web sites hosted on the CyberNodes.

## 2.2.3 Viewing Values

Also under System View you can open one or more Current Conditions forms to examine physical and calculated station points corresponding to the measurements collected.

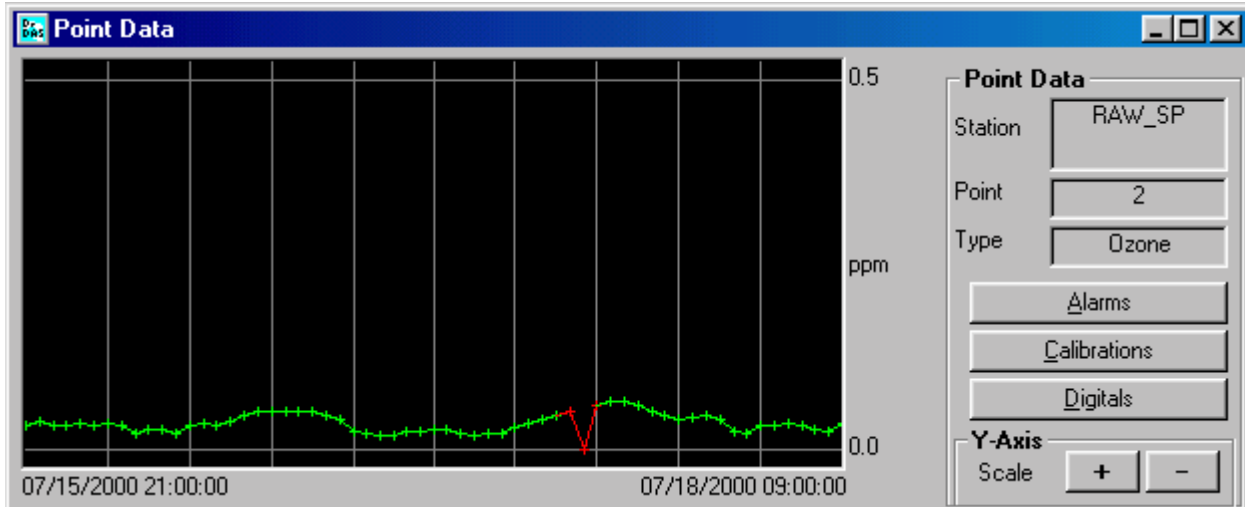


Figure 9 – Point Data Form

On forms such as these you can click on a point and open a popup form that shows the trend of the point over the last 60 intervals. For a physical point, with an interval of 5 minutes, the graph covers 5 hours. If you put the mouse pointer on an individual point on the graph and click, the value and status are displayed. The value and details such as Station, Point No. and Type(Monitor Name) are automatically determined when a point is assigned to the control. Buttons on the dialog provide ready access to calibrations, digital status, and alarms for that point. If the point is not from a physical station calibration and digital buttons are omitted.

### 2.3 Viewing Alarms

Alarms may be view from the Alarm item on the main menu, from the Menu Bar Alarm icon and from the unacknowledged Alarms field at the bottom of the main MDI form. However, it is most convenient to review an alarm by using the Point Data form seen above. If, for example, you click on Alarms the following form will appear showing the systems alarms, filtered for that point alone. The filter may be redefined once the form is displayed.



## 2.4 Multi-Parameter Plots

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Data within the system may also be displayed in multi-parameter graphs. These graphs may show real-time or historical data.

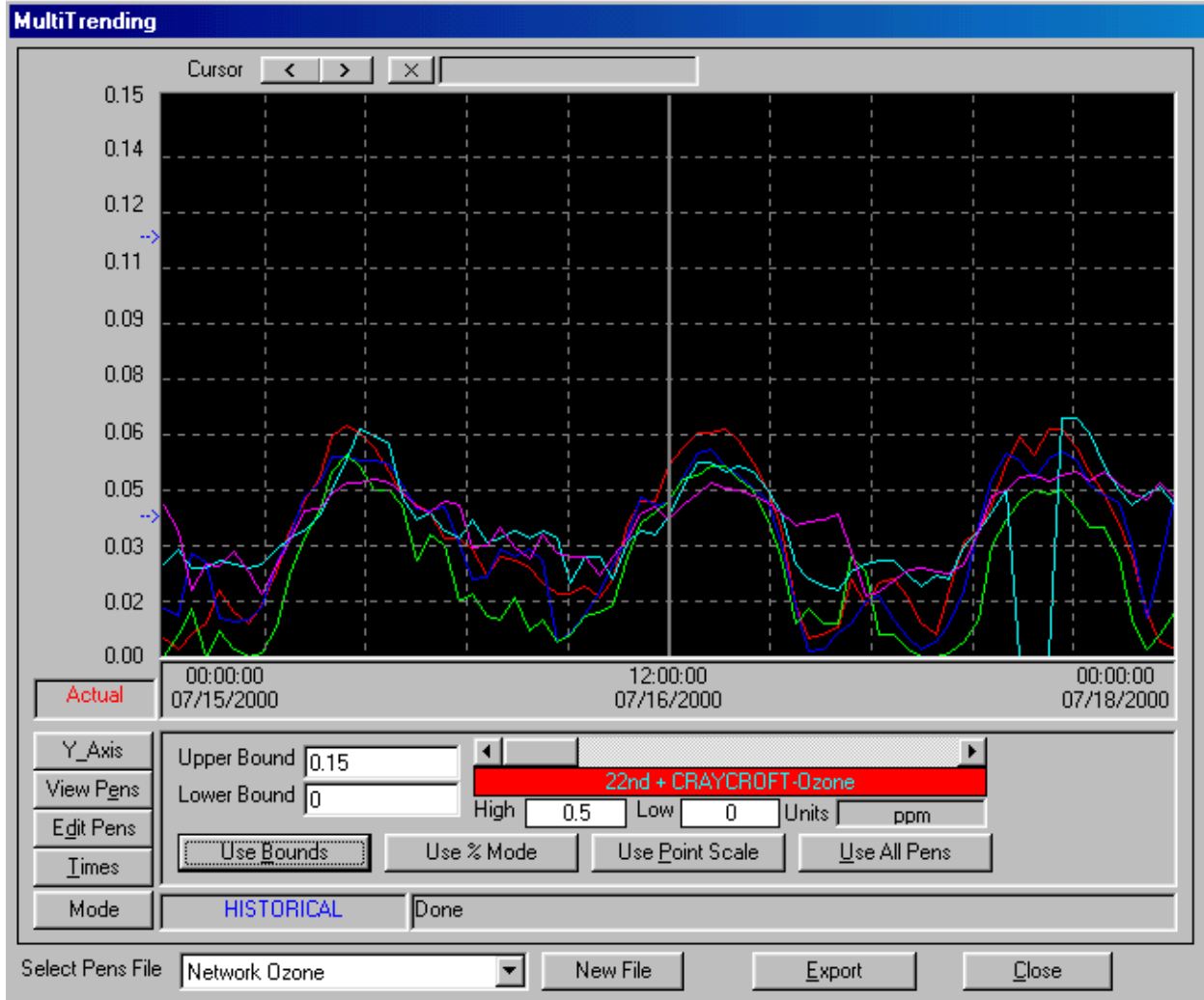


Figure 11 – Multi-point Trends

The Mode button selects Real Time or Historical presentations. The Time button sets the time period displayed on the x-axis. The y-axis button allows control of the y-axis. It may be set to fixed limits or set to a % of full-scale presentation. The graphs that are displayed are established as pens files. Each file may have up to 16 pens created from any analog point in the system. At the bottom of the form you can select an existing pens file to view or edit. You may also add a new pens file.

## 2.5 Enter New Calibration Reference Values

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In most systems calibrations are performed automatically by the system controllers or the analyzers themselves. The calibration events are recorded locally and the calibration records later retrieved. Periodically the reference values of the calibrations must be changed. This may be done with the system online. Under the Configuration Menu/Calibration Values, the following form may be opened. On it are

displayed the current settings. A filter by station option is present. When a single record is selected a popup form is opened. In this form new calibration reference values may be entered.

**CAMDEN COUNTY ENERGY  
CONTINUOUS EMISSION MONITORING SYSTEM**

**EXPECTED CALIBRATION VALUES**

Date: 07/03/2000      Station: ALL

Station	Monitor	Units	Zero	Span1	Span2	Span3	Span4	Span5
Unit 1,2,3 6 MIN	N_Opac	%	0	50	0	0	0	0
Unit 1,2,3 6 MIN	S_Opac	%	0	50	0	0	0	0
Unit 1,2,3 Backup	N_Opac	%	0	50	0	0	0	0
Unit 1,2,3 Backup	S_Opac	%	0	50	0	0	0	0

**Modify Calibration Parameters**

Station: Unit 1,2,3 6 MIN

Monitor: N\_Opac

Units: %

Zero: 0      Span1: 50      Span2: 0

Span3: 0      Span4: 0      Span5: 0

Status: Save      Close

Figure 12 – Enter Calibration Bottle Values

### 3.0 Security

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The DR DAS Open CEM/AQM system encompasses three applications: SiteView HMI, Site Manager and Reporter. The access level of the Operator logged into the application controls access to certain application functions. SiteView HMI provides primary access control.

There are four levels of access supported within the DR DAS Open CEM/AQM System. Functions such as opening or closing a particular form or changing an expected calibration value are assigned an access level. If the operator who is logged in has that access level or higher associated with the login the function may be accessed.

When SiteView HMI starts the default operator is NONE. The NONE operator has an access level of 0. When the access level is 0 most of the menu items are dimmed and inaccessible. Similarly all but the Login and Control Panel buttons are dimmed and inaccessible on the Tool Bar.

The menu items that are active are Active Alarms and System View under which only the Log-In item is active. The Window menu item is active to allow the default displays to be tiled. Help is available under the Help menu item. The Login button on the tool bar activates the login window shown in the figure below.

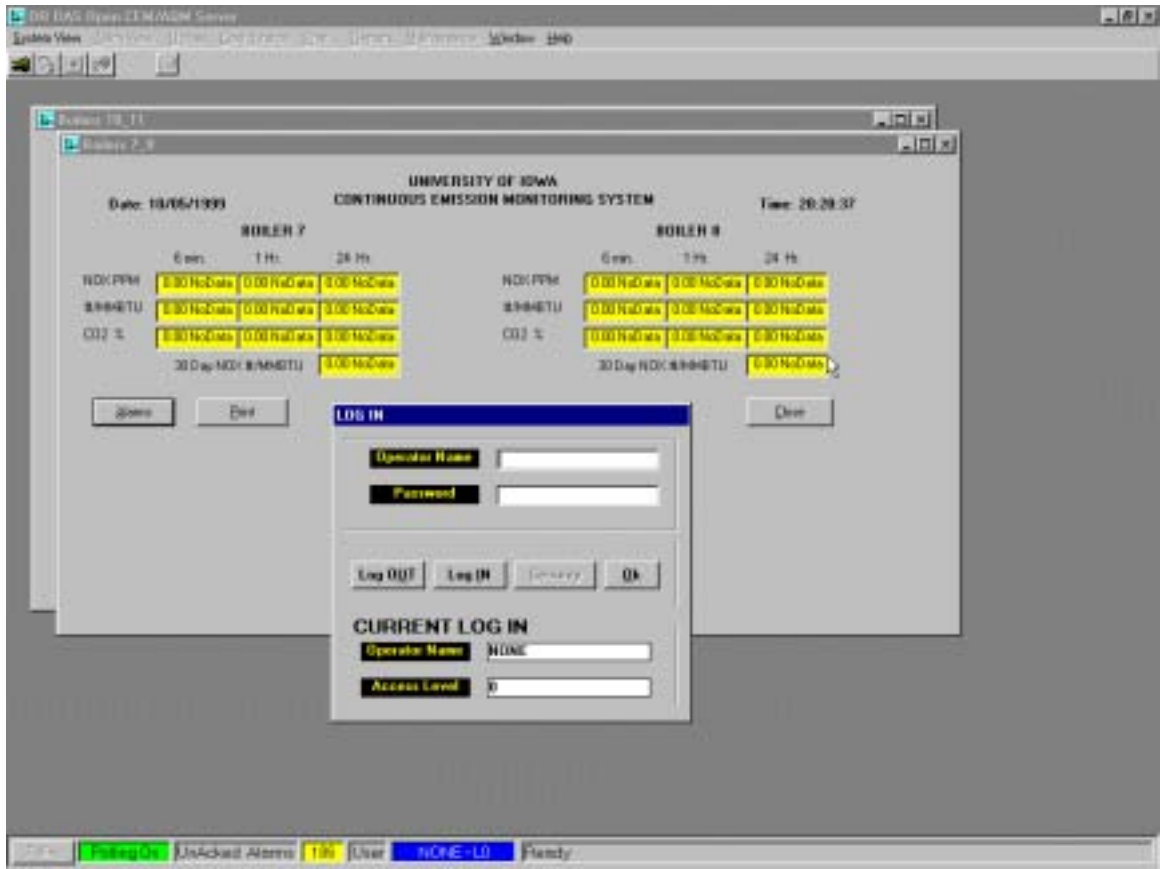


Figure 13 – Login

By design it is not necessary to log into the system to be able to view system-measured values and computed values. The default display forms of the system load automatically upon start. They may be resized and tiled but they may not be closed unless an operator has logged on with an Access Level 1 or higher. If an attempt to perform a function that is not authorized, an advisory message is displayed.

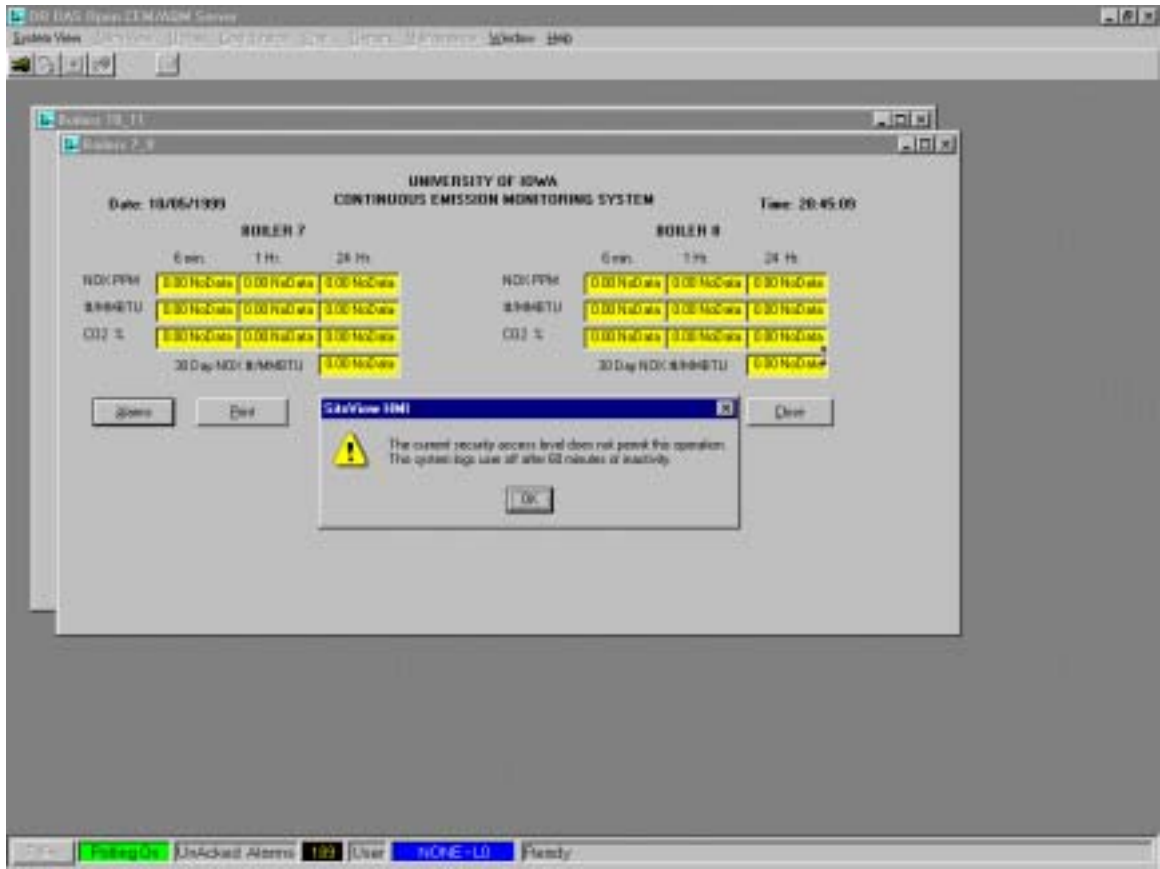


Figure 14 – Inadequate Access Level Message

In the figure above the operator attempted to close a default display. Permission was denied.

At Level 0 operators can fully utilize the default displays to view the system values. Operators can review data histories by clicking on any point. The underlying display window shows the last 60- values for the point selected. In addition buttons exist that allow viewing of current digital point states, calibration results and alarms for the selected point. As usually configured a level 1 Operator can acknowledge alarms. This requirement can easily be modified. However, system administrators should consider carefully before eliminating the requirement to log in before acknowledging alarms. Since all alarm acknowledgements include the operator name as part of the record all operators would be listed as NONE if the Acknowledge security configuration were reduced to 0.

If an Operator with Level 1 access or better logs in the full Menu and Tool Bar will be enabled. Certain features of the System require higher than Level 1 Access. These are:

Function	Access Level
Turning Polling On/Off	2
Close the Application	2
Comm Monitor Menu Items	2
Configuration Menu Items	3
Maintenance Menu Items	2
Change Calibration Reference Values	2
Create and Edit Operators	3

An operator logged in with Level 3 access may modify the existing operator names, passwords and access level authority. From the login screen click on Security and the Security Administration window will appear as shown below.

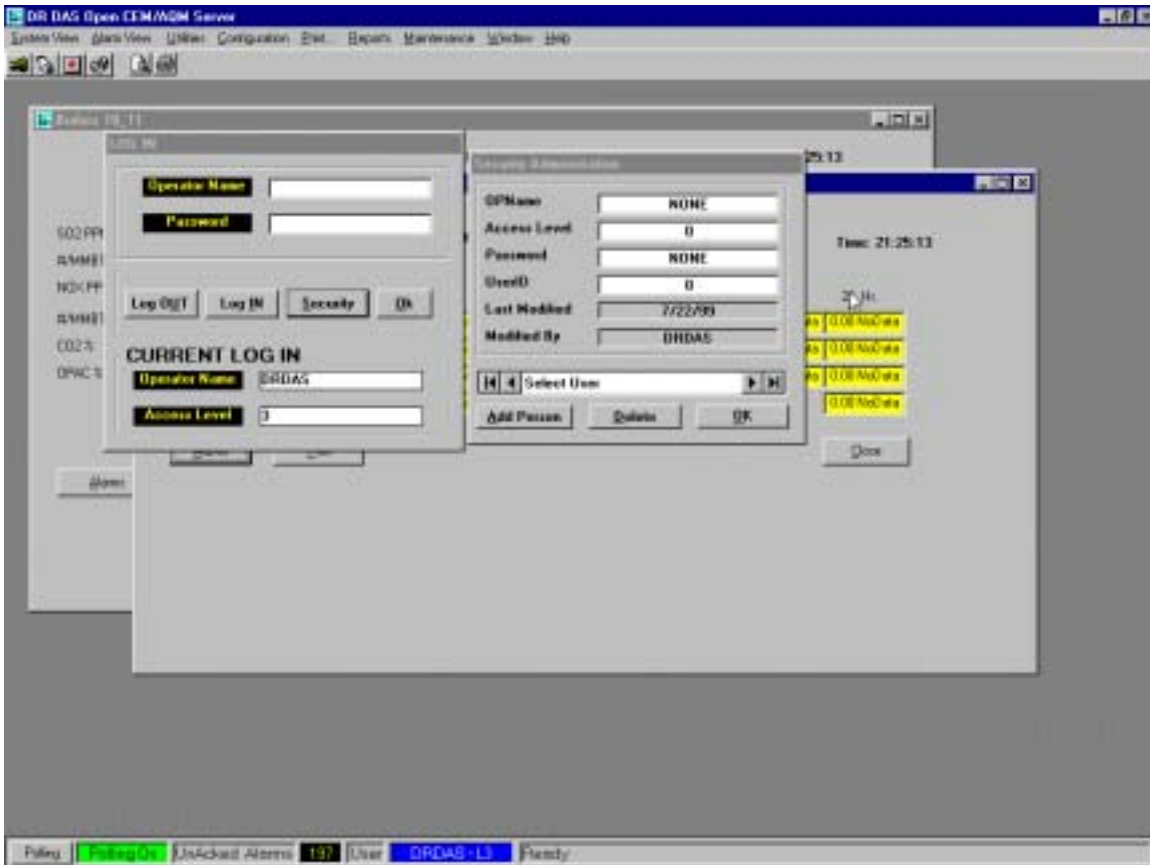


Figure 15 – Add User

