



# *Anywhere to Everywhere* Xconnect

Sutron Master Station Software



4/8/2014



XConnect is a collection of executables designed to provide a complete solution for data collection, data handling, data viewing and data storage.

XConnect applications are automation servers and share data using COM/DCOM as well as supporting DDE and OPC for compatibility with SCADA HMIs and Microsoft Applications.





- XConnect applications can be configured to:
  - Retrieve data from Sutron RTUs (remote terminal units).
  - Process satellite data from Sutron and other manufacturers platforms.
  - Scale or apply an equation to incoming/decoded data.
  - Store data to a database(s).
  - Display data in tabular and graphical formats.
  - Perform higher order calculations.
  - Evaluate alarms and send notifications.
  - Export data to various ASCII format files.



# Overview



- User-friendly Windows applications
- Complete set of help files installed.

The screenshot displays the XConnect software interface on a Windows desktop. The main window, 'XC Desktop', shows a tree view of 'Stations' on the left and a table of station details on the right. The table lists station names and types, such as GS1 through GS28 and GS3, all of type 9210. A status bar at the bottom indicates 'Total Stations: 79'. Overlaid on this is the 'XC DataView' window, which shows a data retrieval window for 'HyderabadAirport Battery' with a date range from 2/1/2003 to 3/1/2003. Below the retrieval window is a line graph showing data points over time, with a legend for 'HyderabadAirport Battery'. To the right, the 'XC Reports' window is open, displaying a grid of report thumbnails and a 'Report Properties' dialog box. The dialog box shows report details such as Title, Subject, Author, Category, Keywords, File Name, Created, Saved, and Accessed dates, along with various settings like 'Enabled', 'Time Range Required', 'Filter File Required', 'Station Selection Required', and 'Sensor Selection Required'.





- Supports direct connect, internal Sutron modem, external modems, GPRS/GSM/CDMA modems, LOS radio and GOES stations.
- For direct, IP, modems and radios, two-way communications between base station and field sites allow for additional control and configuration capabilities.
- Full Sutron Standard Protocol (SSP) supported for two-way communications.





- Communicates with Sutron DRS Receiver to receive GOES messages in real-time.
- Downloads GOES messages from LRGS (i.e. Wallops Island) using DDS Protocol.
- Decodes messages from Sutron and non-Sutron transmitters.





- Full equation processing to convert to engineering units.
- Full table lookup processing for advanced conversions (stage to discharge).
- Links to other programs via COM/DDE.
- Multi-sensor/multi-station calculator.
- Post-processing calculations.





- XConnect data storage options:
  - ODBC with no current restrictions to add other databases.
    - MS Access, MS SQL Server, Oracle, MySQL, PostGres, FoxPro....
  - PcBase2 fixed time interval data files.
  - ASCII Log day files
  - Excel day files
  - XML day files
- Store to one or more storage options simultaneously



# System Features: Data access



- Supports real-time communication displays.
- Supports archive data lookup.
- Supports networks – DCOM/NetDDE.
- Supports data exporting.
- Supports standard and custom reports using Crystal Reports.



# XConnect Product Options



- 9300-0000-1 XConnect Standard
- 9300-0000-2 XConnect Standard w/Database
- 9300-0001-1 XConnect Satellite
- 9300-0001-2 XConnect Satellite w/Database
- 9300-0002-1 XConnect Utils
- 9300-0000-2 XConnect Lite
- 9300-0000-4 XConnect Web Output
- 9300-0003-2 XConnect Annual Support





- Handles conventional communications with:
  - 8200, 8210
  - 7310, 8310
  - 9210, Xpert
  - XLinks.
- Data Storage
  - PcBase2 Binary files
  - ASCII Log files only
  - Excel Files
- Applications included:
  - XC Setup
  - XC Desktop
  - XC Rtu
  - XC DataView



# XConnect Standard w/Database



- Same as XConnect Standard
- Additional Data Storage options:
  - Relational Databases
    - MS Access
    - MS SQL Server
    - Oracle
    - MySQL
    - PostGres
    - FoxPro
- Additional Applications included:
  - XC Reports
  - XC Reports Scheduler
  - XC Calc
  - XC PostProc





- Receives and process GOES messages from Sutron DSR Receiver or downloaded from LRGS (i.e. Wallops Island)
- Data Storage
  - PcBase2 Binary files
  - ASCII Log files only
  - Excel Files
- Applications included:
  - XC Setup
  - XC Desktop
  - XC Mux
  - XC Decode
  - XC DataView





- Receive GOES Messages from:
  - Sutron DSR Receiver
  - LRGS using DDS Protocol
- Data Storage
  - PcBase2 Binary files
  - ASCII Log files only
  - Excel Files
- Applications included:
  - XC Setup
  - XC Desktop
  - XC Mux
  - XC Decode
  - XC DDS
  - XC DataView





- Same as XConnect Satellite
- Additional Data Storage options:
  - Relational Databases
    - MS Access
    - MS SQL Server
    - Oracle
    - MySQL
    - PostGres
    - FoxPro
- Additional Applications included:
  - XC Reports
  - XC Reports Scheduler
  - XC Calc
  - XC PostProc





- Handles all conventional communications with 7310, 8210, 8310, 9210, and XPert.
- Stores to ASCII Log files only.
- Applications included:
  - XC Setup
  - XC Desktop
  - XC Rtu





- **XC Desktop** - Provides an integrated graphical user interface for system configuration. Communicates with XC Setup.
- **XC Setup** – Stores/provides system configuration information to XConnect applications and/or clients.
- **XC DataView** – Standard data viewing application. Also provides basic plotting, editing, and exporting
- **XC RTDisplay** – Displays real-time data user-selected data values in a multi-tabbed grid format.





- **XC Rtu** - Communicates with field stations when using direct, modems or radios to retrieve, process and store data





- **XC Mux** – Communicates with a Sutron receive site to receive satellite data and store messages into raw files.
- **XC Decode** – Processes satellite data in raw files into sensor values and stores data.
- **XC DDS** – Provides backup for satellite messages from Wallops Island LRGS database.





- **XC Reports** – Crystal Report viewer used with database storage option. New reports can be created and added to Report library.
- **XC Report Scheduler** – Automatically generates reports from XC Reports on a user-defined schedule.
- **XC PostProc** – Service module that compute statistics from the sensor data. Post processing such as daily, monthly or yearly minimums and maximums.
- **XC Calc** – Higher order calculator to handle multi-sensor or multi-station calculations.

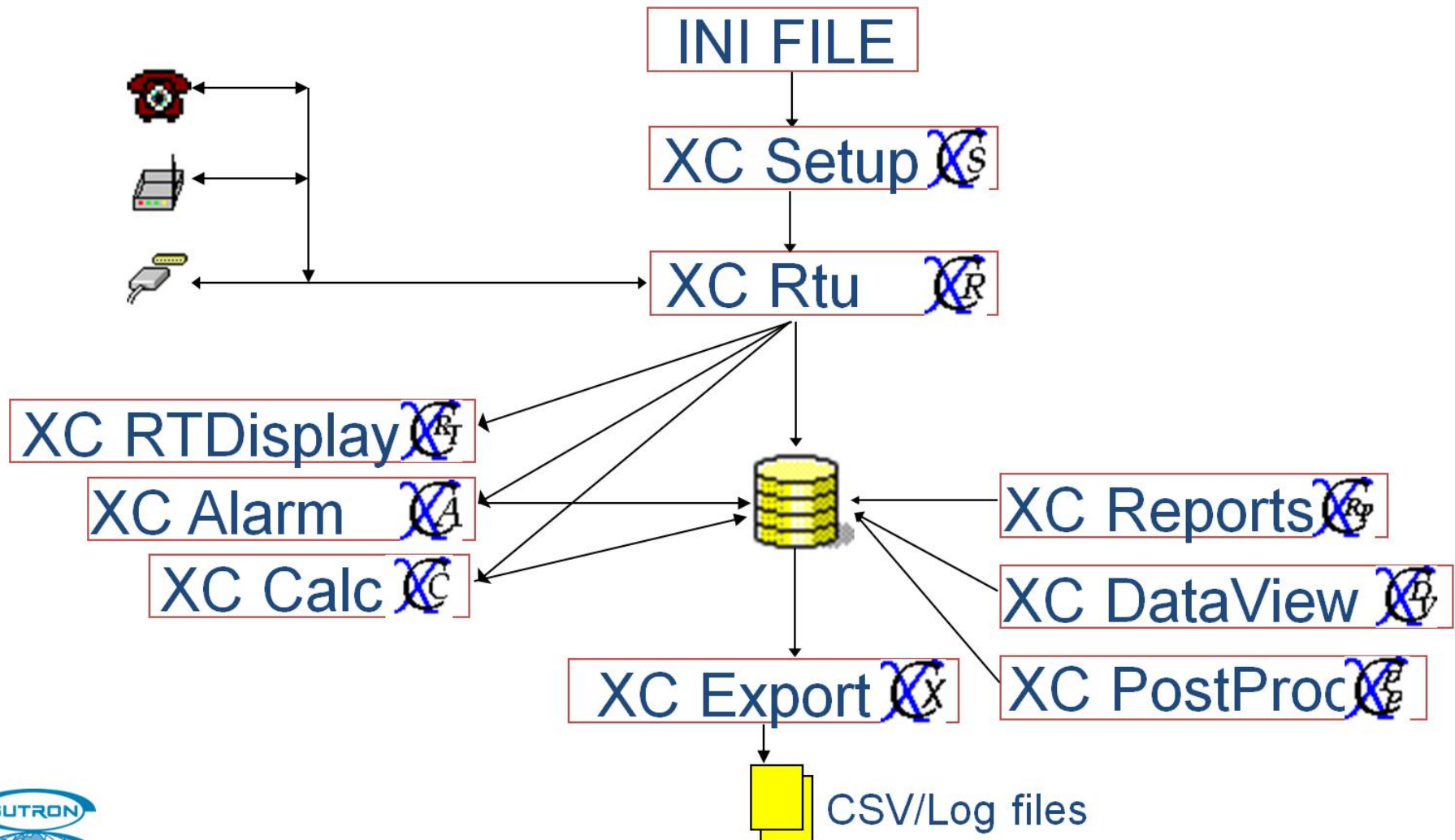




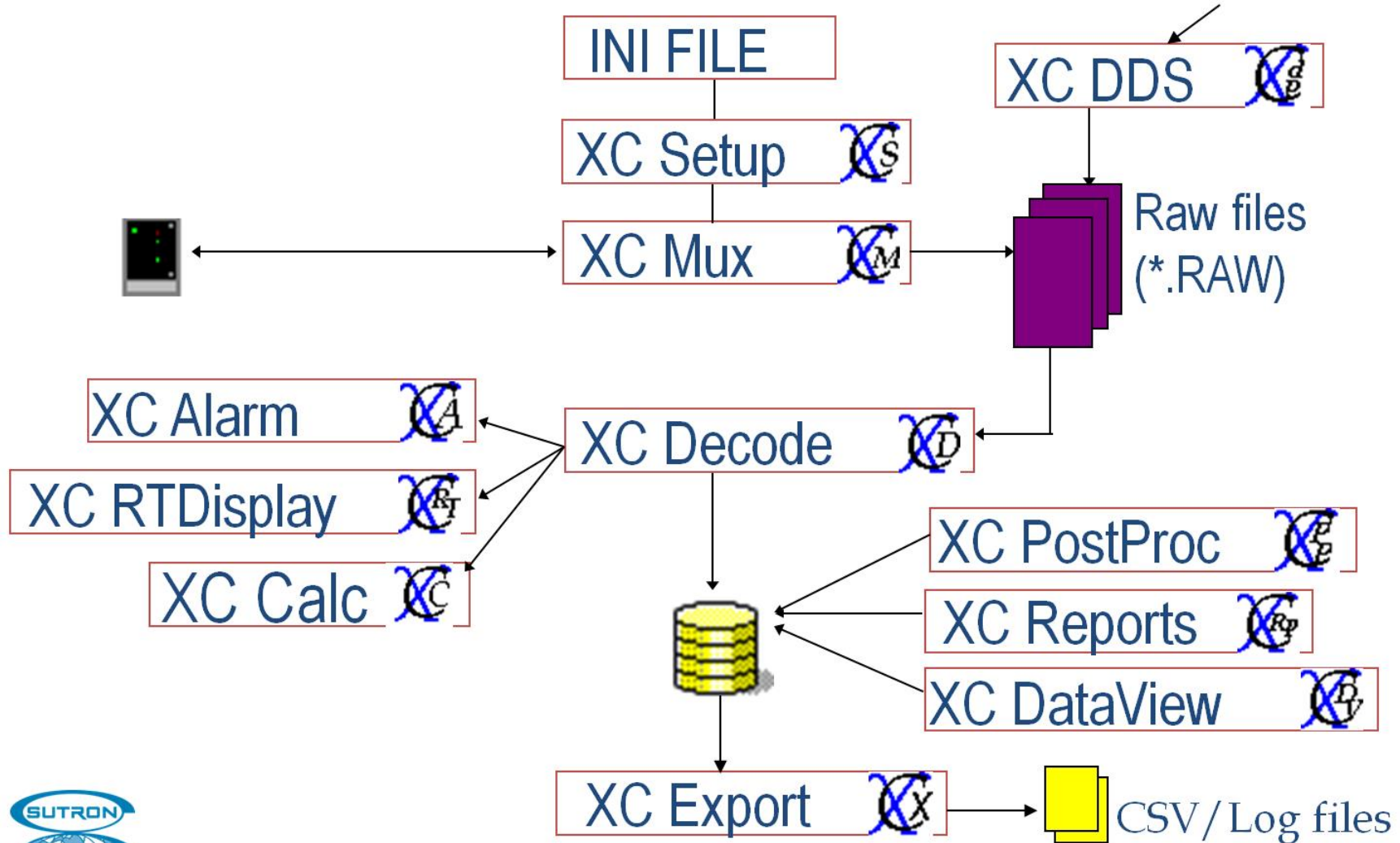
- **XC Alarm** – Evaluates operator selected sensor thresholds and stores results in XConnect database. Provide notifications via audio, fax, email and text.
- **XC Export** – Exports sensor data in flexible ASCII, Excel, SHEF or custom formats to disk.

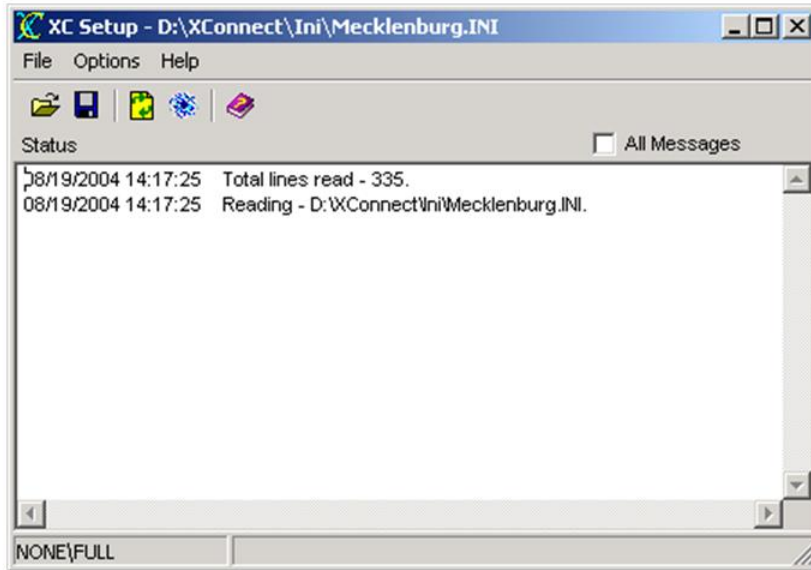


# Conventional Systems Data Flow



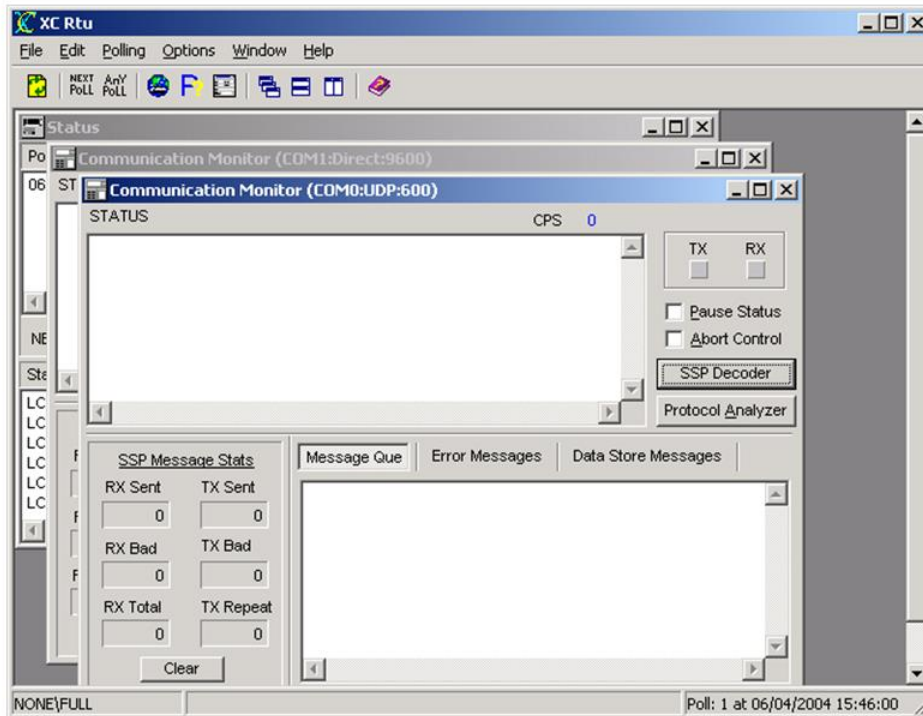
# Satellite Systems Data Flow





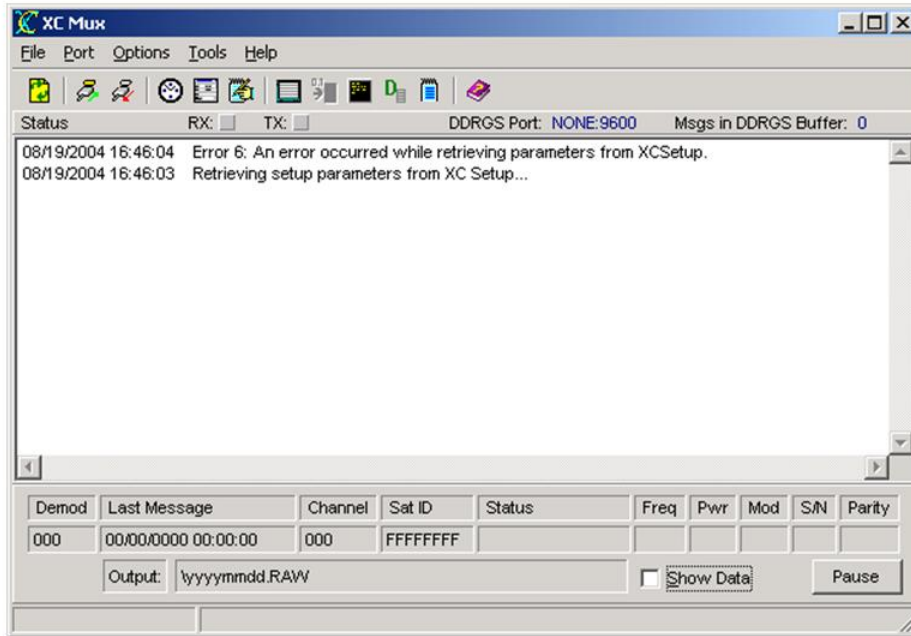
- All system setup information is stored in the INI file.
- XC Setup provides all setup information from the INI file to any client who requests it.
- ONLY XC Setup can get or store information in the INI file.





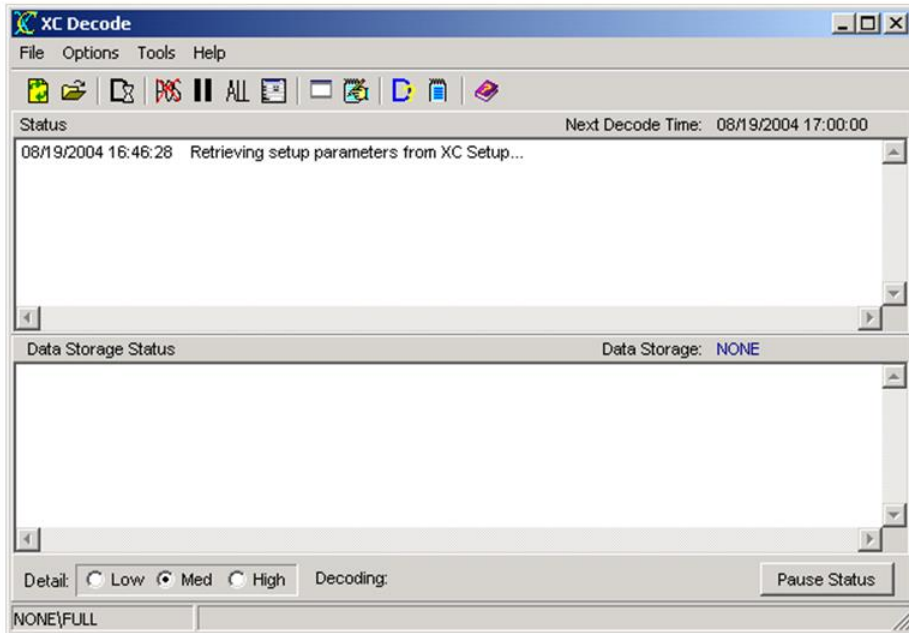
- Handles all communications with remote sites and base stations using modems and radio.
- Performs polls and maintains poll schedules.
- Applies user defined equations or lookup tables on data.
- Stores data to data store option.





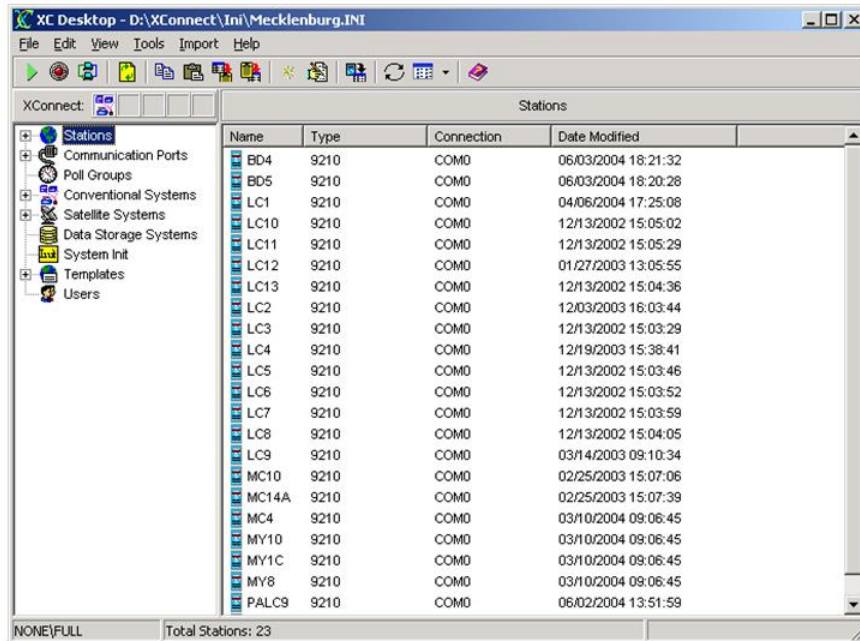
- Stores satellite messages into standard ASCII text files (RAW).
- Raw file duration and name are completely configurable.
- Provides real-time quality data
- Provides diagnostic windows to DDRGS.





- Reads RAW files of satellite messages.
- Applies user-defined equations or lookup tables on data.
- Stores data to data store option.
- Provides diagnostic windows to aid in decoding sensor data.
- Provides summary statistics on stations.





- User-interface for XC Setup.
- Configure all parameters for stations, sensors, XConnect modules and users.
- All changes sent to XC Setup via COM.



# XC RTDisplay



The screenshot shows the XC RTDisplay (local) application window. It features a menu bar (File, Watch, Options, Help), a toolbar with various icons, and a main display area. The main display area is divided into several sections: a 'Stations' dropdown menu set to 'XPERT', a 'Sensors' dropdown menu set to 'deg. C', and a 'RawList' table. Below these are two data tables. The first table lists sensor configurations, and the second table shows real-time data for station LC4. At the bottom, there are buttons for 'Watch 1' through 'Watch 5' and 'Graph 1' through 'Graph 3', along with a 'Status' section.

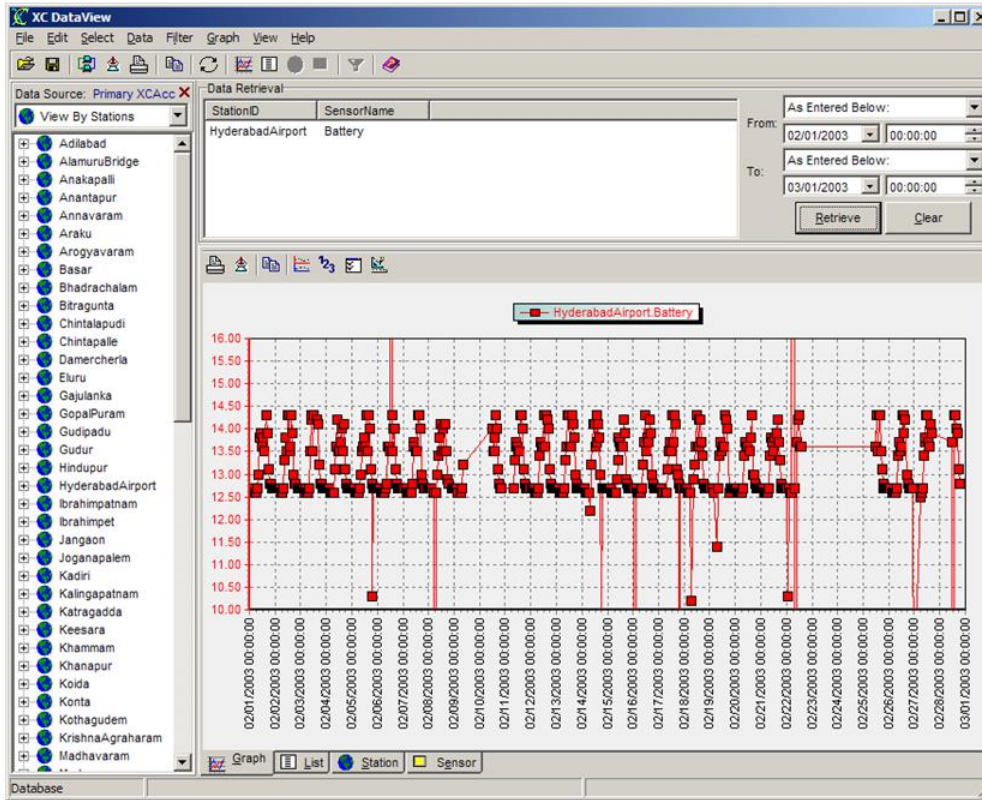
SensorName	RtuSensorName	Enabled	IsText	Equation	RawList
deg. C	deg. F	Yes	No		
SpCond us/cm	SpCond	Yes	No		
DO sat%	DO sat%	Yes	No		
pH	pH	Yes	No		
DO mg/L	DO mg/L	Yes	No		
Turb NTU	Turb NTU	Yes	No		
IntBat	IntBat	Yes	No		

StationID	SensorName	TimeTag	Value
LC4	deg. C	02/28/2003 14:31:01	7.3100
LC4	SpCond us/cm	02/28/2003 14:31:01	74.000
LC4	DO sat%	02/28/2003 14:31:01	105.400
LC4	pH	02/28/2003 14:31:01	6.8600
LC4	DO mg/L	02/28/2003 14:31:01	12.6900
LC4	Turb NTU	02/28/2003 14:31:01	39.300

- Provides real-time updates of sensor data.
- User selects desired sensors.
- 5 watch lists and 3 graphs available

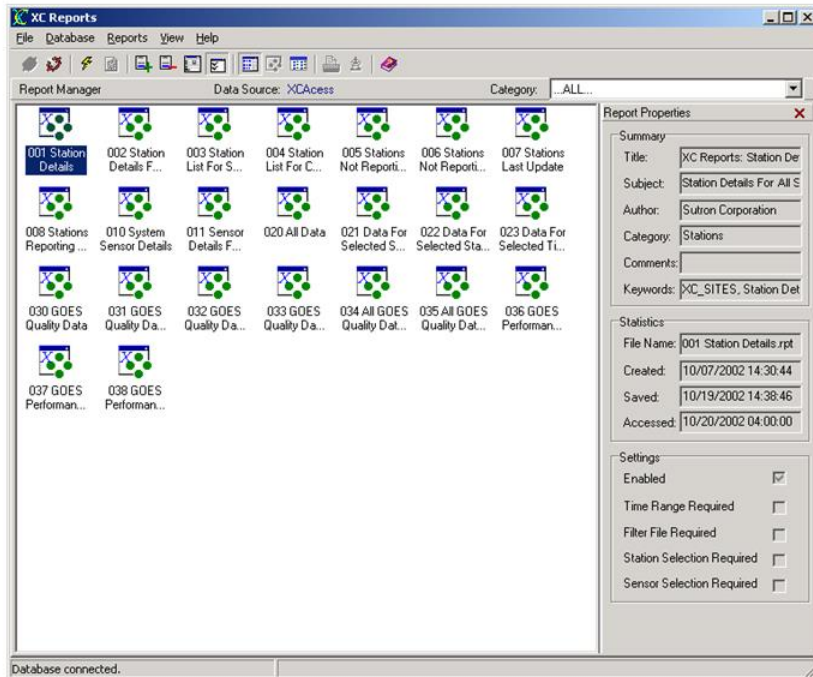




- Provides interactive Data Server functions
- View, graph and print of data
- Provides tools to import/export data
- Provides data file management tools

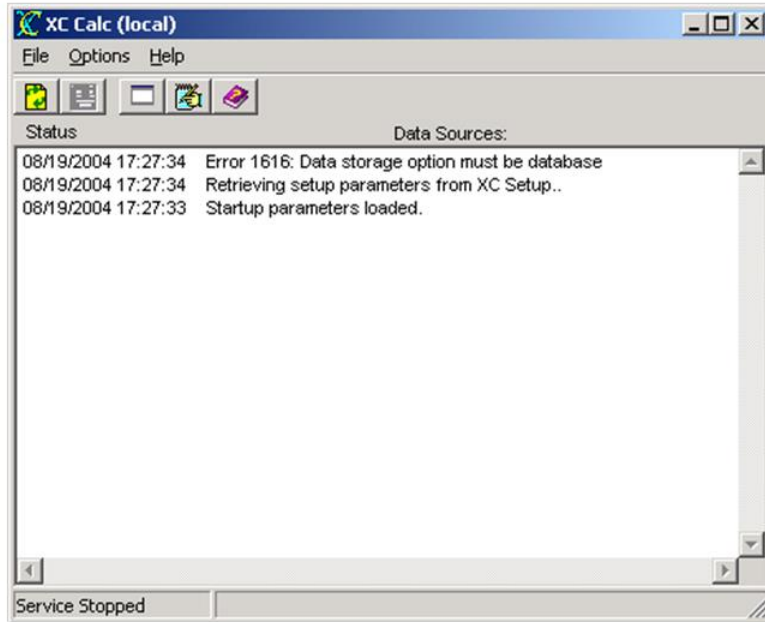


# XC Reports - Database



- View data in XConnect database via standard XConnect reports.
- Reports created in Crystal Reports.
- Add custom reports and categories to Report Library.
- Multiple export formats available.

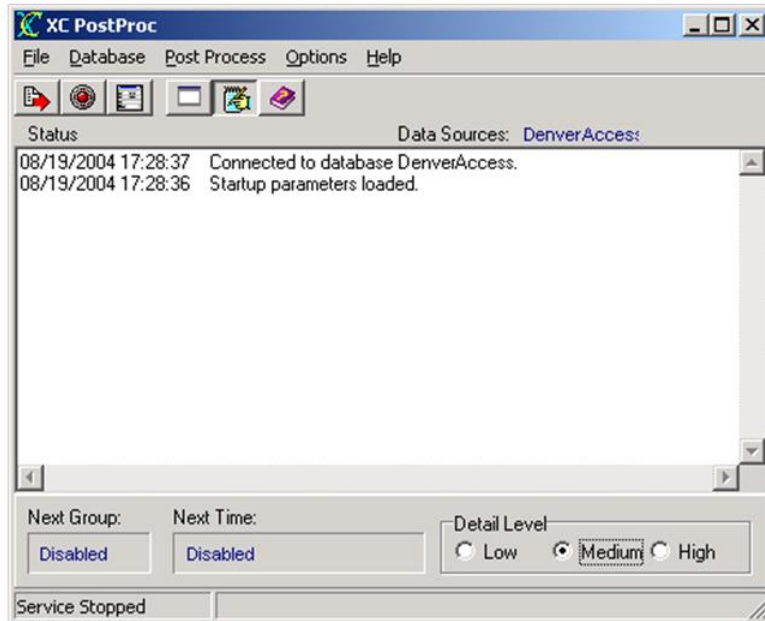




- Higher order real-time calculator .
- Equations using multiple sensors from same station or sensors from different stations.
- Define equations using standard mathematical expressions.
- Simple graphical interface to create equations and select sensors.



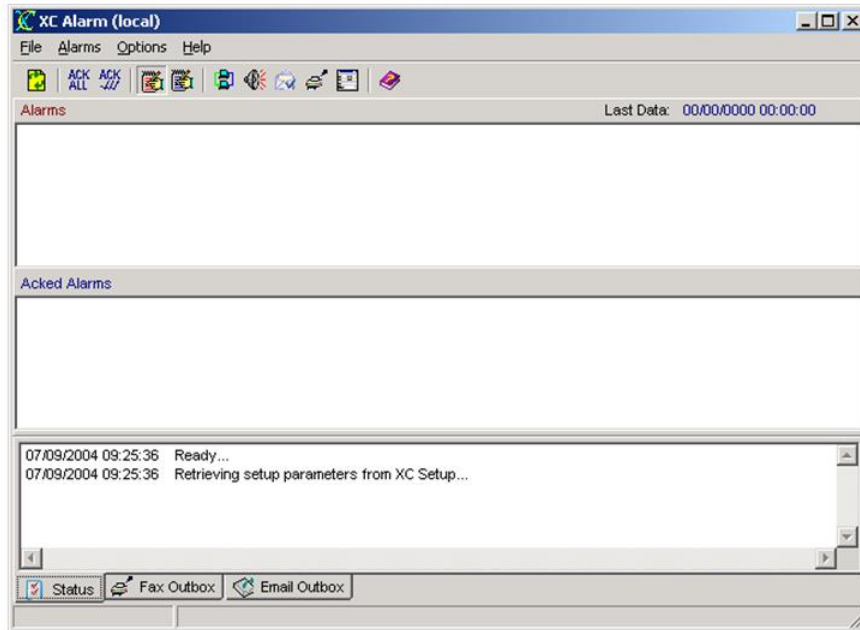
# XC PostProc - Database



- Post-processed data stored in post-processing data tables.
- Service application computes daily, monthly or yearly minimums, maximums and averages.
- Post processed data viewed by XConnect applications such as XC DataView and XC Reports.



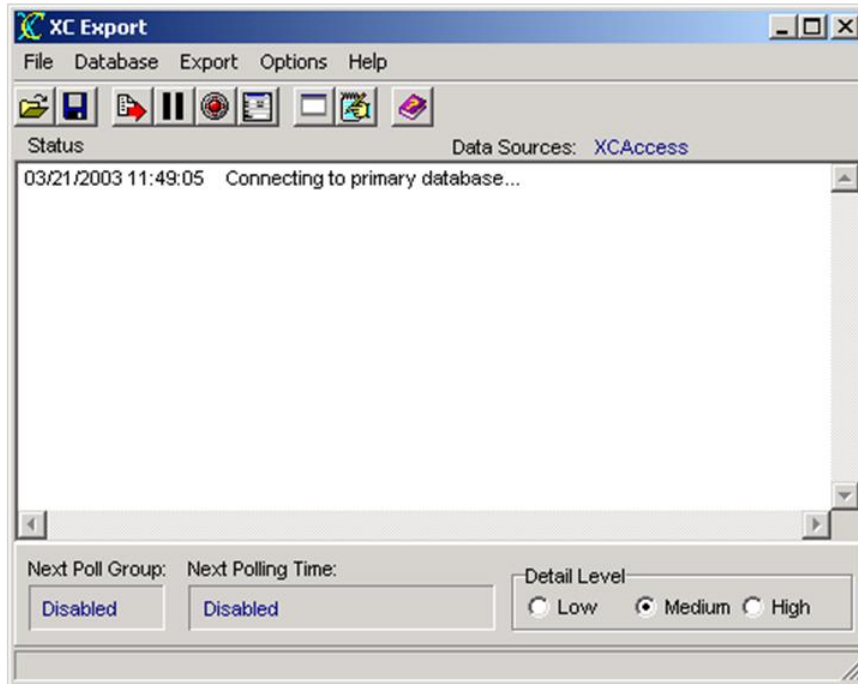
# XC Alarm - Toolkit



- Connects to XC Rtu or XC Decode to receive newest data.
- Evaluates alarms and sets appropriate flags in XConnect database.
- Options to save alarms to disk and play wave files as notification.
- Notification to email and cell phones.



# XC Export - Toolkit



- Exports data from XConnect database to ASCII, Excel or SHEF files.
- Exported data can be incorporated in reports, imported by other databases, or used for a variety of other purposes.
- Runs on user-defined schedule.



# XConnect Web Output Option



- Web site out of the box with Map Display.
- Source code installed on PC.
- Written in Classic ASP for ease of customization.
- Tabular reports and graphs
- Easily customizable by customer.



# XConnect Web Output



XC Reports - Windows Internet Explorer  
http://isdclaptopw7/xcreports/ui/index.asp

File Edit View Favorites Tools Help

VC Reports

## City of Virginia Beach Virginia

A Community for a Lifetime

### Reports:

- Station List
- Station Last Update
- Station Not Reporting Today
- Station Not Reporting Yesterday
- Data for Today
- Data for Yesterday
- Data for Last 5 Days
- Data for Selected Stations and Time Range
- Data for Selected Sensors and Time Range
- Graph for Selected Sensors and Time Range
- Bar Graph for Selected Sensors and Time Range

Norfolk

F.S. 03 - London Bridge  
F.S. 04 - Chesapeake Beach  
F.S. 06 - Creeds  
F.S. 08 - Oceana  
F.S. 09 - Kempsville  
F.S. 11 - Beach Borough  
F.S. 12 - Seatack  
F.S. 13 - Blackwater

Building #2 Operatoris

Done Local intranet | Protected Mode: Off 90%





- Main web page is divided between report links and map
- Markers on map designate the station locations
- Click on the markers to show the most recent data form the station.
- Click on the report link to generate the report.
- Reports created in classic ASP for easy modification.



# XConnect Web Output



City of Virginia Beach Virginia  
A Community for a Lifetime

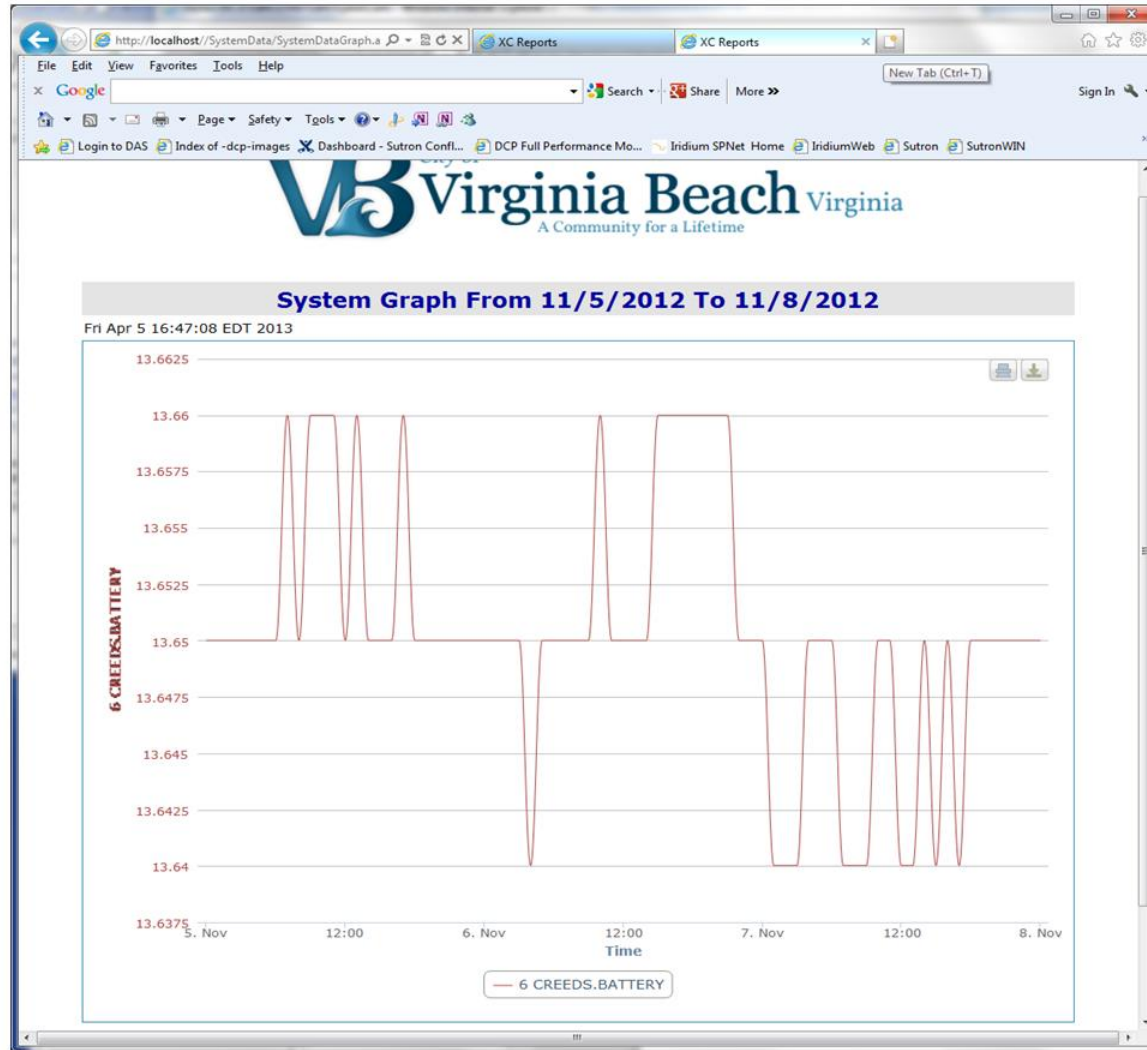
### Station List

Thu Apr 4 20:20:45 EDT 2013

Station ID	Enabled	Unit ID	Description
03 LONDON BRIDGE	Y	LONDONBRIDGE	
06 CREEDS	Y	CREEDS	
08 OCEANA	Y	OCEANA	
09 KEMPSVILLE	Y	KEMPSVILLE	
11 BEACH BOROUGH	Y	BEACHBOROUGH	
12 SEATACK	Y	SEATACK	
13 BLACKWATER	Y	BLACKWATER	
16 PLAZA	Y	PLAZA	
17 SANDBRIDGE	Y	SANDBRIDGE	
18 GREEN RUN	Y	GREENRUN	
19 STUMPY LAKE	Y	STUMPYLAKE	
20 LITTLE NECK	Y	LITTLENECK	



# XConnect Web Output



# Metro WasteWater, Denver CO



Metro Wastewater Reclamation District - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites

My Web Search Search Address <http://opsdata/> Go Links

Google Search 0 blocked ABC Check AutoLink AutoFill Options

METRO DISTRICT INTRANET

OPERATIONAL DATA

Home Process Control Control Systems Operations Emergency Info

**Connector Reports:**

- ▶ Flow and AvgFlow for a Specific Time Range
- ▶ All Data for Today
- ▶ All Data for Yesterday
- ▶ All Data for Selected Station and Time Range
- ▶ Selected Data for Selected Station and Time Range
- ▶ Data for Selected Station and Time Range (Summarized Daily)
- ▶ Data for Selected Station and Time Range (Summarized Periodically)
- ▶ System Graph for Selected Data

Operational Data - Home Wednesday, July 19, 2006 Local intranet





- XConnect applications are automation servers and share data using COM/DCOM as well as supporting DDE and OPC for compatibility with SCADA HMIs and Microsoft Applications.
- XConnect provides a technical reference API to all the open data links for easy programming.
- HMIs can display values from the loggers as well as send control commands.




# Toronto Regional Conservancy



XC Reports - Windows Internet Explorer  
http://74.107.137.185/xcreports/ui/index.asp

File Edit View Favorites Tools Help  
Google  
Go  
No popups  
Settings

XC Reports



**TORONTO AND REGION**  
**Conservation**  
for The Living City

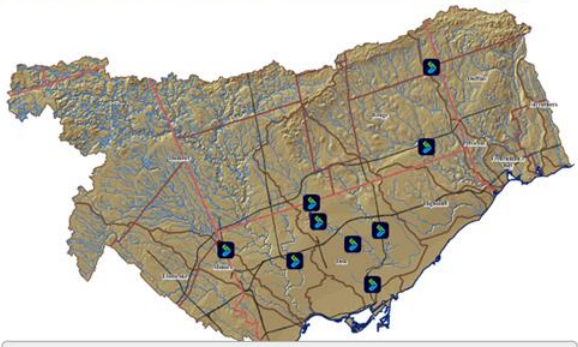
Building a Living City Region

[Blackberry Access](#)

**Diagnostic Reports:**  
[Station Last Update](#)  
[Station Last Battery](#)  
[Stations Not Reported Today](#)  
[Not Reported In 5Days](#)

**Tabular Reports:**  
[All Stations List](#)  
[All System Data](#)  
[Data For Today](#)  
[Data For Station - TimeRange](#)  
[Water Level/Discharge Data For Today](#)  
[Stage-Rise For Stations - TimeRange](#)

**Graphical Reports:**  
[Water Level/Discharge Graph For 3 Days](#)  
[System Graph](#)  
[System Graph with Reference](#)  
[Flood Monitoring Report](#)



Station Name	Last Update	
G ROSS LORD DAM	6/28/2007 3:15:00 PM	
Water Level	Discharge	Battery
172.583	null	13.7

[Refresh Data](#) Last Data Refresh : 6/28/2007 3:15:00 PM

<a href="#">Don at Glenshield 6 Hour Water Level Graph</a>	<a href="#">Don at Glenshield 2 Day Level-Discharge Data</a>
<a href="#">Don at Knightswood 6 Hour Water Level Graph</a>	<a href="#">Don at Knightswood 2 Day Level-Discharge Data</a>
<a href="#">Don at Todmorden 6 Hour Water Level Graph (w/ Live View)</a>	<a href="#">Don at Todmorden 2 Day Level-Discharge Data</a>
<a href="#">East Don at York Mills 6 Hour Water Level Graph</a>	<a href="#">East Don at York Mills 2 Day Level-Discharge Data</a>
<a href="#">G. Ross Lord Dam 6 Hour Water Level Graph</a>	<a href="#">G. Ross Lord Dam 2 Day Level-Storage Data</a>
<a href="#">Milne Dam 6 Hour Water Level Graph</a>	<a href="#">Milne Dam 2 Day Level-Storage Data</a>
<a href="#">Claireville Dam 6 Hour Water Level Graph</a>	<a href="#">Claireville Dam 2 Day Level-Storage Data</a>

Done Internet 100%





- Salvage Well Control Screen

File Logic Special Development!

CURRENT TIME: 11/19/96 1:44:47 PM [VIEW ALL PMSC ALARMS](#)

Salvage Well	Observation Well	Check Structure	Constant Head Orifice
Flume	San Luis Lake Turnout	Head Lake Turnout	San Luis Pumping Plant
Refuge Pumping Plant	Project Office	Repeater	Special Displays

SALVAGE WELL

SW006

LAST POLL

LAST POLL Date  
LAST POLL Time

SALVAGE WELL CONTROL

Sutron

MODE OFF  
OVERLOAD  
STARTS 0

VALVE MOTOR TIMER  
MODE OFF  
READY  
OVERLOAD

100 %

LEVEL OK  
WATER LEVEL 0.00

PUMP HP	0.00	FLOW	0.00
MAX FLOW	0.00	SP	0.00
KW HOUR	0.00	DB	0.00
YESTERDAY'S VOLUME	0.00	TDS	0.00

ACK Current Well  
ACK All Wells  
POLL  
POLL ALL SITES  
RETURN

COMMUNICATIONS  
OUTPUTS DISABLE  
AC POWER  
CONTROL  
ENTRY  
SETUP

[View Well Alarms](#)





- Check Structure Control Screen

The screenshot displays the 'Check Structure' control screen within the InTouch - WindowViewer application. The window title is 'InTouch - WindowViewer - C:\PROJECTS\ALAMOSA'. The interface includes a menu bar with 'File', 'Logic', 'Special', and 'Development!'. The current time is shown as 11/19/96 at 2:04:47 PM, with a 'VIEW ALL PMSC ALARMS' button. A grid of buttons lists various system components: Salvage Well, Observation Well, Check Structure, Constant Head Orifice, Flume, San Luis Lake Turnout, Head Lake Turnout, San Luis Pumping Plant, Refuge Pumping Plant, Project Office, Repeater, and Special Displays. The 'Check Structure' section features a 'CHECK2' dropdown menu, a 'LAST POLL' status box showing 'Last Poll Date' and 'Last Poll Time', and a central diagram of a gate structure with 'UPSTREAM' and 'DOWNSTREAM' labels. To the left of the diagram is a 'CANAL WATER' level indicator set to 0.00. To the right are 'MODE' options (OVERLOAD, FULL OPEN, FULL CLOSE) and 'CONDUCTIVITY' and 'FLOW' indicators, both at 0.00. Below the diagram are 'CANAL INVERT' indicators for both upstream and downstream, both at 0.00. On the right side, there are buttons for 'ACK Current Check', 'ACK All Checks', 'POLL', 'POLL ALL SITES', and 'RETURN'. Below these are 'COMMUNICATIONS' options (RTU DISABLE, CONTROL, AC POWER, ENTRY) and a 'BATTERY VOLTAGE' indicator at 0.00. A 'Sutron' logo is present, along with 'GATE SETPOINT LOOP' and 'P + PR LOOP' indicators. A 'View Check Alarms' button is located at the bottom right.



# Mora Fish Hatchery

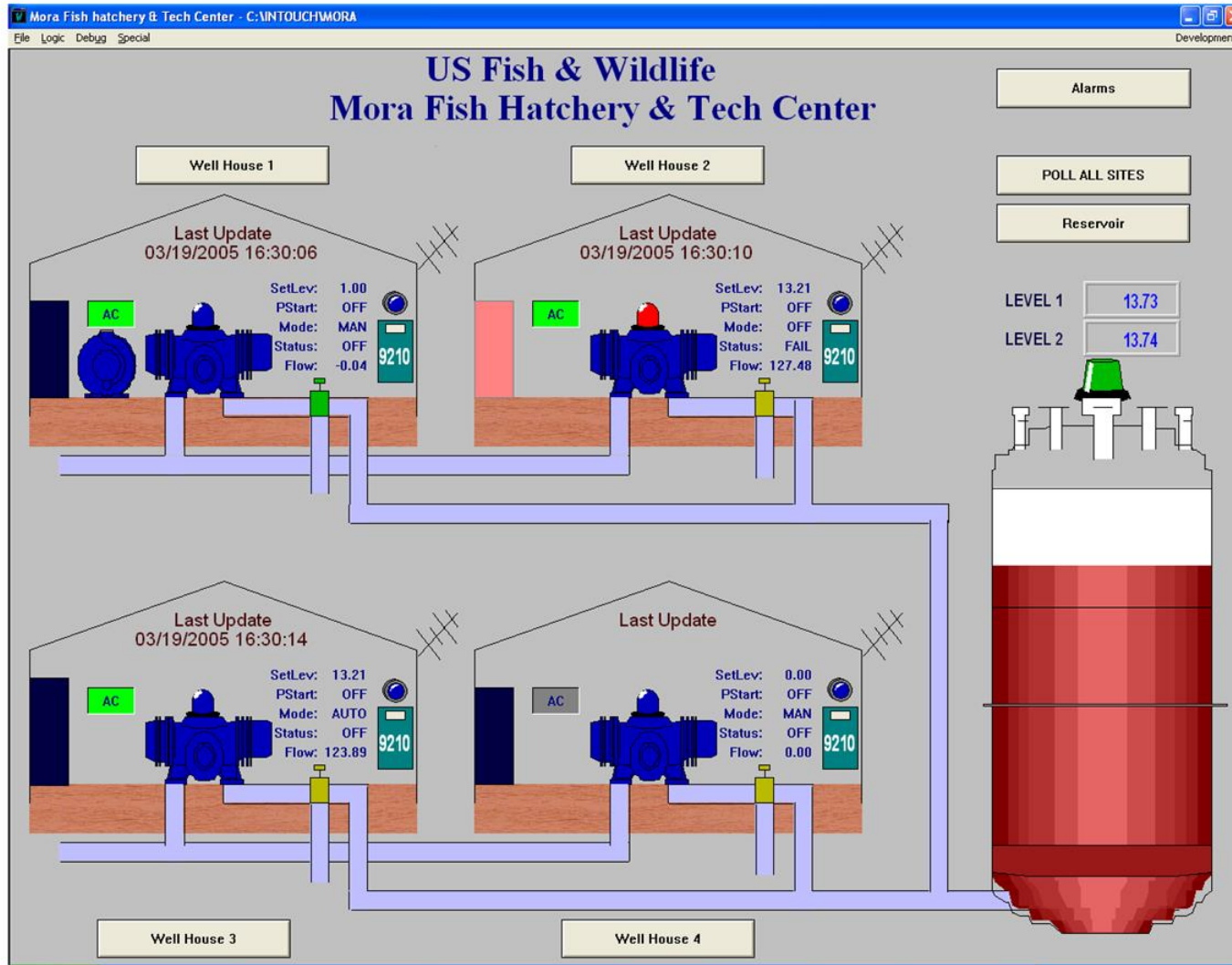


Figure 1 Main System Overview



# Mora Fish Hatchery

