A Novel Integrated Solution to Nutrient Monitoring The Next Generation in Water Quality Monitoring and Watershed Management

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Goals and Objectives

Evaluation of a side stream nutrient water quality monitoring panel for long-term deployment in tributary streams to the Chesapeake Bay.

Develop real-time nutrient loadings and stream assessments.

Richmond Times-Dispatch

October 31, 2011

State says computer model for bay cleanup has problems

Stream Selection

Rational :

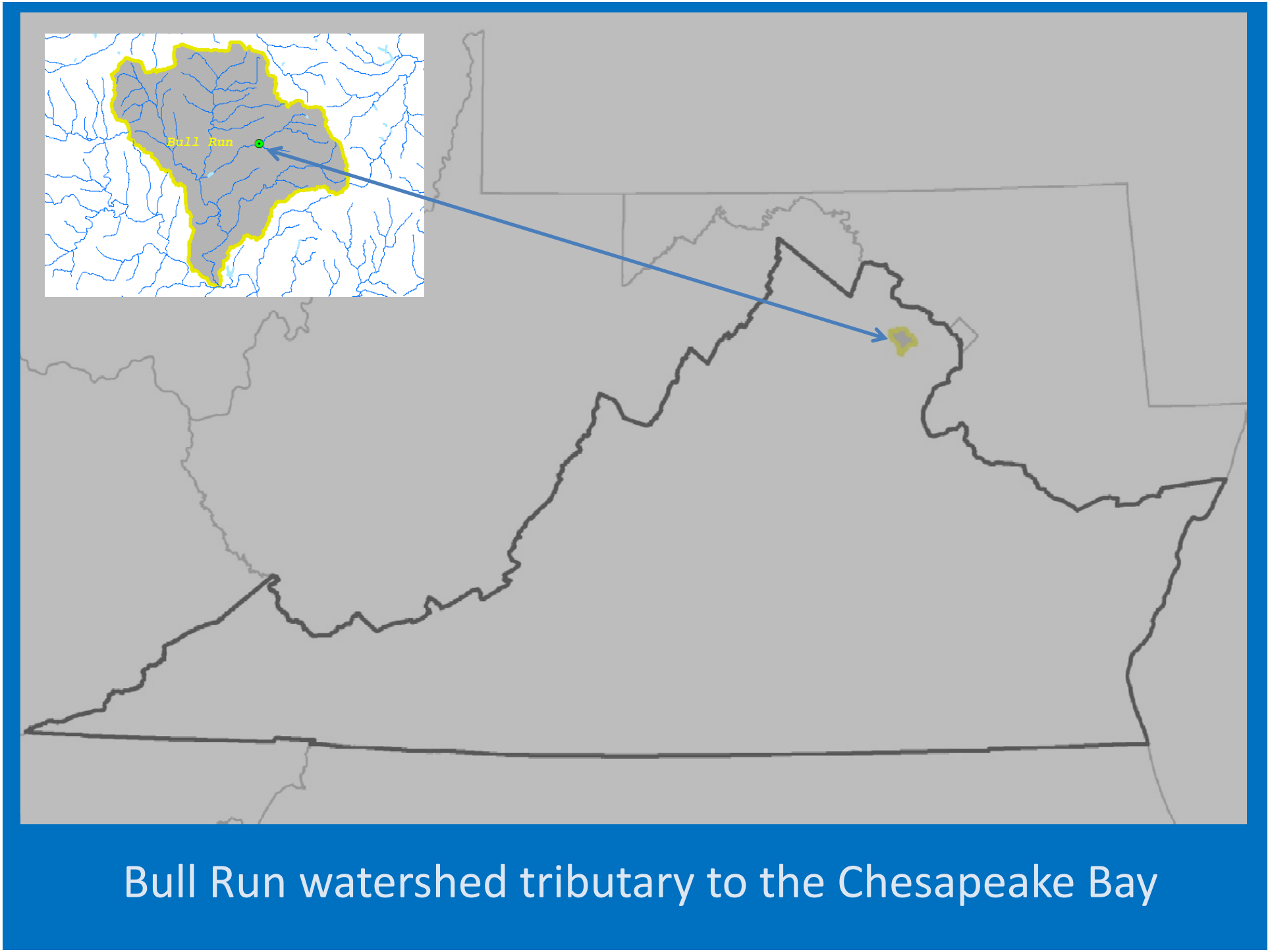
Infrastructure Presence

Close to the greater Washington, DC area

Known nutrient presence

Flatlick Branch above Frog Branch at Chantilly, Virginia

USGS Gage Station 01656903



Bull Run watershed tributary to the Chesapeake Bay

Water Quality Parameter Selection for Stream Deployment

pH – Continuous
Conductivity - Continuous
Temperature -Continuous
Turbidity - Continuous
Nitrite/Nitrate - Continuous
Luminescence Dissolved Oxygen - Continuous
Ortho-phosphate – Continual, every 5 – 15 minutes

Nutrient Water Quality Monitoring Panel

Nitratax Probe –NO2/NO3

Solatax–Turbidity/Suspended Solids

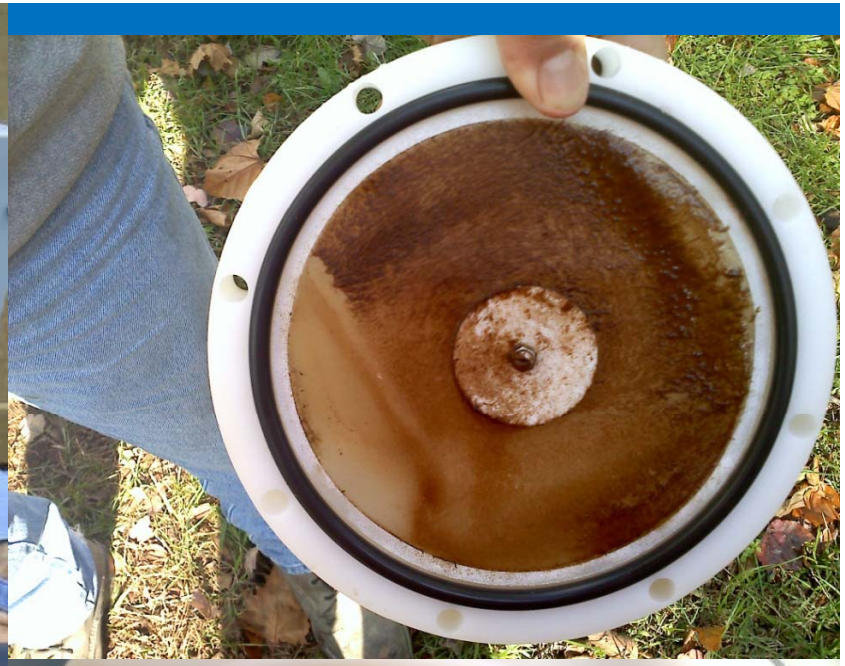
Hydrogen Ion Activity Probe –pH

Conductivity Probe –Specific Conductance

Luminescence Dissolved Oxygen Probe–DO

Temperature Probe

Manifold and Pre-filter to Phosphax Analyzer



Pre-filter and 0.2 um Teflon filter to Phosphax Analyzer

Submergible Pump

Submergible Pump instream installation

Calibrating Side-stream Sensors

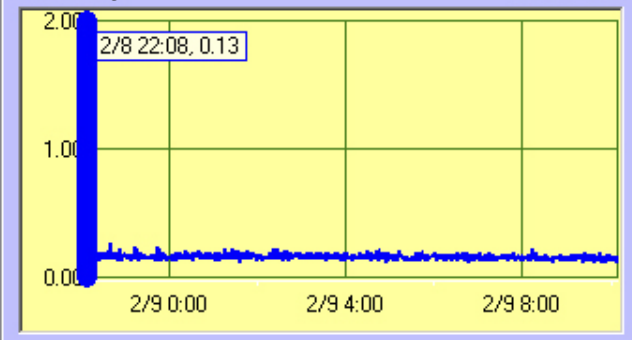
HACH **Event Monitor** 1.1.0.106

Site: WDMPsc Panel 2
Current User: hach
Role: Commissioner

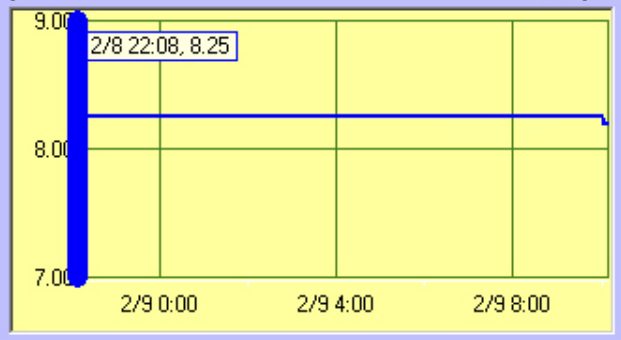
02-09-2007 10:08:38

Logout

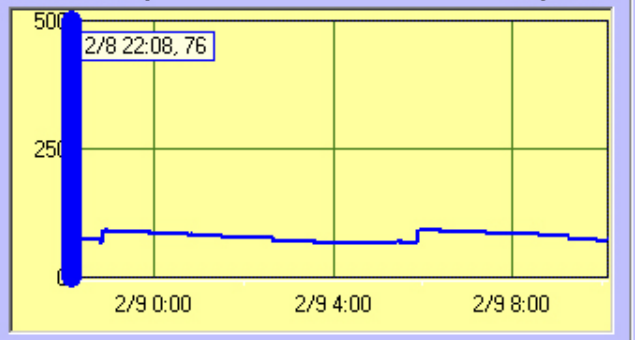
Turbidity 0.16 NTU



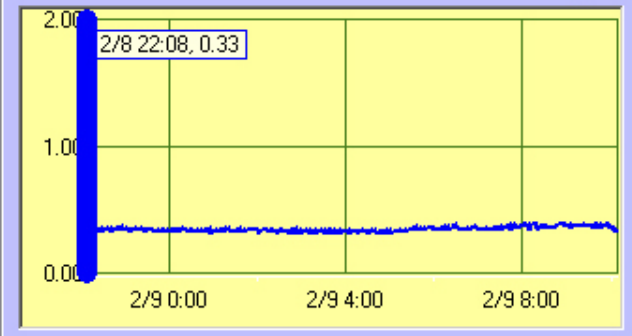
pH 8.19 pH



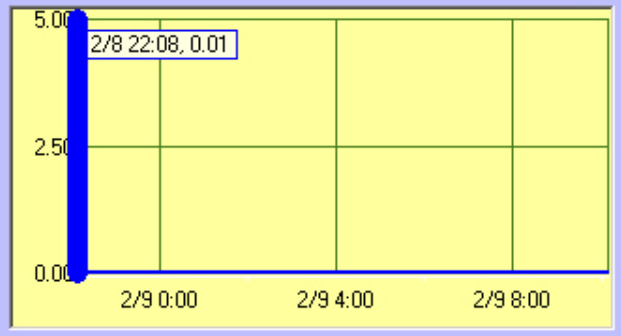
Conductivity 72 µS/cm



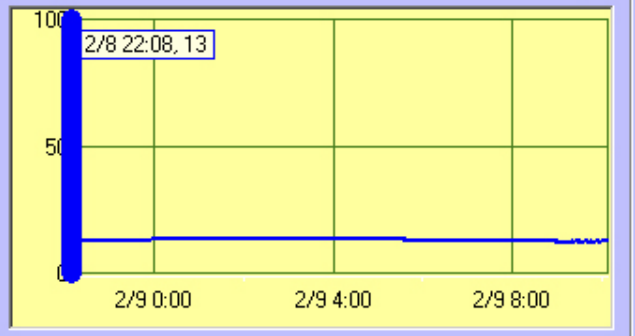
Chlorine 0.32 ppm



TOC 0.01 mg/L



Temperature 12.25 deg C

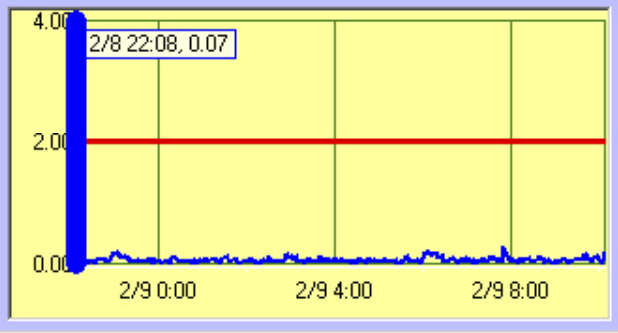


Graphs

CONFIGURATION

MAINTENANCE

Trigger 0.19

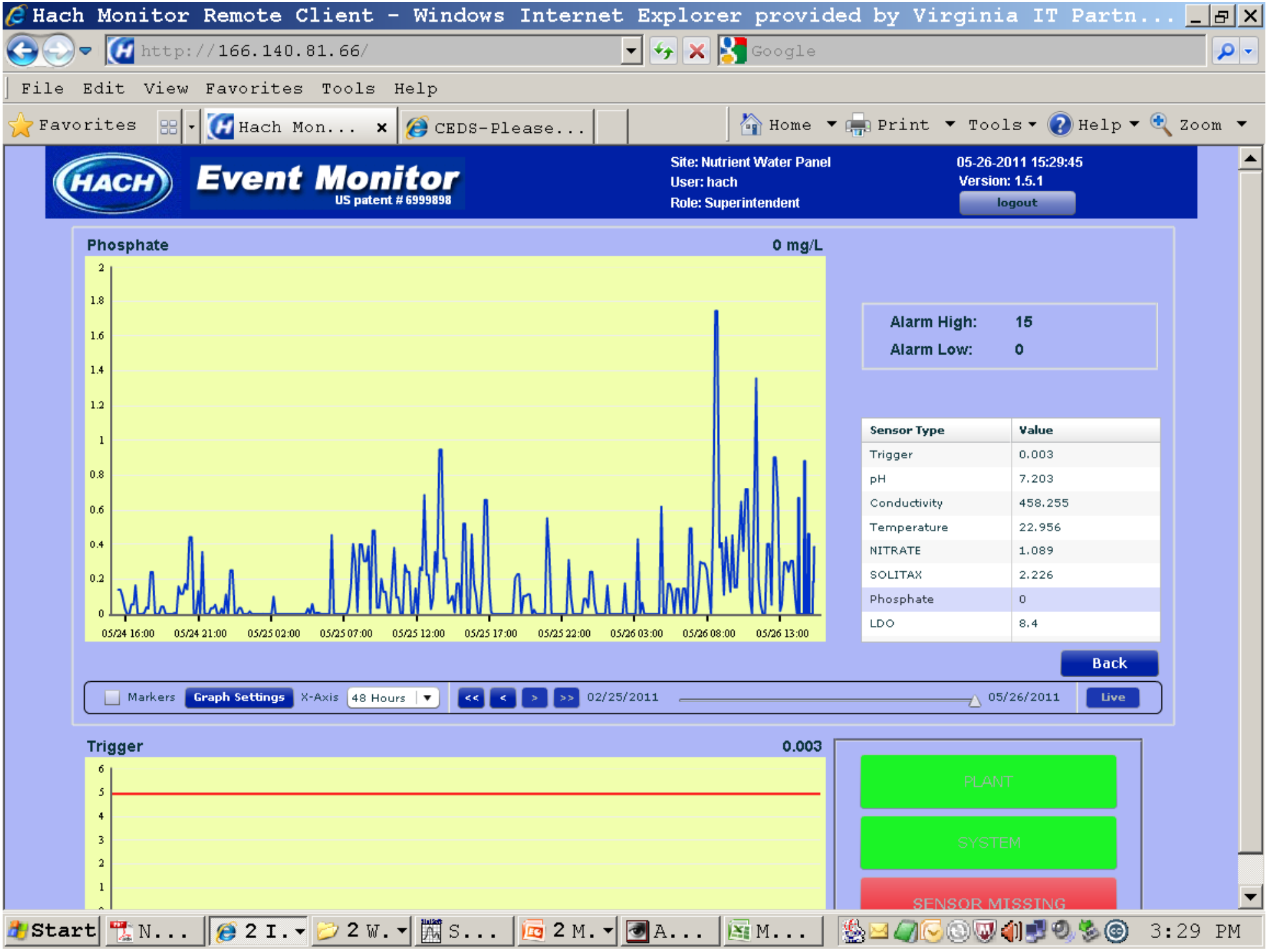


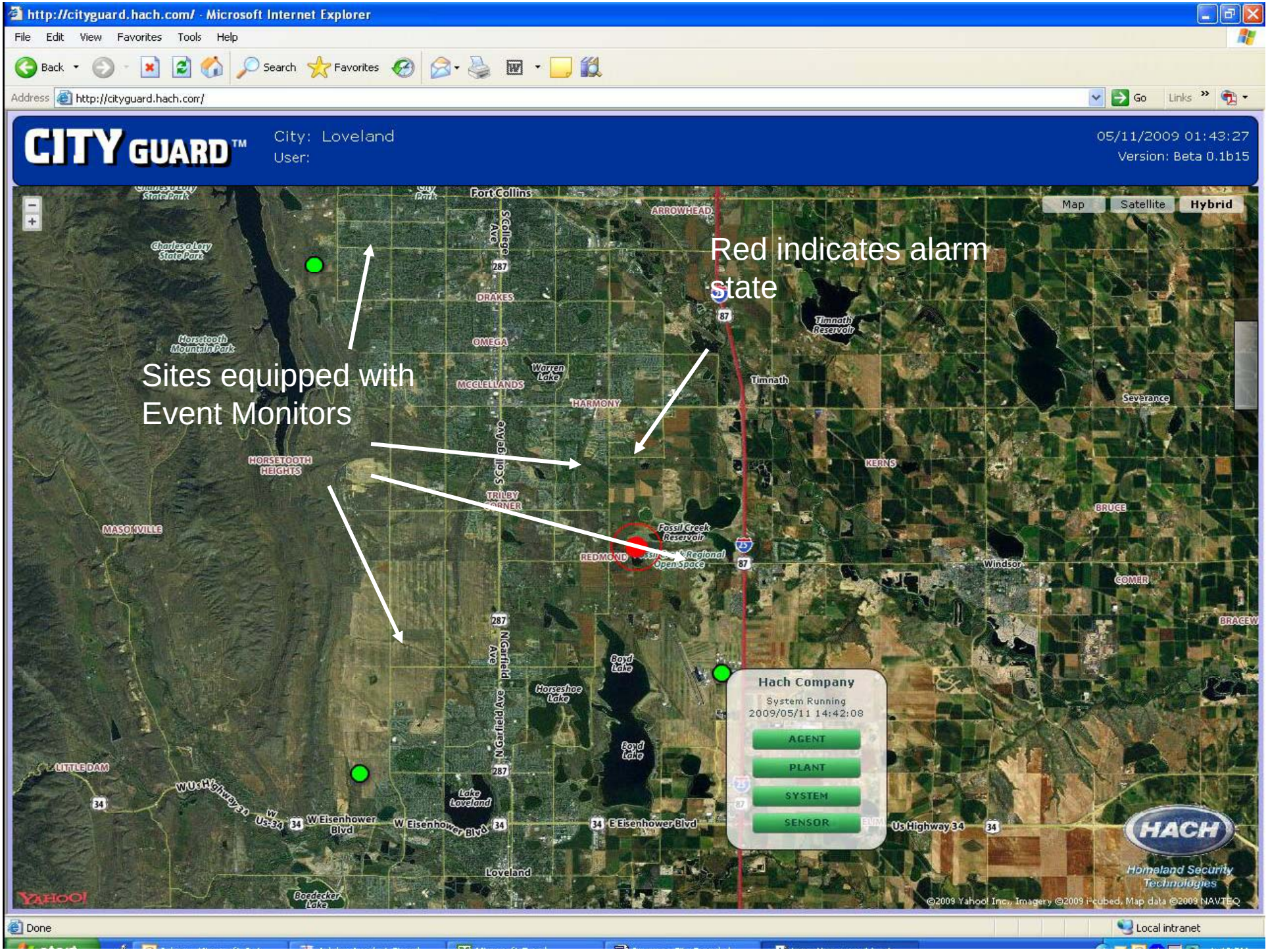
AGENT

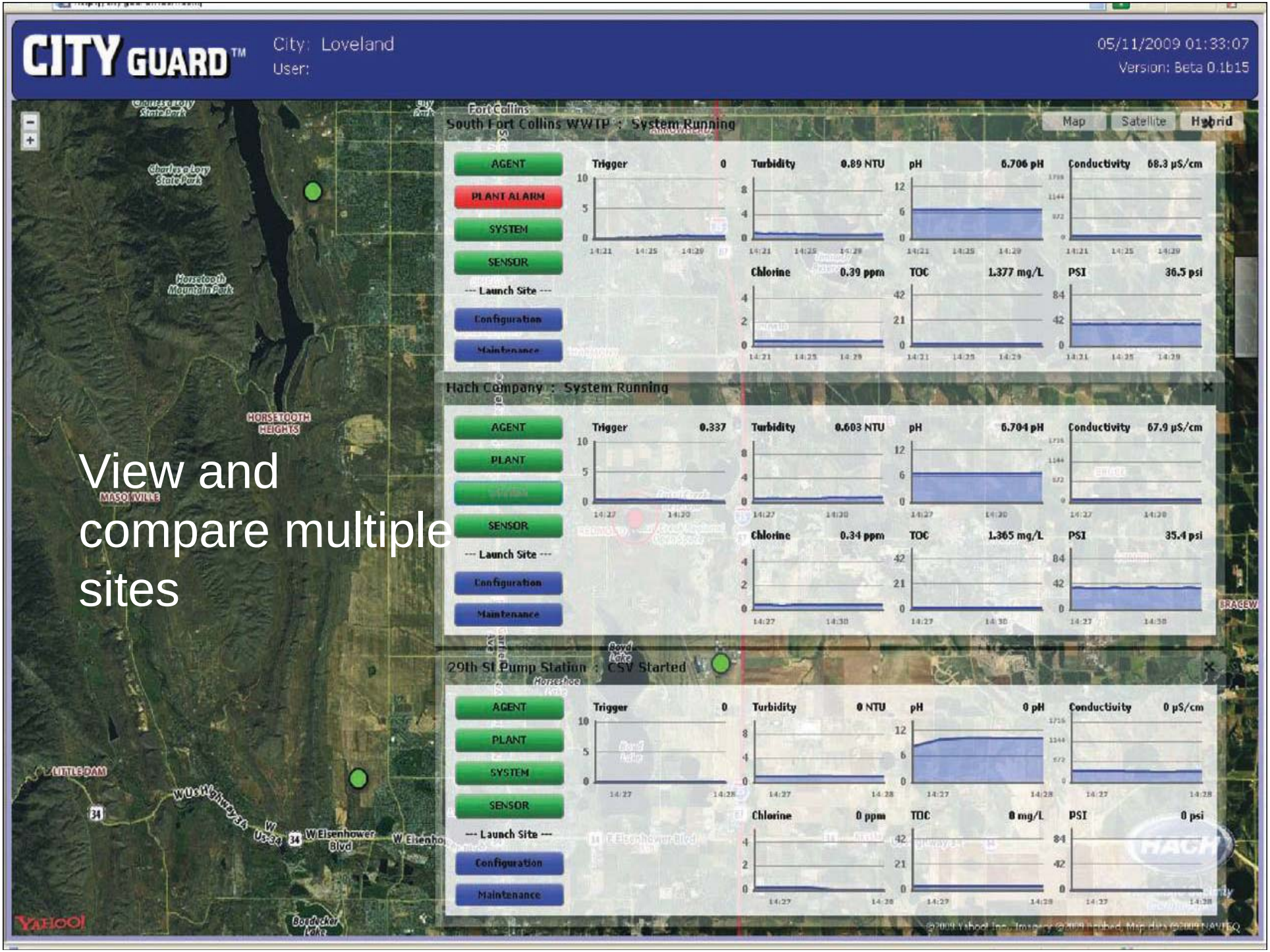
PLANT

SYSTEM

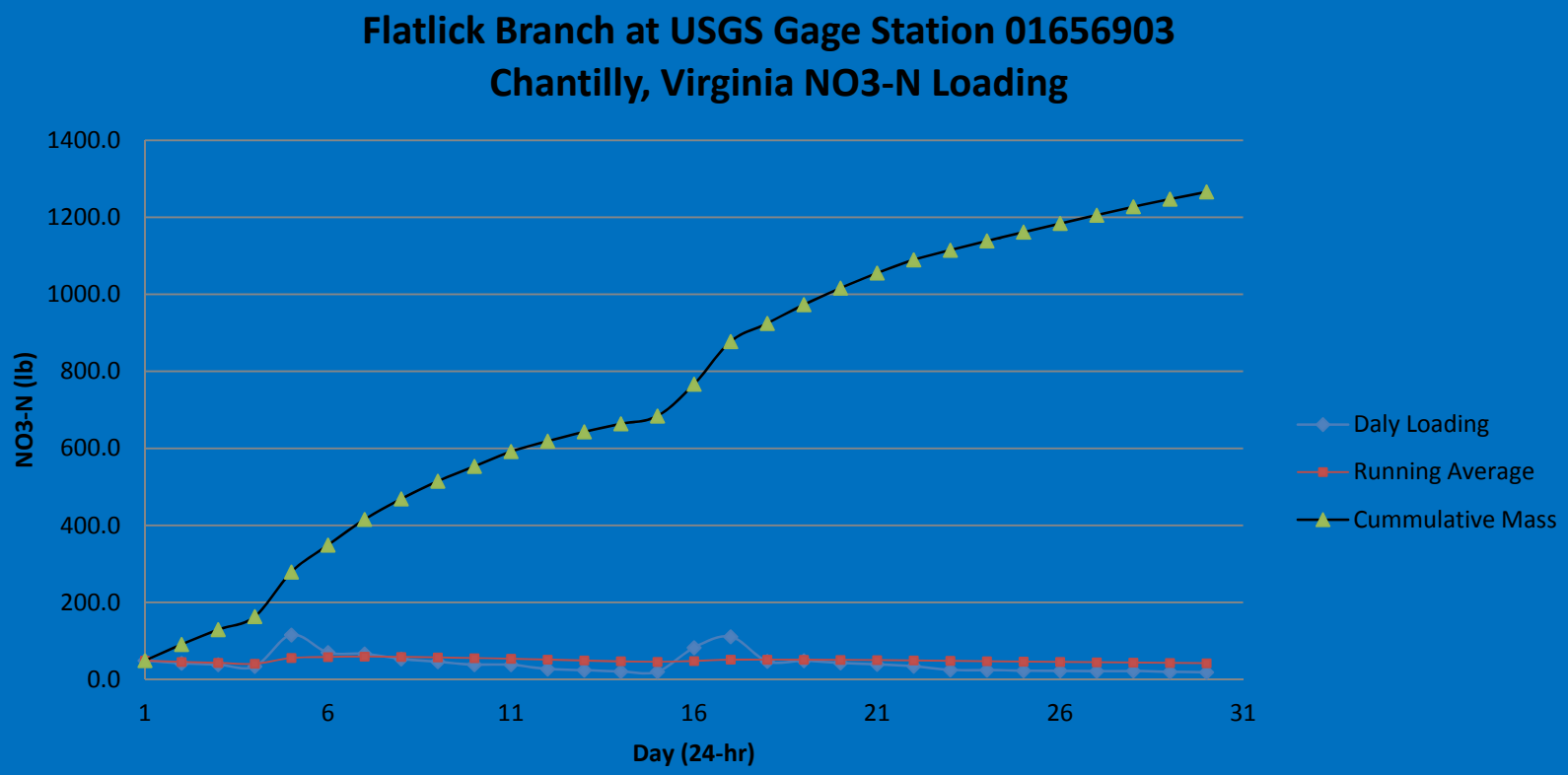
SENSORS

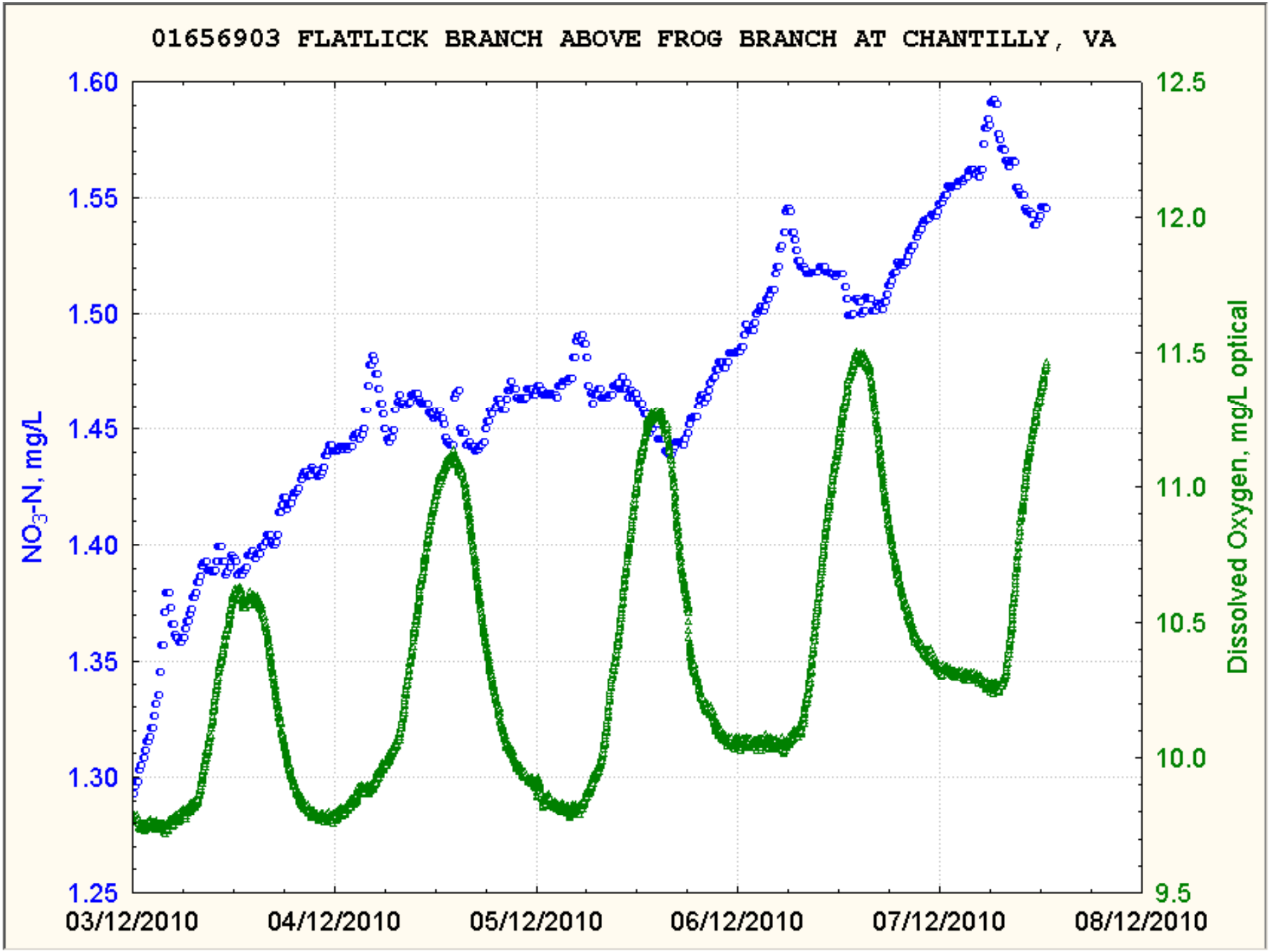

Hach Monitor Remote Client - Windows Internet Explorer provided by Virginia IT Partn...
http://166.140.81.66/
Google
File Edit View Favorites Tools Help
Favorites
Hach Mon...
CEDS-Please...
Home
Print
Tools
Help
Zoom
HACH
Event Monitor
US patent # 6999898
Site: Nutrient Water Panel
User: hach
Role: Superintendent
05-26-2011 15:29:45
Version: 1.5.1
logout
Phosphate
0 mg/L
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
05/24 16:00
05/24 21:00
05/25 02:00
05/25 07:00
05/25 12:00
05/25 17:00
05/25 22:00
05/26 03:00
05/26 08:00
05/26 13:00
Alarm High: 15
Alarm Low: 0
Sensor Type
Value
Trigger 0.003
pH 7.203
Conductivity 458.255
Temperature 22.956
NITRATE 1.089
SOLITAX 2.226
Phosphate 0
LDO 8.4
Back
Markers
Graph Settings
X-Axis
48 Hours
<<
<
>
>>
02/25/2011
05/26/2011
Live
Trigger
0.003
6
5
4
3
2
1
PLANT
SYSTEM
SENSOR MISSING
Start
N...
2 I...
2 W...
S...
2 M...
A...
M...
3:29 PM

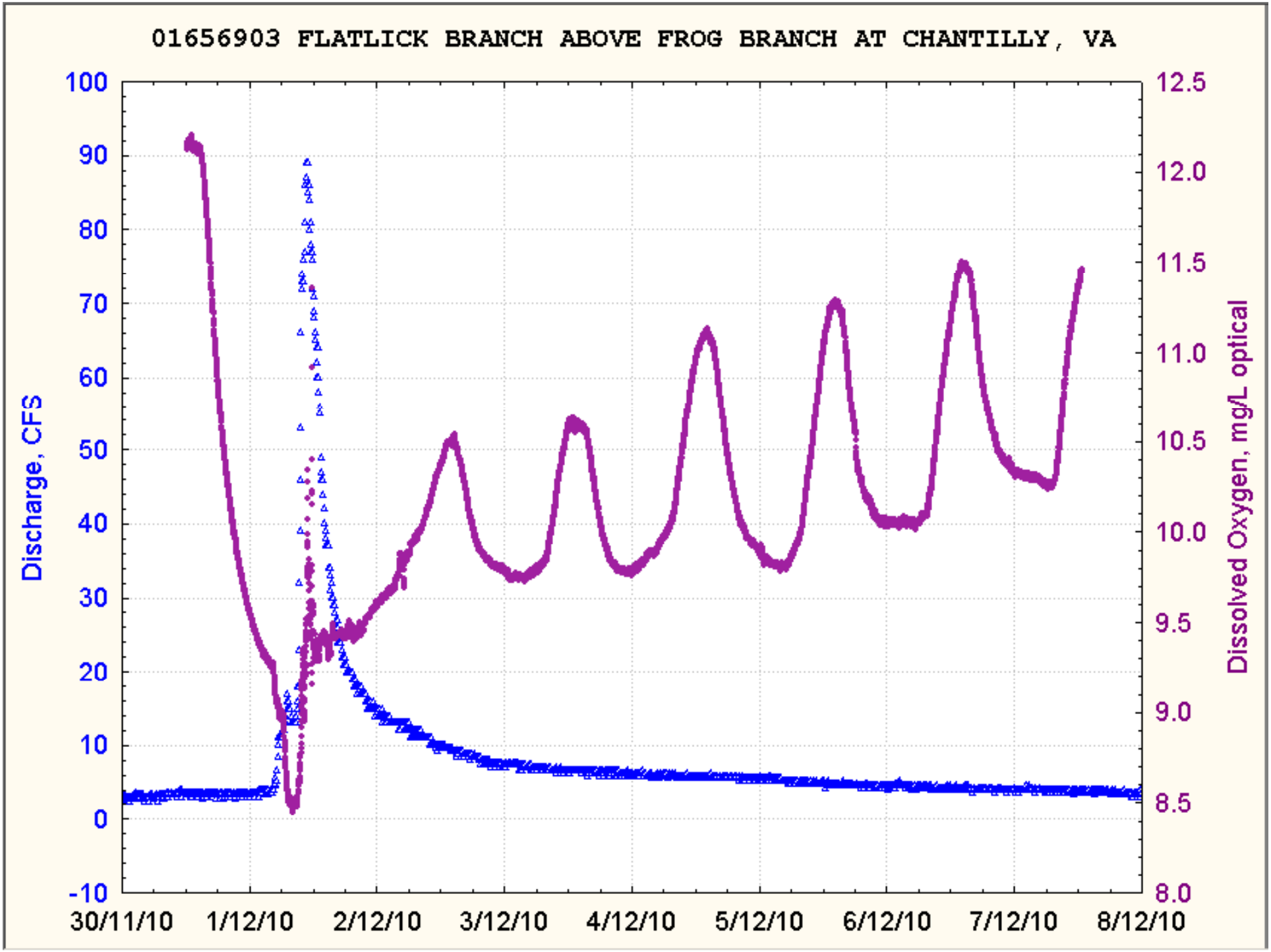

http://cityguard.hach.com/ - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://cityguard.hach.com/
Go Links
CITY GUARD™
City: Loveland
User:
05/11/2009 01:43:27
Version: Beta 0.1b15
Map Satellite Hybrid
Red indicates alarm state
Sites equipped with Event Monitors
Hach Company
System Running
2009/05/11 14:42:08
AGENT
PLANT
SYSTEM
SENSOR
HACH
Homeland Security Technologies
Fort Collins
ARROWHEAD
DRAKES
OMEGA
MCCLELLANDS
HARMONY
Timnath
Severance
KERNS
BRUCE
Windsor
COMER
BRACEW
HORSETOOTH HEIGHTS
MASONVILLE
TRILBY
REDMOND
Fossil Creek Reservoir
Timnath Reservoir
Warren Lake
Boyd Lake
Horseshoe Lake
Lake Loveland
LITTLE DAM
W Eisenhower Blvd
E Eisenhower Blvd
Us Highway 34
Loveland
Boedecker Lake
S College Ave
N Garfield Ave
Done
Local intranet


CITY GUARD™
City: Loveland
User:
05/11/2009 01:33:07
Version: Beta 0.1b15
Map
Satellite
Hybrid
South Fort Collins WWTP : System Running
AGENT
PLANT ALARM
SYSTEM
SENSOR
--- Launch Site ---
Configuration
Maintenance
Trigger 0
Turbidity 0.89 NTU
pH 6.706 pH
Conductivity 68.3 µS/cm
Chlorine 0.39 ppm
TOC 1.377 mg/L
PSI 36.5 psi
Hach Company : System Running
AGENT
PLANT
SENSOR
--- Launch Site ---
Configuration
Maintenance
Trigger 0.337
Turbidity 0.603 NTU
pH 6.704 pH
Conductivity 67.9 µS/cm
Chlorine 0.34 ppm
TOC 1.365 mg/L
PSI 35.4 psi
29th St Pump Station : CSV Started
AGENT
PLANT
SYSTEM
SENSOR
--- Launch Site ---
Configuration
Maintenance
Trigger 0
Turbidity 0 NTU
pH 0 pH
Conductivity 0 µS/cm
Chlorine 0 ppm
TOC 0 mg/L
PSI 0 psi
View and compare multiple sites
Fort Collins
HORSETOOTH HEIGHTS
MASONVILLE
LITTLE DAM
W Eisenhower Blvd
Boyd Lake
BRACEW
YAHOO!

Data Processing




01656903 FLATLICK BRANCH ABOVE FROG BRANCH AT CHANTILLY, VA
1.60
1.55
1.50
1.45
1.40
1.35
1.30
1.25
NO3-N, mg/L
12.5
12.0
11.5
11.0
10.5
10.0
9.5
Dissolved Oxygen, mg/L optical
03/12/2010
04/12/2010
05/12/2010
06/12/2010
07/12/2010
08/12/2010


01656903 FLATLICK BRANCH ABOVE FROG BRANCH AT CHANTILLY, VA
Discharge, CFS
Dissolved Oxygen, mg/L optical
100
90
80
70
60
50
40
30
20
10
0
-10
12.5
12.0
11.5
11.0
10.5
10.0
9.5
9.0
8.5
8.0
30/11/10
1/12/10
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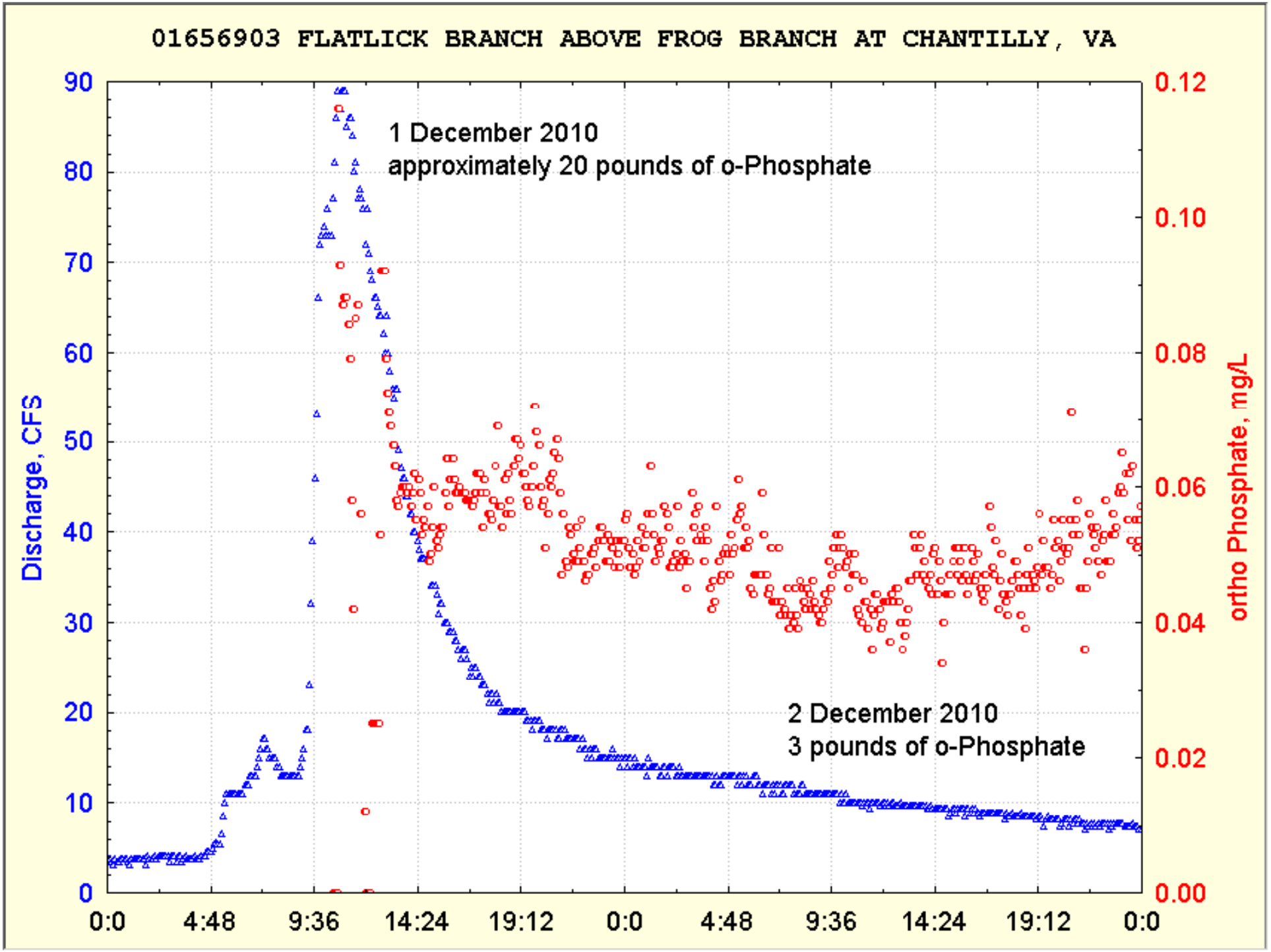
7/12/10
8/12/10


01656903 FLATLICK BRANCH ABOVE FROG BRANCH AT CHANTILLY, VA
1 December 2010
approximately 20 pounds of o-Phosphate
2 December 2010
3 pounds of o-Phosphate
Discharge, CFS
ortho Phosphate, mg/L
90
80
70
60
50
40
30
20
10
0
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0:0
4:48
9:36
14:24
19:12
0:0
4:48
9:36
14:24
19:12
0:0

Online sensor workshop
Coco Beach Florida
January 21, 2013

Questions?