



Bighorn: Real-time Continuous Structural Monitoring

Kent Lindquist

Danny Harvey

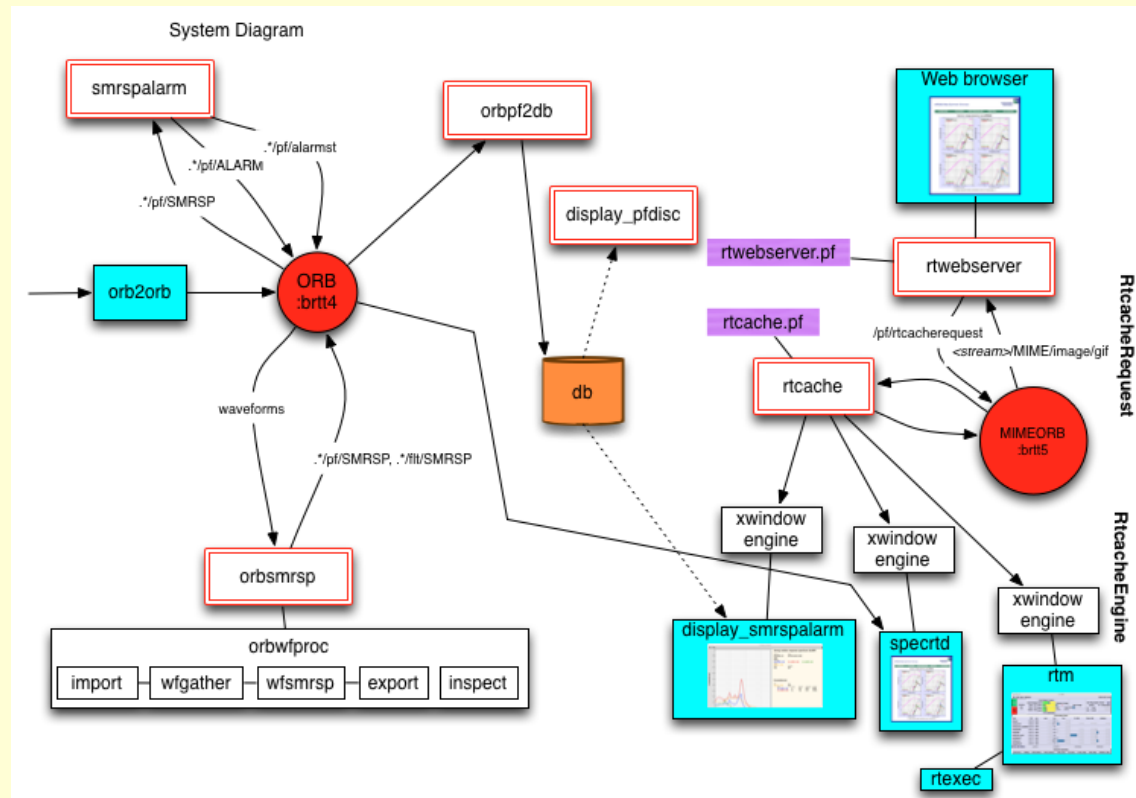
December, 2012

AGU

Bighorn

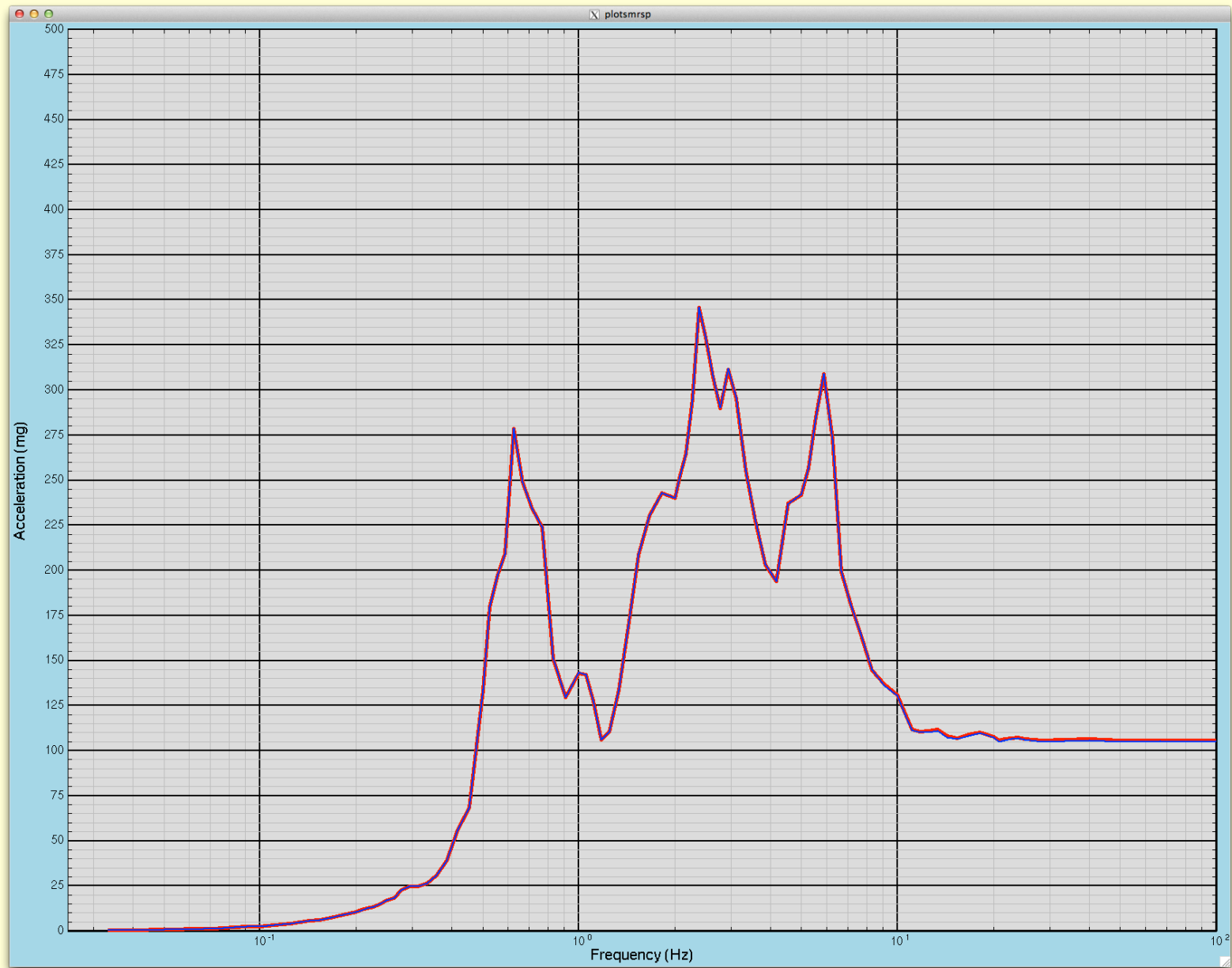
- Peregrine plus engineering analysis tools
- Antelope + rtwebserver + real-time spectral monitoring and alarm capabilities
- Monitor, study, and react to the spectral content of your data

Example Bighorn RT System



Bighorn - orbsmrsp

- New ability developed for producing continuous time-dependent strong motion response spectra
- Expanded floating point data representations within ORB packets and Datascope waveform files
- Pf ORB packets to represent time continuous strong motion response spectra
- Provides a very fast method for computing continuous time-dependent response spectra for large numbers of channels



OVERALL

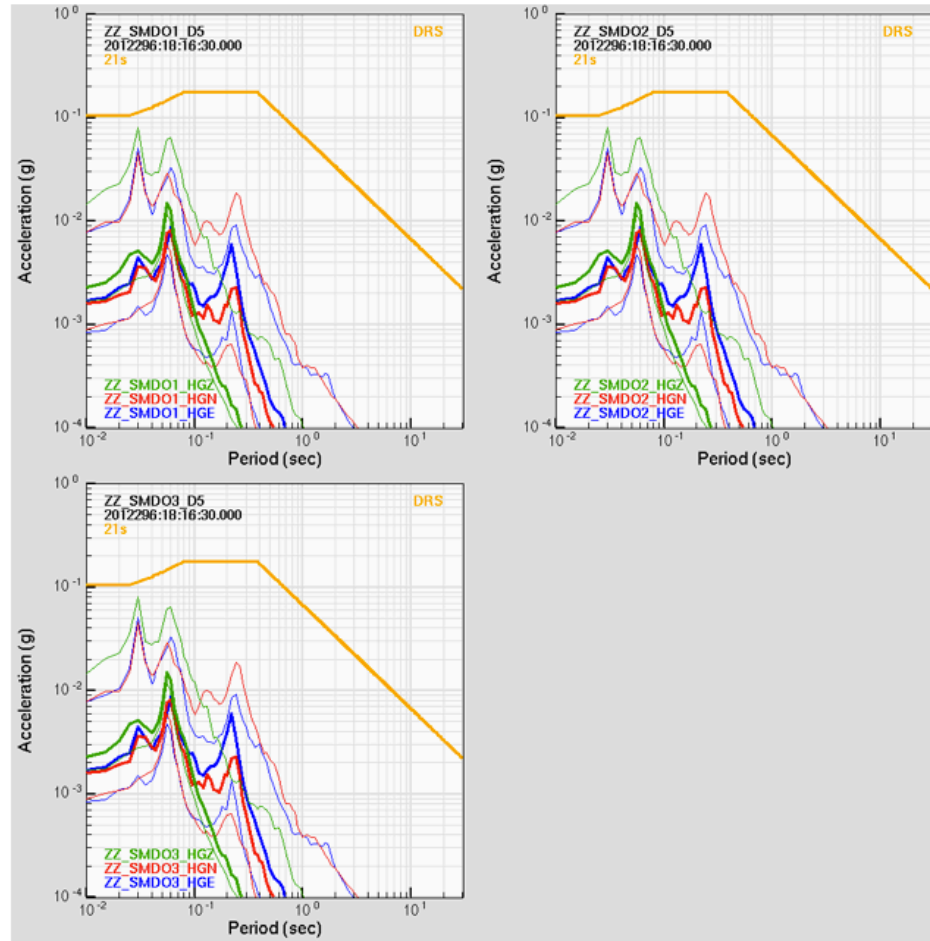
FACILITY MAP

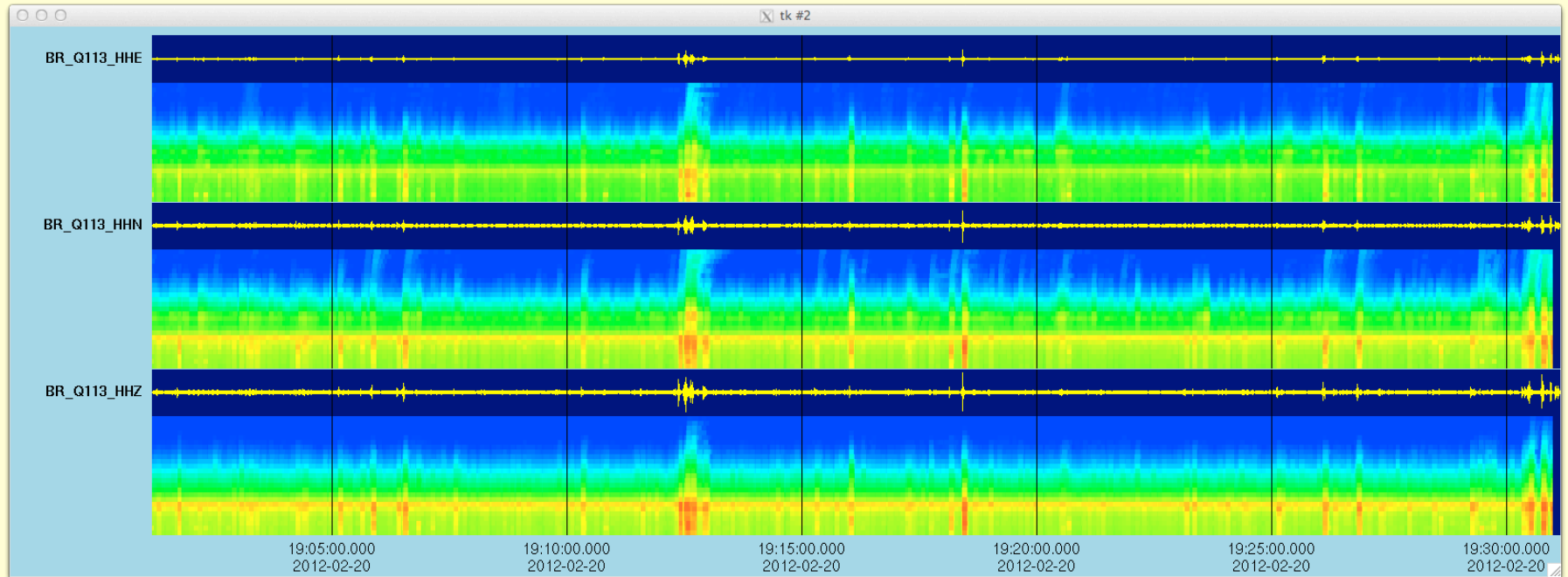
SPECTRA

FACILITY SOH

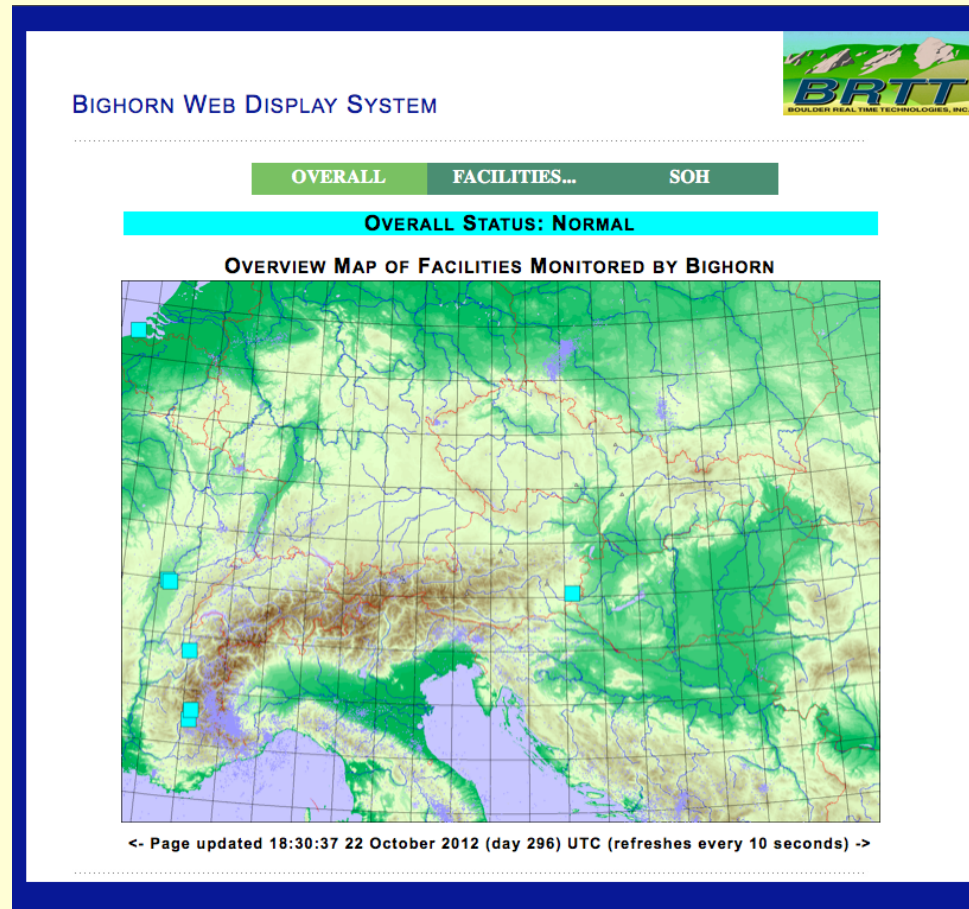
SMDemo0 FACILITY STATUS: NORMAL

OUTPUT FROM SPECTRD FOR FACILITY: SMDemo0 FACILITY

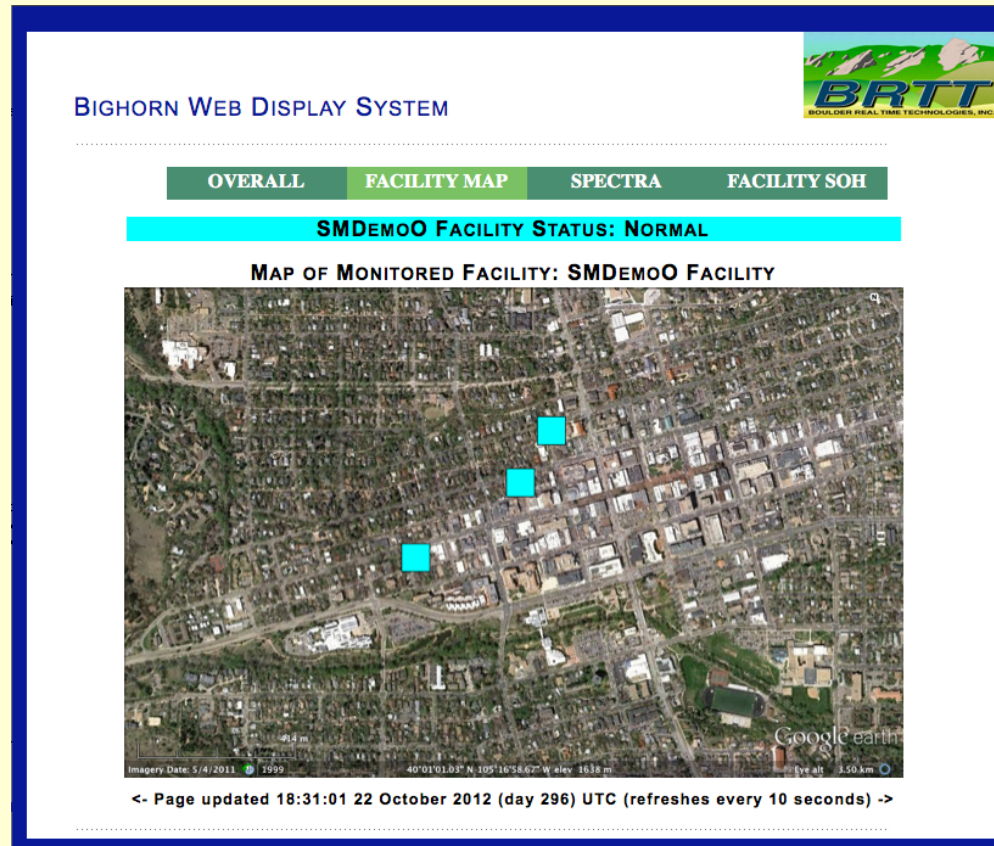




Bighorn Example: Network Overview Center




Bighorn Example: Facility Map



Bighorn Example: Stations *dlmon* for Facility

BIGHORN WEB DISPLAY SYSTEM



OVERALL

FACILITY MAP

SPECTRA

FACILITY SOH

SMDemoO FACILITY STATUS: NORMAL

OUTPUT FROM DLMON FOR FACILITY: SMDemoO FACILITY

File	Views	Windows														
dname	gp24	gp1	nr24	SLT	dtncy	runtm	ctncy	lq	cdrt	temp	volt	amp	pll	lat	lon	elev
ZZ_SMD01	0s	0s	0	07s	01s	13d21h08m11s	00s	100%	0us	26C	15.6V	152mA	L	40.019	-105.281	1612m
ZZ_SMD02	0s	0s	0	07s	01s	13d21h08m11s	00s	100%	0us	26C	15.6V	152mA	L	40.019	-105.281	1612m
ZZ_SMD03	0s	0s	0	07s	01s	13d21h08m11s	00s	100%	0us	26C	15.6V	152mA	L	40.019	-105.281	1612m

<- Page updated 18:32:14 22 October 2012 (day 296) UTC (refreshes every 10 seconds) ->

Bighorn Example: Stations *dlmon* for whole net

BIGHORN WEB DISPLAY SYSTEM

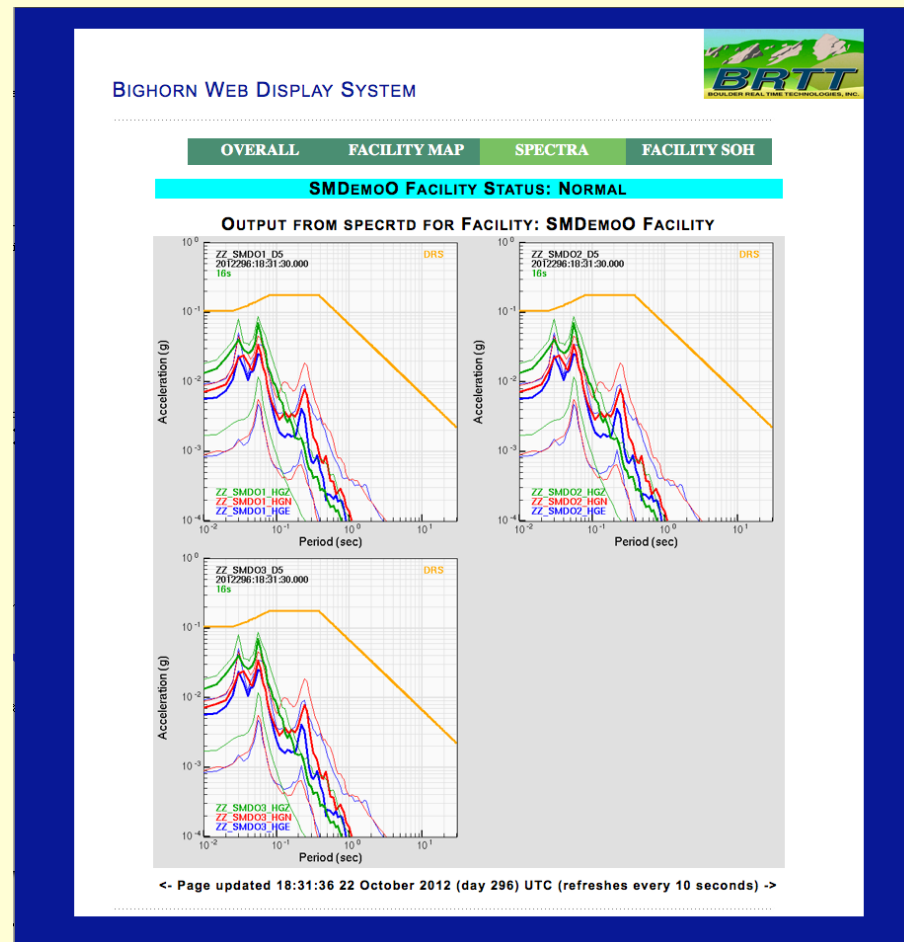
OVERALL FACILITIES... SOH

OVERALL STATUS: DATA PROBLEMS AT SMDemoP, SMDemoQ, SMDemoR, SMDemoD, SMDemoE, SMDemoG, SMDemoA, SMDemoB, SMDemoC, SMDemoO, SMDemoH, SMDemoI, SMDemoJ

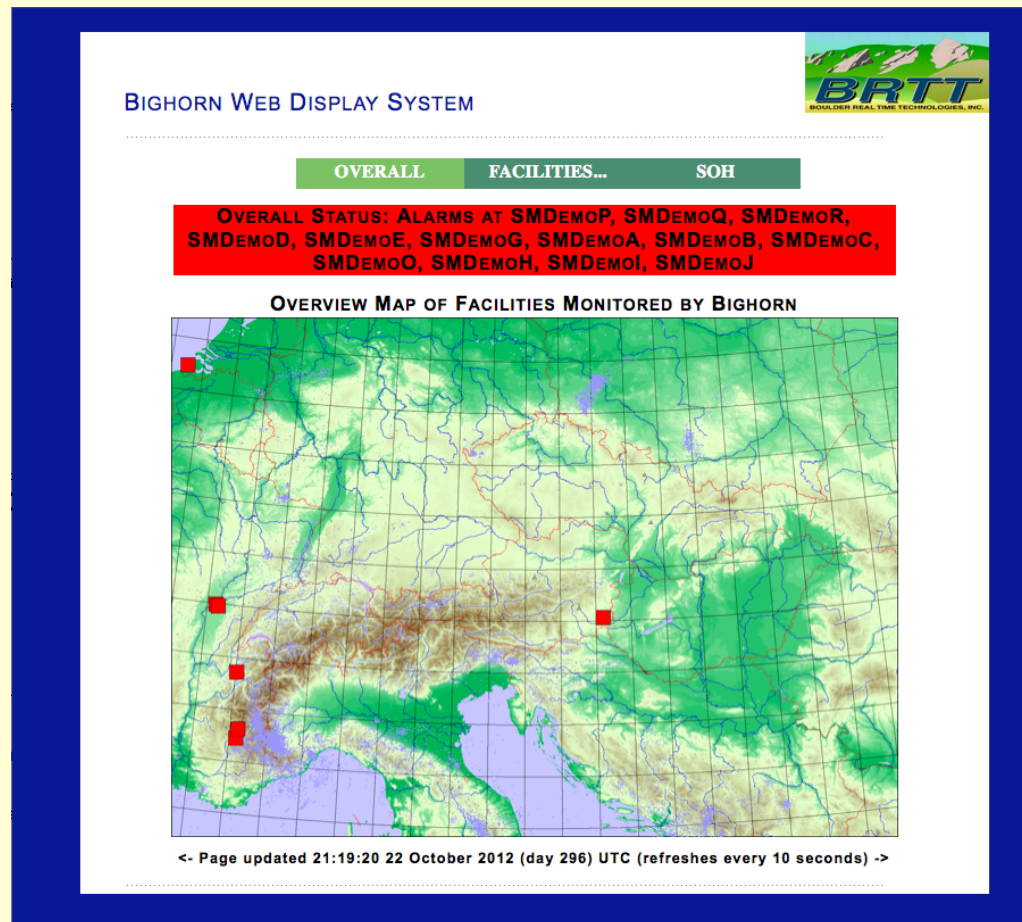
OUTPUT FROM DLMON FOR BIGHORN SYSTEM

File	Views	Windows														
dname	gp14	gp1	gp24	SLT	ctfacy	ntm	ctfacy	lcq	ctstf	temp	volt	amp	pl	lat	lon	ele
SC_SMDA1	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA2	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA3	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA4	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA5	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA6	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA7	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA8	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA9	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA10	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA11	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA12	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA13	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA14	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA15	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA16	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA17	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA18	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA19	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA20	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA21	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA22	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA23	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA24	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA25	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA26	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA27	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA28	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA29	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA30	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA31	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA32	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA33	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA34	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA35	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA36	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA37	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA38	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA39	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA40	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	
SC_SMDA41	0s	0s	0	02s	01s	14000931mA0s	00s	100%	0us	23C 15.6V	159mA	L	40.019	-105.281	1620m	

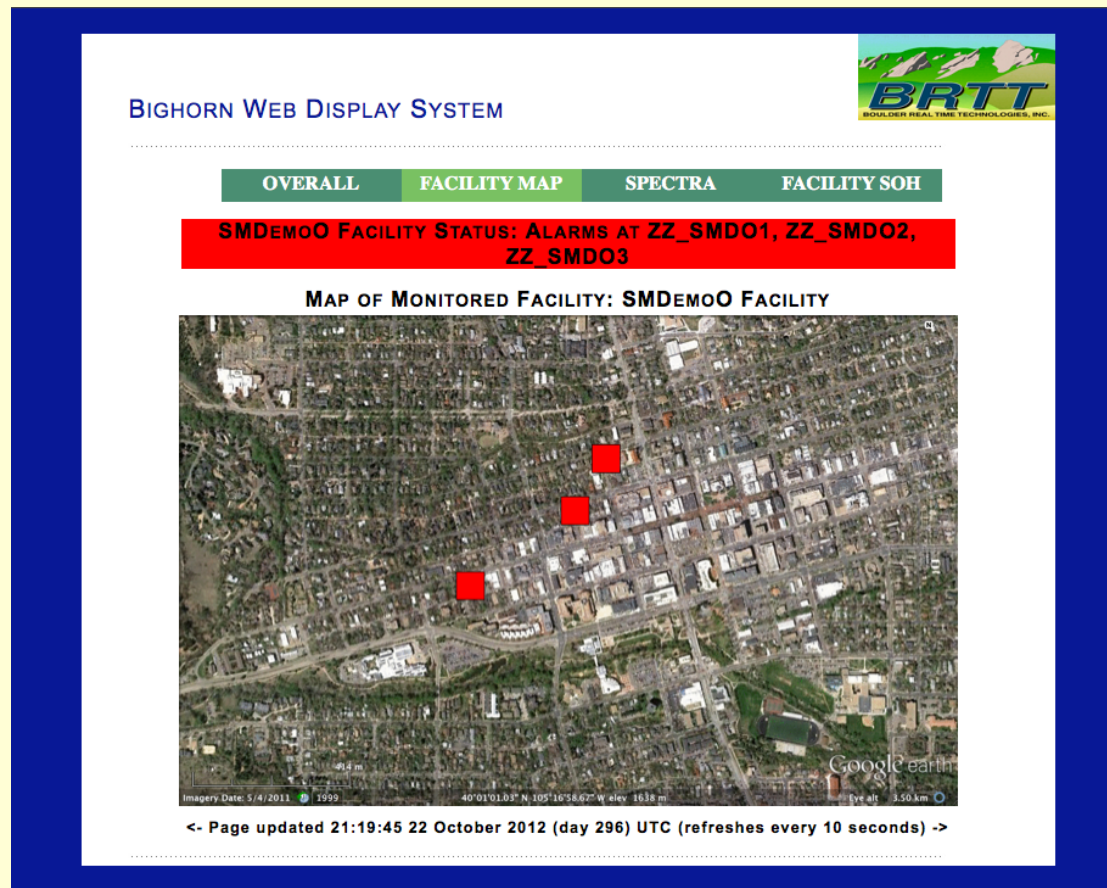
Bighorn Example: Real-time Spectral Display



Bighorn Example: Spectral Exceedence Alarm




Bighorn Example: Facility Exceedence Alarm



Bighorn Example: Station Alarms Page

BIGHORN WEB DISPLAY SYSTEM



OVERALL

FACILITY MAP

SPECTRA

FACILITY SOH

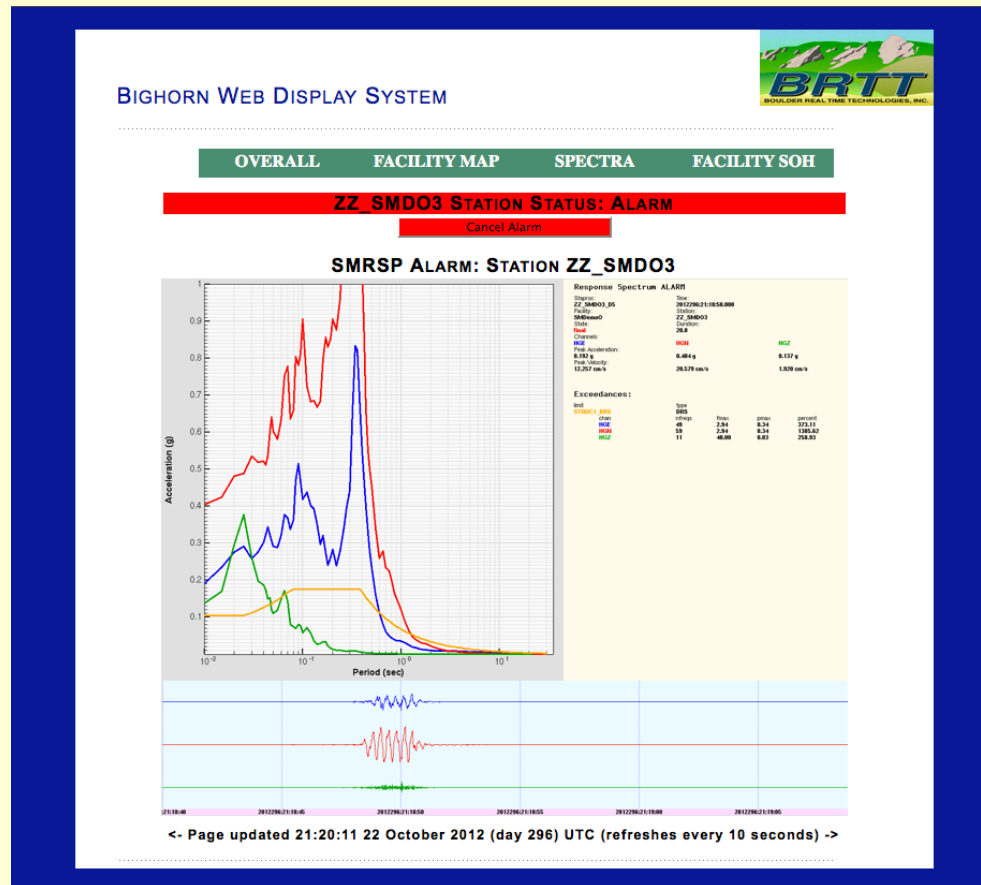
ZZ_SMDO3 STATION STATUS: ALARM

Alarms for station ZZ_SMDO3

Alarm Time	Alarm State
21:18:50 22 October 2012 (day 296) UTC	final
18:34:20 19 October 2012 (day 293) UTC	final-ack
18:32:20 19 October 2012 (day 293) UTC	final-ack
18:25:40 19 October 2012 (day 293) UTC	final-ack
18:10:50 19 October 2012 (day 293) UTC	final-ack
18:10:50 19 October 2012 (day 293) UTC	final-ack
22:37:10 18 October 2012 (day 292) UTC	final-ack
06:27:10 17 October 2012 (day 291) UTC	final-ack
16:18:30 15 October 2012 (day 289) UTC	final-ack
14:28:00 15 October 2012 (day 289) UTC	final-ack

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Bighorn Example: Alarm Report and Acknowledgment



Bighorn Example: Alarm Details

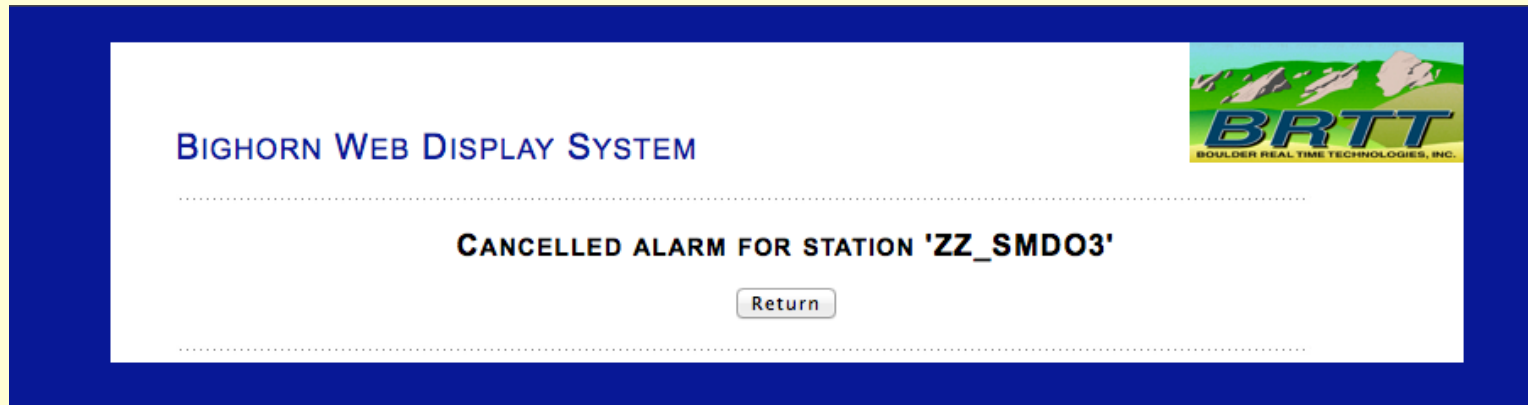
Response Spectrum ALARM

Staproc:	Time:	
ZZ_SMD03_D5	2012296:21:18:50.000	
Facility:	Station:	
SMDemo0	ZZ_SMD03	
State:	Duration:	
final	20.0	
Channels:	HGN	HGZ
Peak Acceleration:	0.404 g	0.137 g
Peak Velocity:	20.579 cm/s	1.920 cm/s

Exceedances:

limit	type			
STRUC1_DRS	DRS			
chan	nfreqs	fmax	pmax	percent
HGE	49	2.94	0.34	373.11
HGN	59	2.94	0.34	1385.62
HGZ	11	40.00	0.03	258.93

Bighorn Example: Confirmed Alarm Cancellation




Bighorn Example: Dynamic updates from database

BIGHORN WEB DISPLAY SYSTEM

OVERALL FACILITY MAP SPECTRA FACILITY SOH

SMDemoO FACILITY STATUS: ALARMS AT ZZ_SMD01, ZZ_SMD02

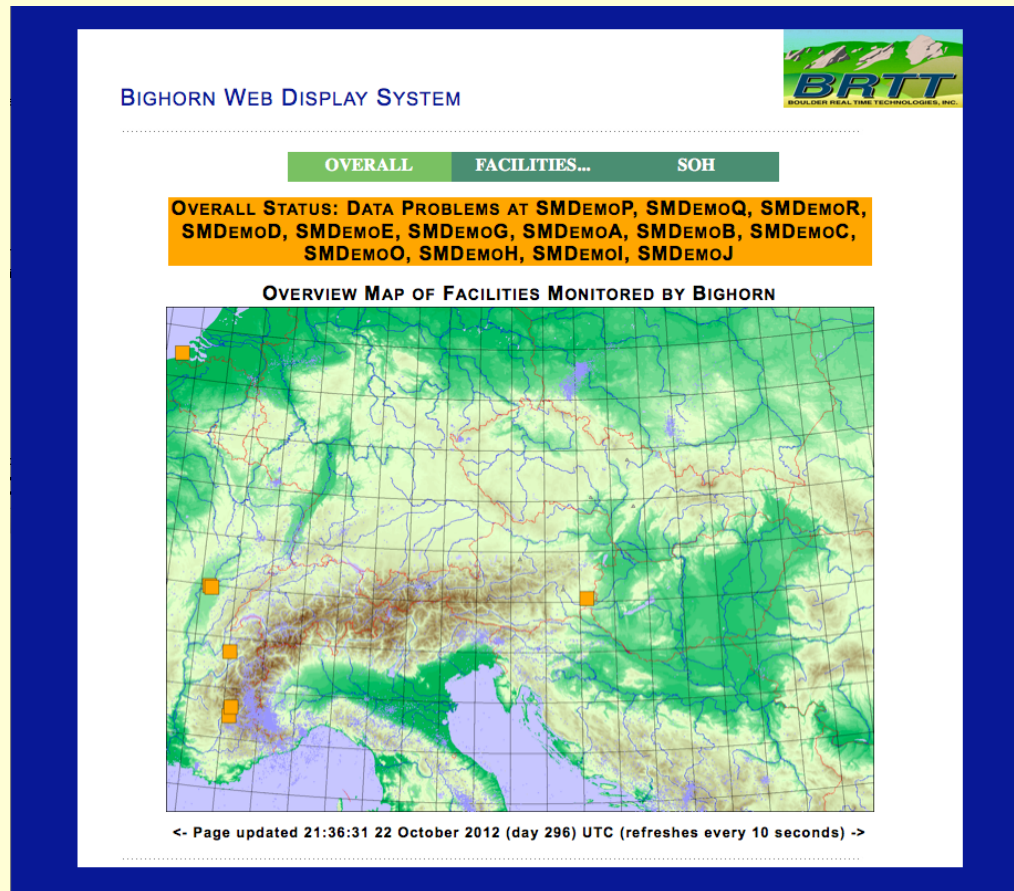
MAP OF MONITORED FACILITY: SMDemoO FACILITY



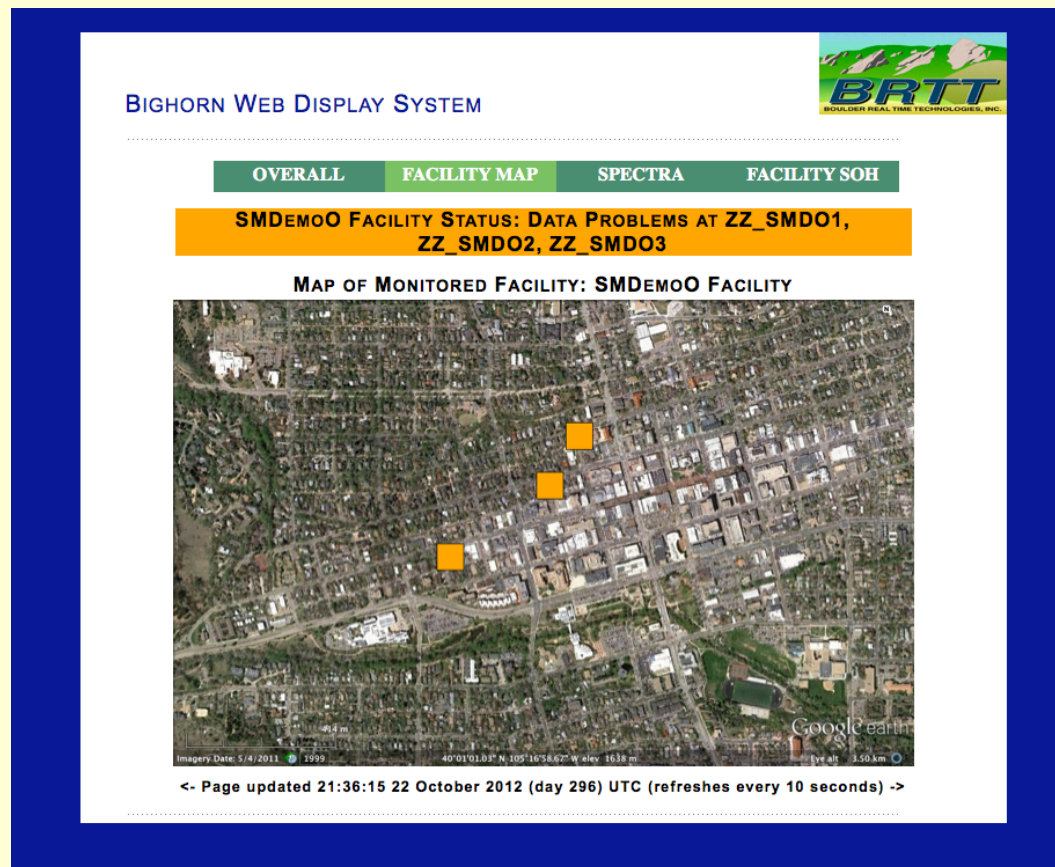
Imagery Date: 5/4/2011 40°01'01.03" N 105°16'58.62" W elev 1638 m Eye alt 3.50 km

<- Page updated 21:20:49 22 October 2012 (day 296) UTC (refreshes every 10 seconds) ->

Bighorn Example: Data Problem Detection



Bighorn Example: Data Problem Detection



Bighorn Example: Data Problem Analysis

The screenshot shows a web browser window displaying the 'BIGHORN WEB DISPLAY SYSTEM'. The browser tabs include 'Facility 'SMDemoO Facility' State Of Health', 'Facility 'SMDemoO Facility' Stat...', 'System Overview Map', and 'CSN Demo Real-time Streaming...'. The address bar shows 'quandary:8010/facsoh/SMDemoO'. The page has a blue header with the BRTT logo. Below the header, there are four tabs: 'OVERALL', 'FACILITY MAP', 'SPECTRA', and 'FACILITY SOH'. The 'OVERALL' tab is selected, showing 'SMDemoO FACILITY STATUS: NORMAL'. Below this, it says 'OUTPUT FROM DLMON FOR FACILITY: SMDemoO FACILITY'. There is a table with columns: File, Views, Windows, cfac, nstn, cfac, kq, cktf, temp, vol, amp, pH, ht, kn, ewv. The table has three rows of data, all with green status indicators. At the bottom, it says '<- Page updated 18:32:04 22 October 2012 (day 296) UTC (refreshes every 10 seconds) ->'. The BRTT logo is also visible in the top right corner of the page content.

BIGHORN WEB DISPLAY SYSTEM

OVERALL FACILITY MAP SPECTRA FACILITY SOH

SMDemoO FACILITY STATUS: NORMAL


OUTPUT FROM DLMON FOR FACILITY: SMDemoO FACILITY

File	Views	Windows	cfac	nstn	cfac	kq	ctkf	temp	vol	amp	pH	ht	kn	ewv	
0s	0s	0	28s	01s	1352107m0s	00s	100%	0us	28C	15.6V	157mA	L	40.019	-105.281	1612m
0s	0s	0	28s	01s	1352107m0s	00s	100%	0us	28C	15.6V	157mA	L	40.019	-105.281	1612m
0s	0s	0	28s	01s	1352107m0s	00s	100%	0us	28C	15.6V	157mA	L	40.019	-105.281	1612m

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Bighorn Example: Historic Report Exploration

BIGHORN WEB DISPLAY SYSTEM



OVERALL FACILITY MAP SPECTRA FACILITY SOH

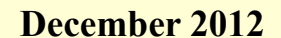
ZZ_SMD01 STATION STATUS: NORMAL

Alarms for station ZZ_SMD01

Alarm Time	Alarm State
18:34:20 19 October 2012 (day 293) UTC	final-ack
18:32:20 19 October 2012 (day 293) UTC	final-ack
18:25:40 19 October 2012 (day 293) UTC	final-ack
18:10:50 19 October 2012 (day 293) UTC	final-ack
18:10:50 19 October 2012 (day 293) UTC	final-ack
22:37:10 18 October 2012 (day 292) UTC	final-ack
06:27:10 17 October 2012 (day 291) UTC	final-ack
16:18:30 15 October 2012 (day 289) UTC	final-ack
14:28:00 15 October 2012 (day 289) UTC	final-ack
14:24:20 15 October 2012 (day 289) UTC	final-ack

<- Page updated 18:32:32 22 October 2012 (day 296) UTC (refreshes every 10 seconds) ->

BRTT



Thank You

- For Purchase Information on Bighorn,
contact Ogie Kuraica at Kinometrics, Inc.
– ogie@kmi.com