



Cheeka Peak Observatory (CPO)

James Werner

Senior Air Monitoring Technician
Olympic Region Clean Air Agency
Olympia, Washington

Project Partners

ORCAA is working with various stakeholders, including the Makah Tribe, EPA Region 10, the University of Washington, Puget Sound Clean Air Agency (PSCAA) and the Washington State Department of Ecology, to change the emphasis of the site from short-term research to a long-term background air quality monitoring site.

Project Goals

- Change the emphasis of the site from short-term research to a long-term background air quality monitoring site.
- Develop into an NCORE facility
- Focus on the transition of the operation, maintenance and real-time data acquisition at CPO to assure consistency with Washington state air monitoring network.

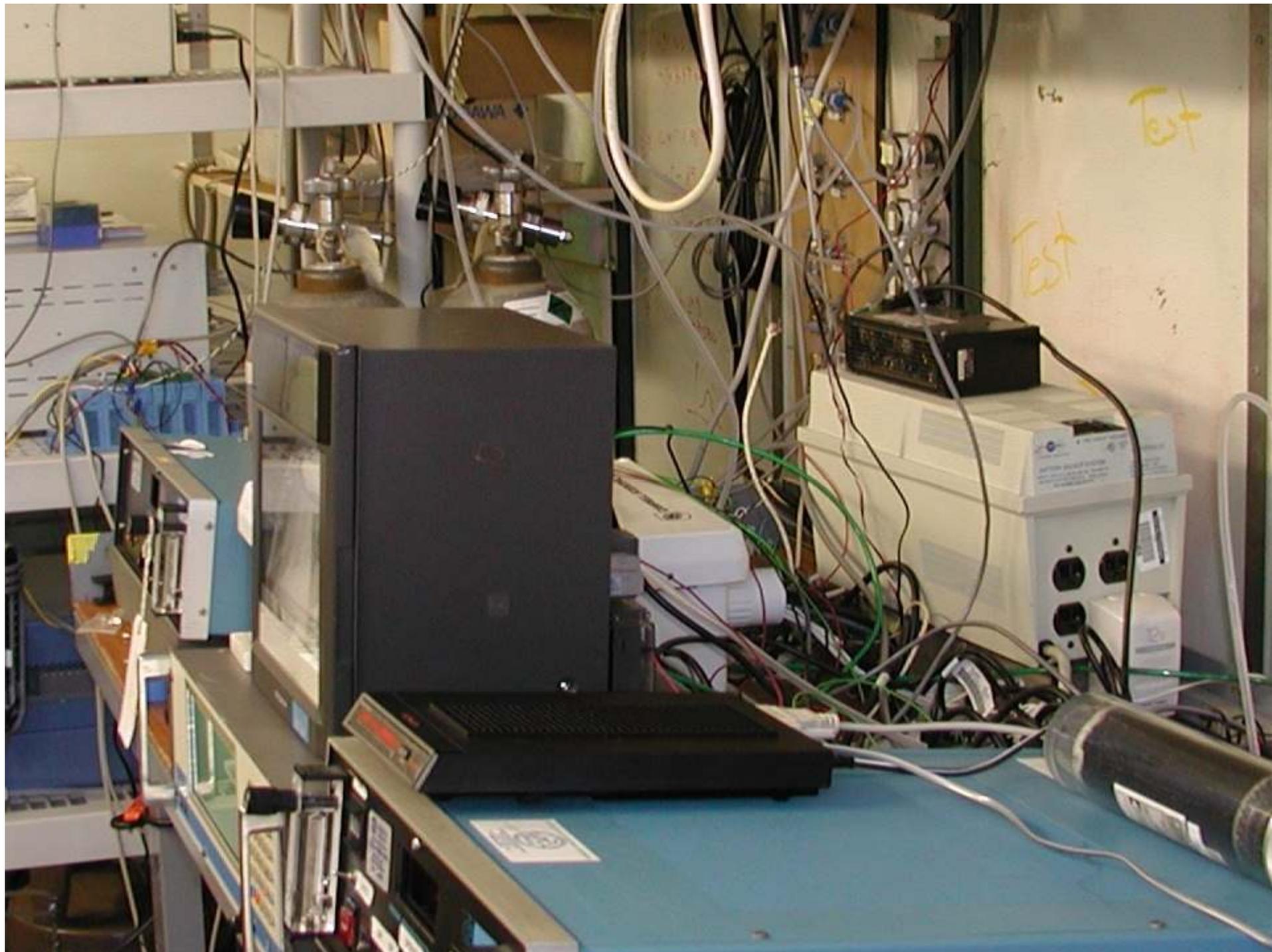
Description

- Use monitors, analyzers, and methods that are used in the Washington state and local monitoring network
- Use EPA SOP's as a guide for implementing trace gas monitoring.

Project Plan

- Current measurements of wind speed-direction, Temperature, Relative Humidity, Total Solar Radiation, NO_y, SO₂, O₃ and PM_{2.5}-Visibility-light scatter by heated nephelometer allowing researchers and regulators to identify and characterize major transport episodes, and to identify the likely sources (e.g. dust, smoke). These measurements will provide additional tools to characterize important source types and new measurements will be added to the existing measurements at CPO over the next several years as funding allows.

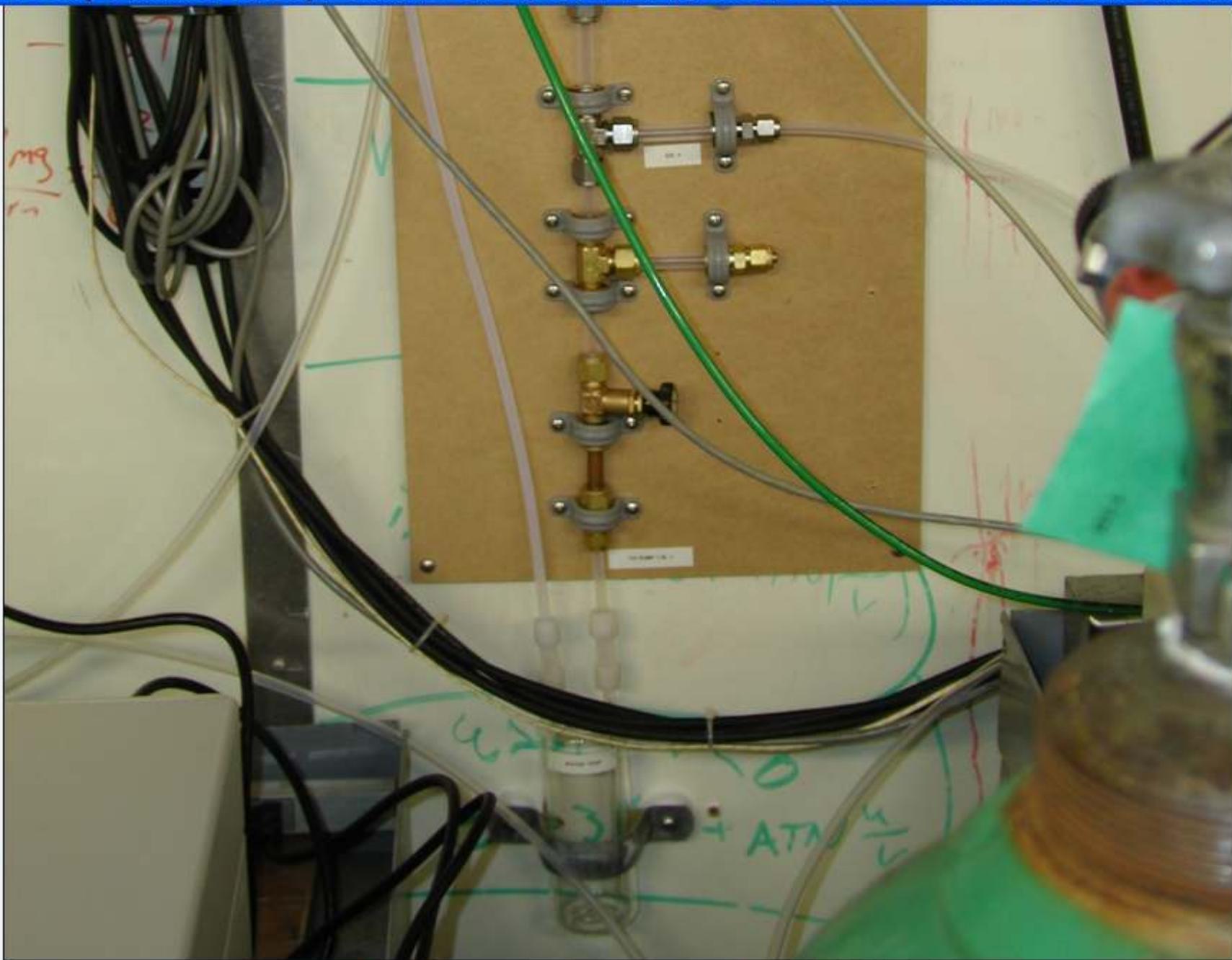














Sabio Instruments, Inc.

103A Halmar Cove
P.O. Box 5059
Georgetown, TX 78628 USA

Voice: 512- 869-0544
Fax: 512- 869-0993

Bill To:
Olympic Region Clean Air Agency
2940-B Limited Lane NW
Olympia, WA 98502
USA

Ship To:
Same as Bill To:
Attn: James Werner

Customer ID	Customer PO	
OLYMPIC RCAA	SP2695	
Sales Rep ID	Shipping Method	Ship Date
	UPS RED	3/31/06

Quantity	Item	Description	Unit
1.00	4010-100	Model 4010 Gas Dilution Calibrator	
1.00	4010-02	Diluent Mass Flow Controller, 0-10 SLM	
1.00	4010-05	Source Mass Flow Controller, 0-100 SCCM	
1.00	4010-50	Single Port Diluent Gas Manifold	
1.00	4010-30	4-Port Source Gas Manifold	
1.00	4010-16	Ozone Generator, 0.05-1.5 PPM @ 5 SLM	
1.00	4010-18	Ozone Generator Optical Servo Control Loop	
1.00	4010-48	Universal Input 98-264 VAC, 50/60 Hz Power Supply	
1.00	4010-27	Digital Input/Output, 24 Bits	
1.00	4010-35	Rack Mount Kit for 19"	
1.00	1001-100	Model 1001, Compressed Air Source	
1.00	1001-01	Standard 22 SLM @ 25 PSIG	
1.00	1001-05	Line Voltage, Standard 98-132 VAC	
1.00	1001-08	CO Catalytic Oxidizer	

Quoted To:
 Olympic Region Clean Air Agenc
 2940-B Limited Lane NW
 Olympia, WA 98502
 USA

Customer: James P. Werner
Fax:
Voice: 360 586 1044 Ext. 1

Customer ID	Good Thru	Payment Terms
OLYMPIC RCAA	8/17/06	Net 30 Days

Quantity	Item	Description	Unit
1.00	1001-2104	Purafil, Per Pound, (Removes NOX, NO2, NO)	
1.00	1001-2105	Purakol, Per Pound, (Removes SO2, O3, H2S)	
1.00	1001-2079	Hopcalite, Per Pound, (Removes CO and Light Hydrocarbons)	
4.00	1001-3618	Inlet Filter for Pump, Removes Particulates	
		Media for two years of operation. Inlet filters for two years operation with change semi-annually. Change filters more often if major discolorization occurs before six month interval.	

Calibration Gas CC 105850

- CO = 100.6 ppm
- NO/NOX = 10.03 ppm
- SO2 = 9.9 ppm

NOY Converter Test CC101305

N-Proply Nitrate = 1.007 ppmv

Thermo
ELECTRON CORPORATION



SO2 PPM .02
15:44 0.01E

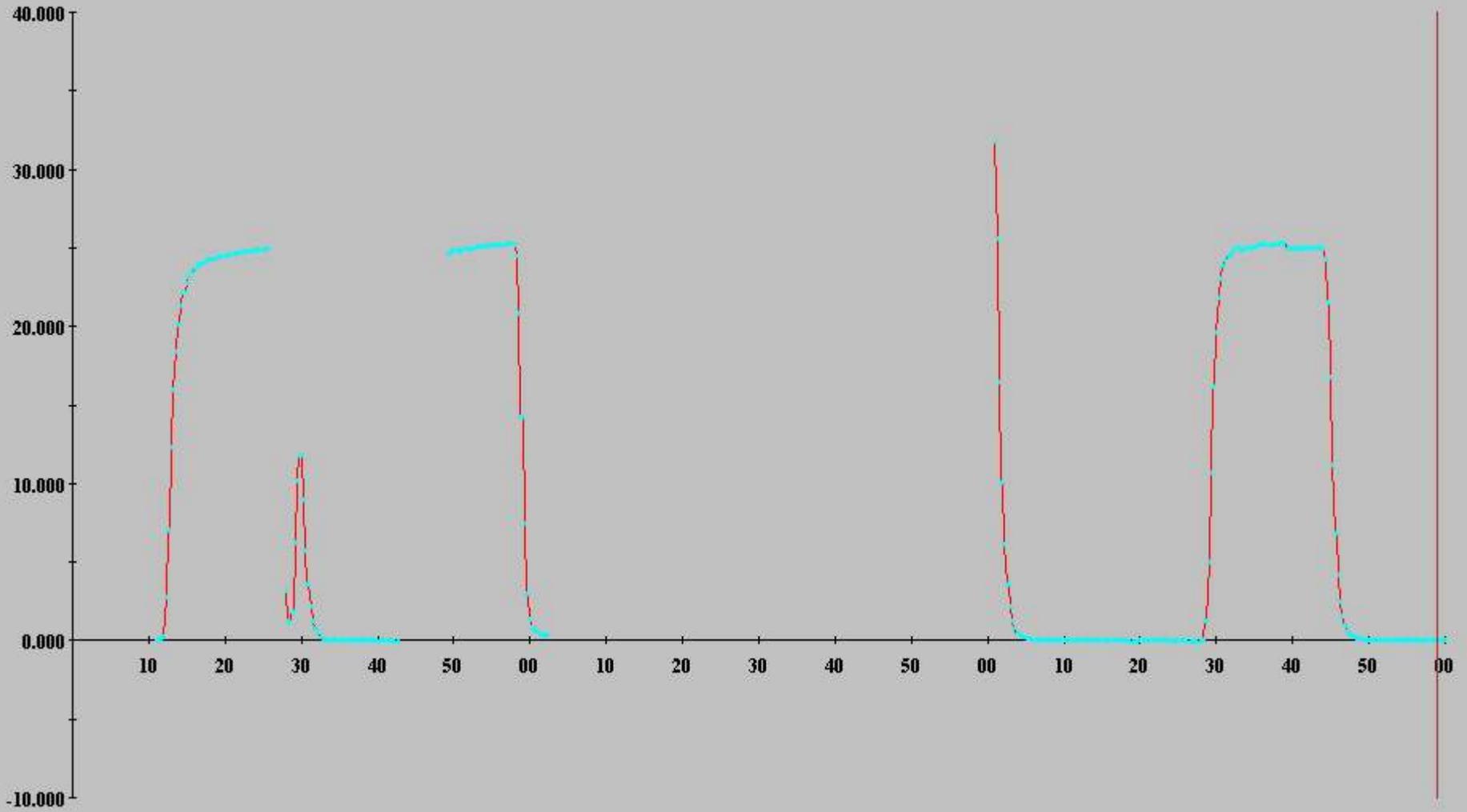


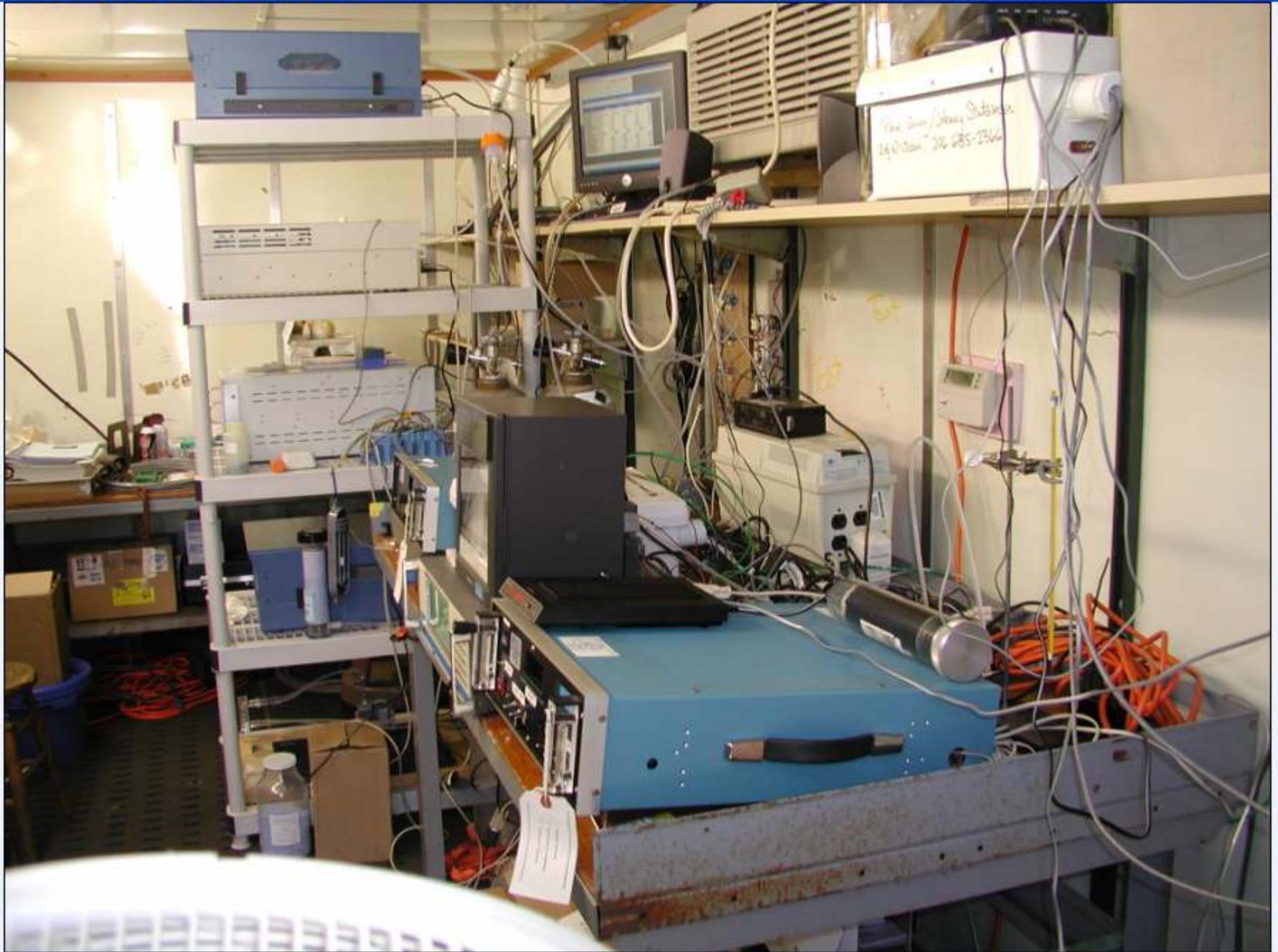
43C SO₂ Analyzer
Trace Level - Enhanced





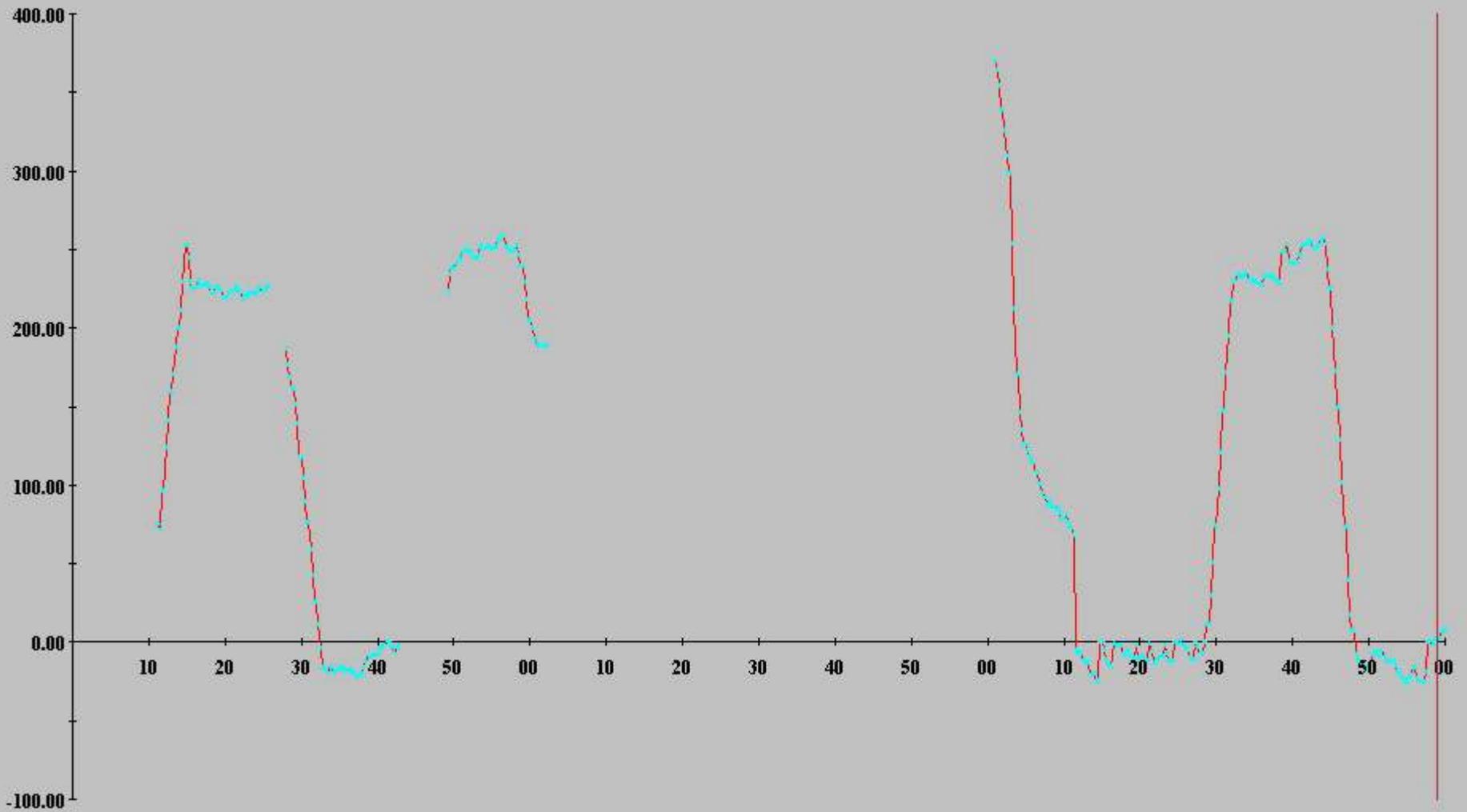
Station: Cheeka Peak SO2 ppb 11:00 - 14:00







Station: Cheeka Peak CO ppb 11:00 - 14:00



Thermo
ELECTRON CORPORATION



NO PPB -0.04
DIF PPB -0.03
NO_y PPB -0.07
10:16 REMOTE



42C NO_y Analyzer

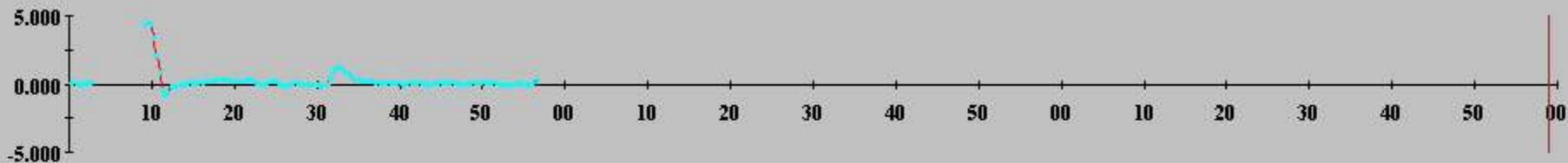




Instant Graph

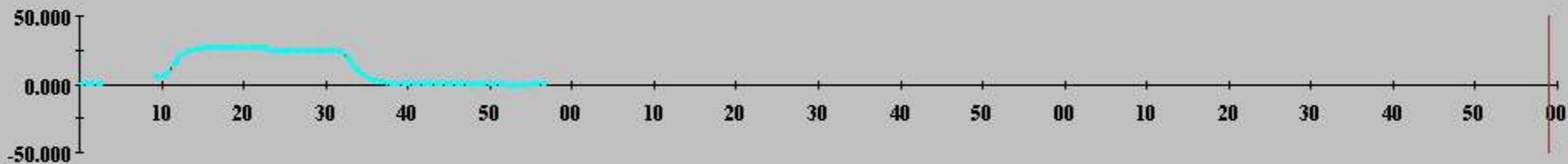
Wind Polar

Station: Cheeka Peak Diff ppb 13:00 - 16:00



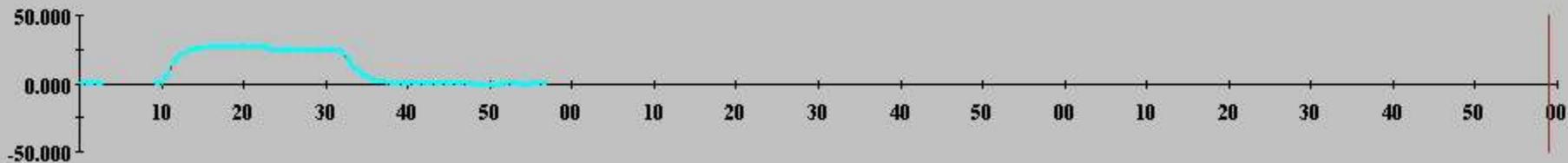
Instant Graph

Station: Cheeka Peak NOy ppb 13:00 - 16:00



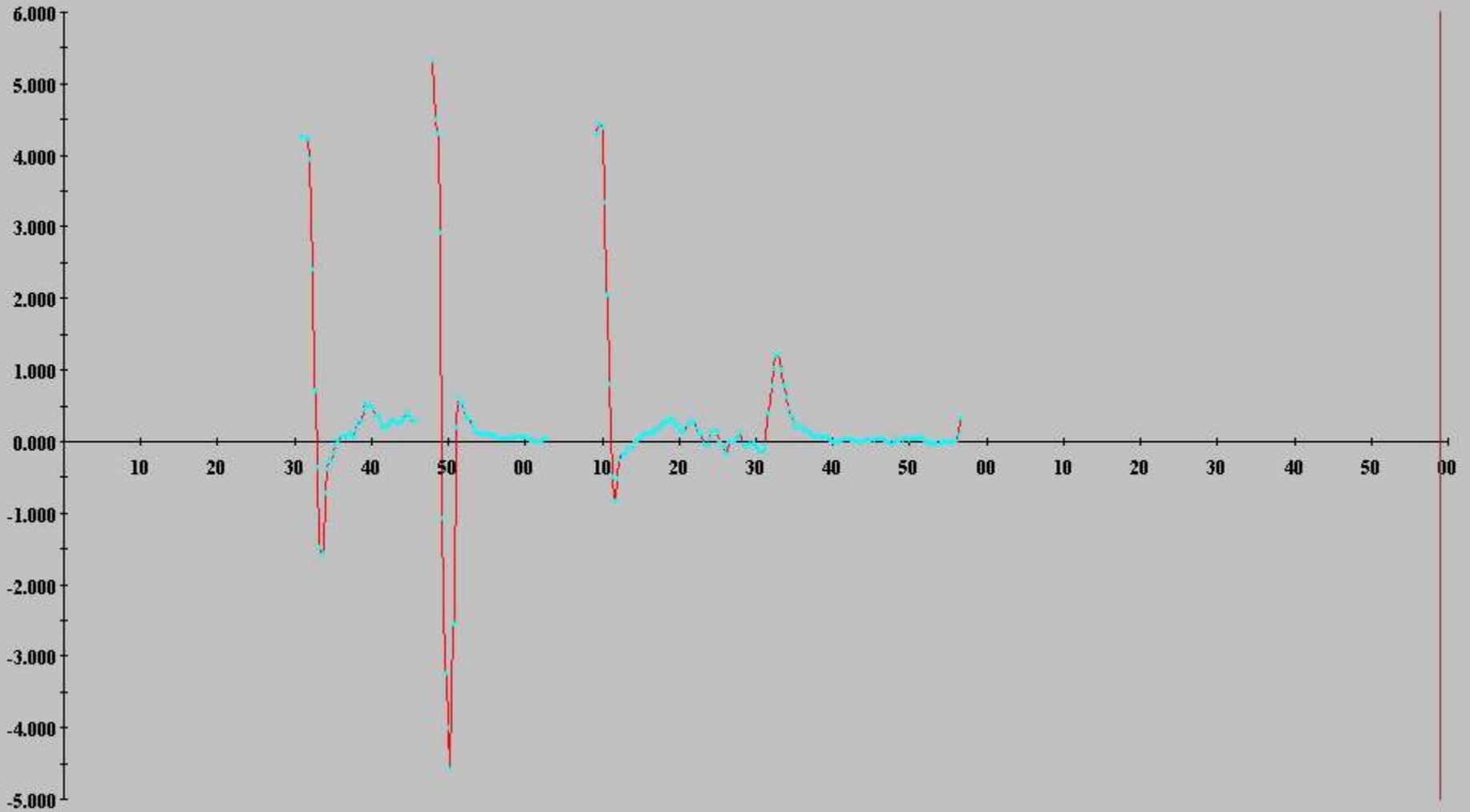
Instant Graph

Station: Cheeka Peak NO ppb 13:00 - 16:00



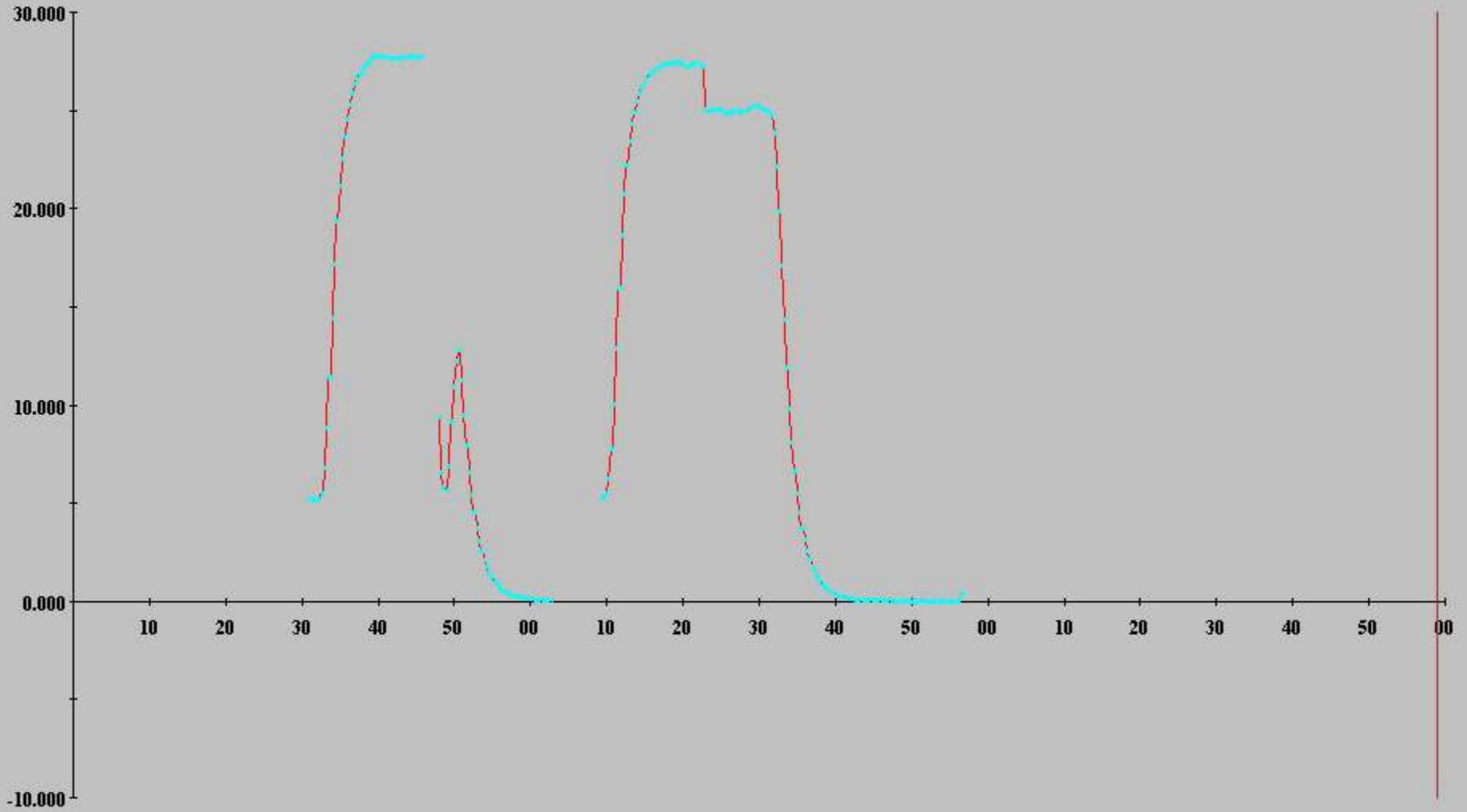


Station: Cheeka Peak Diff ppb 12:00 - 15:00



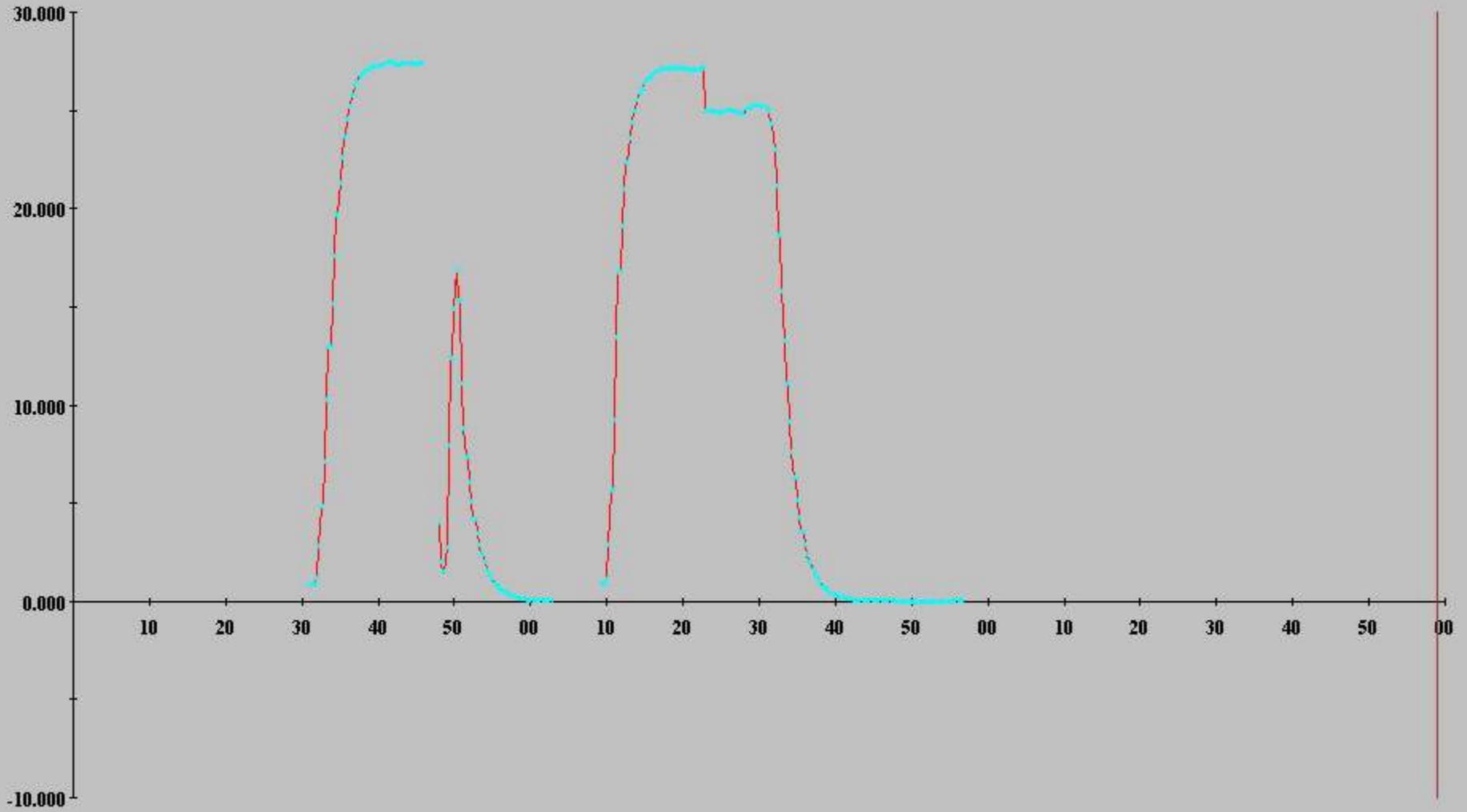


Station: Cheeka Peak NOy ppb 12:00 - 15:00





Station: Cheeka Peak NO ppb 12:00 - 15:00

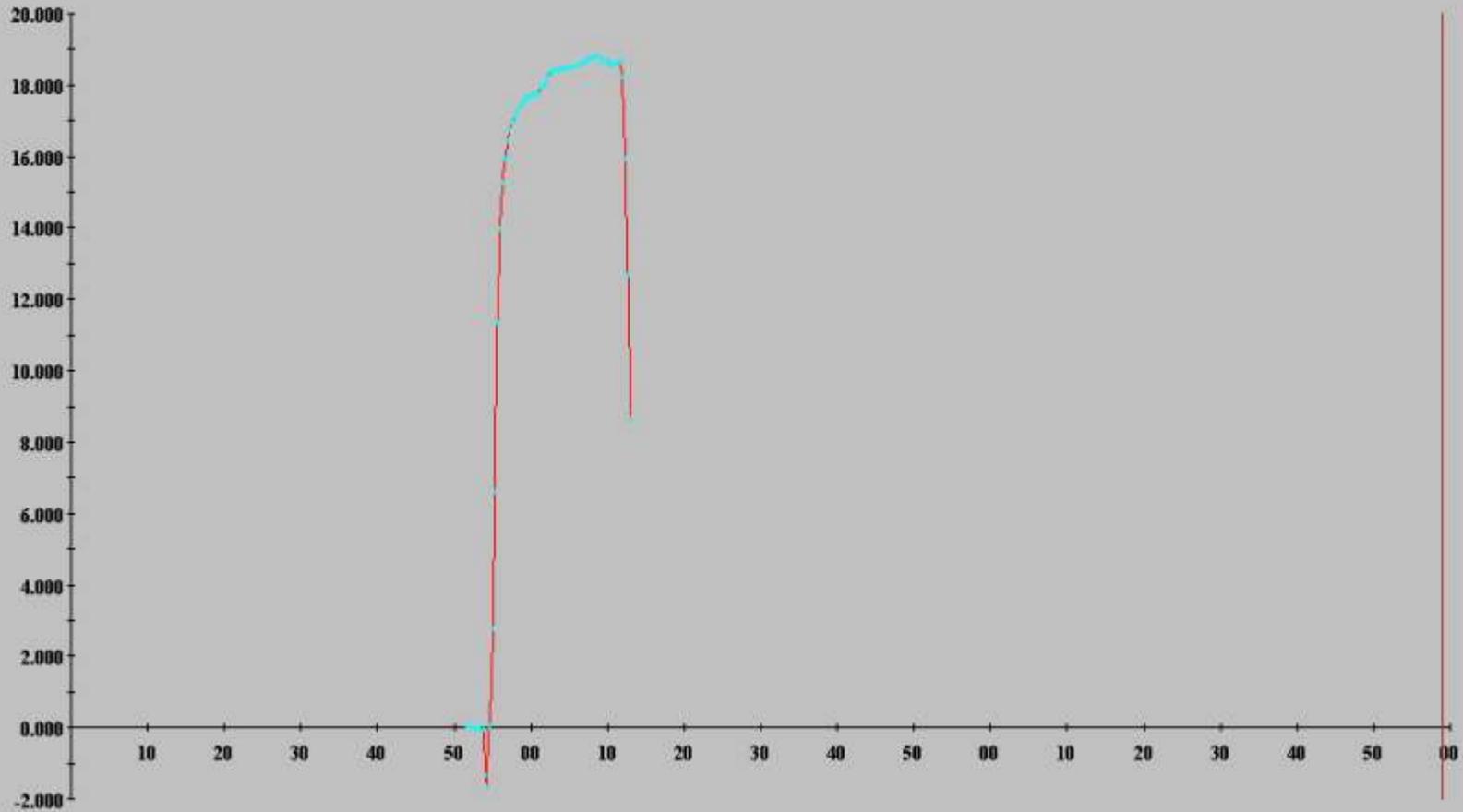


Envidas For Windows Reporter - [Instant Graph]

File Dynamic Reports Analyze Edit Utilities Configuration Fast Report Window Help



Station: Cheeka Peak Diff ppb 16:00 - 19:00



Idle 10/19/2006 8:38 PM

start Envidas for Windows ... Removable Disk (F:) Calculator Envidas For Windows... F:\CAL JUNE 29 OCT ... 8:38 PM

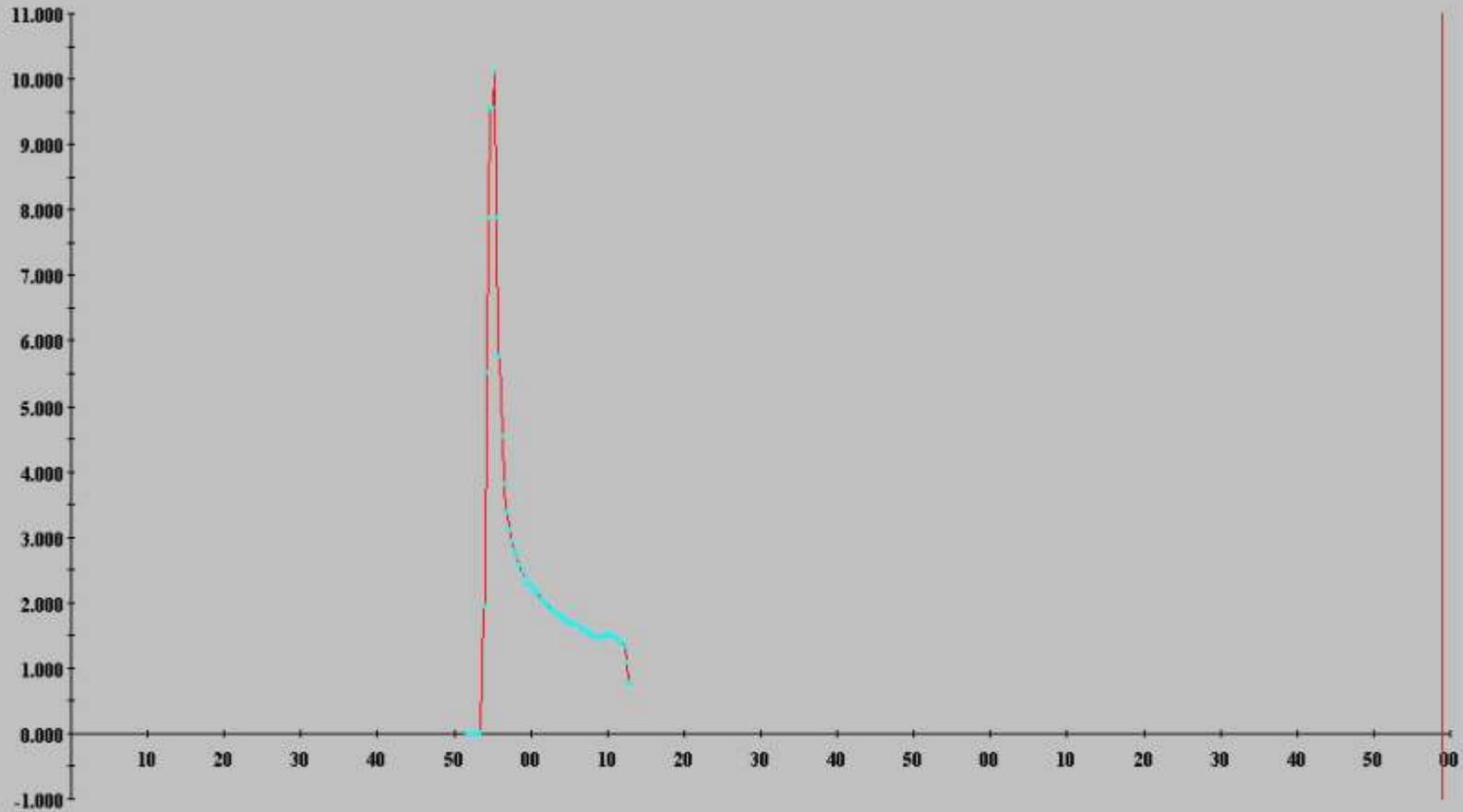


Envidas For Windows Reporter - [Instant Graph]

File Dynamic Reports Analyze Edit Utilities Configuration Fast Report Window Help



Station: Cheeka Peak NO ppb 16:00 - 19:00



Idle 10/19/2006 8:43 PM

start Envidas for Windows ... Removable Disk (F:) Calculator Envidas For Windows... F:\CAL JUNE 29 OCT ... 8:43 PM

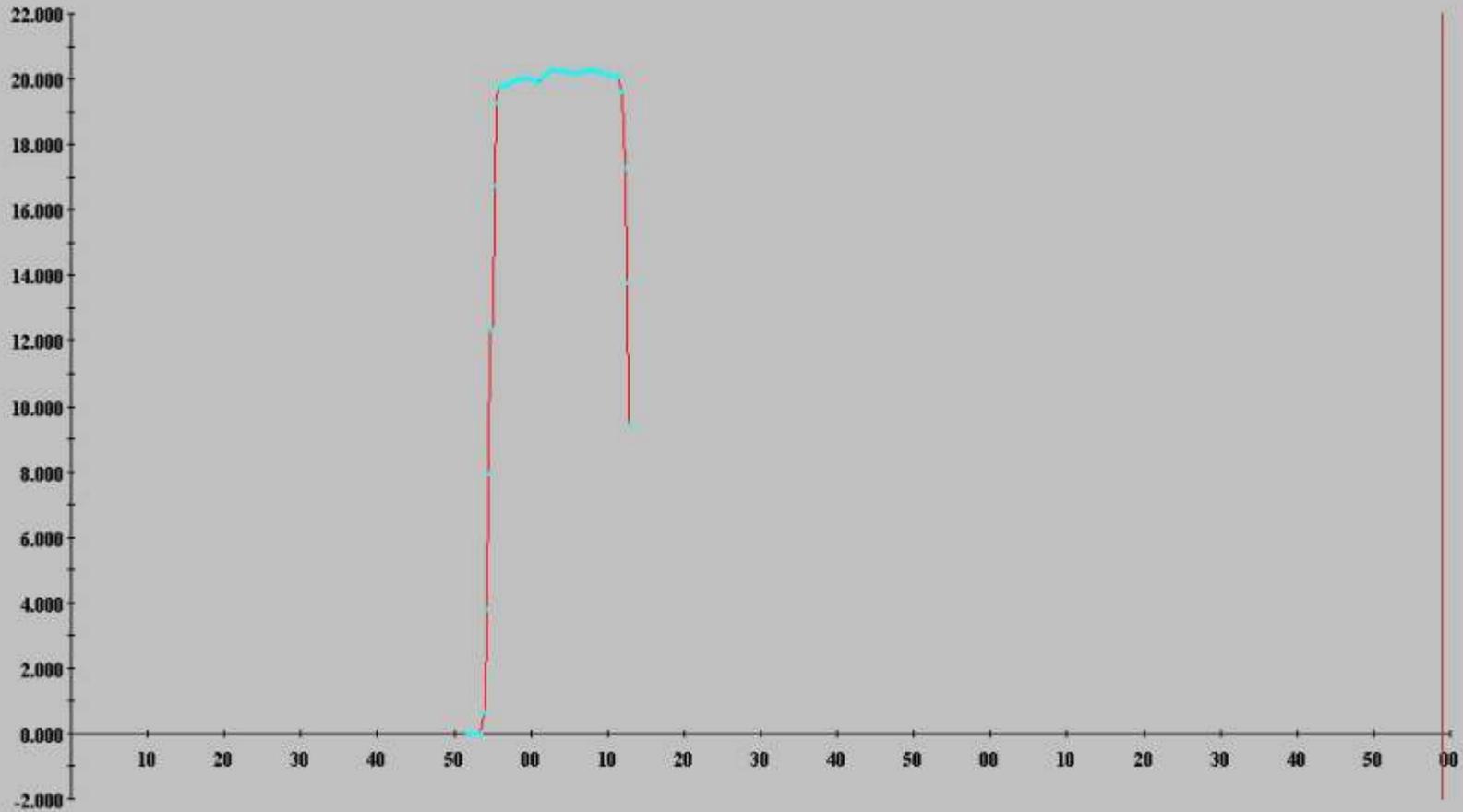


Envidas For Windows Reporter - [Instant Graph]

File Dynamic Reports Analyze Edit Utilities Configuration Fast Report Window Help



Station: Cheeka Peak NOy ppb 16:00 - 19:00



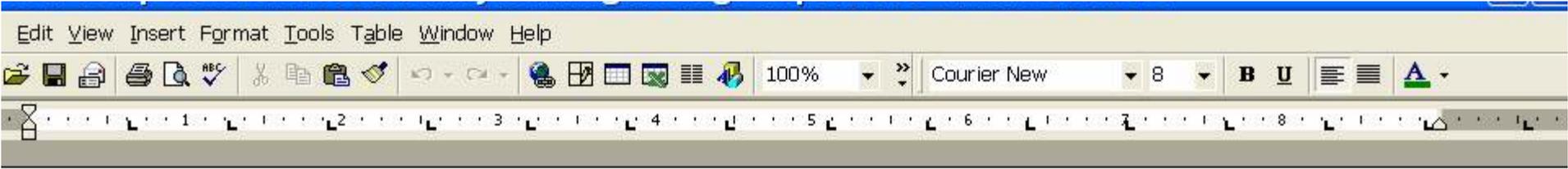
Idle 10/19/2006 8:39 PM

start Envidas for Windows ... Removable Disk (F:) Calculator Envidas For Windows... F:\CAL JUNE 29 OCT ... 8:39 PM



Daily Calibration

Date Time	Mon.	Units	ZRef.	SRef.	ZMes.	SMes.	Zero	Factor	SDiff%
10/15/2006 21:36	CO	ppb	0	250	14.09	258.51	14.09	1.023	3.4
10/15/2006 21:36	SO2	ppb	0	25	-0.014	24.628	-0.014	1.015	-1.5
10/15/2006 22:36	NO	ppb	0	25	0.006	25.03	0.006	0.999	0.1
10/15/2006 22:36	NOy	ppb	0	25	-0.031	25.127	-0.031	0.994	0.5
10/15/2006 22:36	Diff	ppb	0	0	-0.036	0.093	-0.036	0	
10/16/2006 21:36	CO	ppb	0	250	3.98	258.89	3.98	0.981	3.6
10/16/2006 21:36	SO2	ppb	0	25	-0.007	24.643	-0.007	1.014	-1.4
10/16/2006 22:36	NO	ppb	0	25	0.011	25.617	0.011	0.976	2.5
10/16/2006 22:36	NOy	ppb	0	25	-0.014	25.732	-0.014	0.971	2.9
10/16/2006 22:36	Diff	ppb	0	0	-0.023	0.106	-0.023	0	



Monthly Running Average Report
 Run Date: 11/03/06 02:40
 (1 Hour Rolling Averages)

SITE NAME: CHEEKAPK : 53-009-0013	PARAMETER NAME: RTEMP	MONTH: October
ADDRESS: LOGGING ROAD NEAR NEAH BAY	PARAMETER CODE: 62107	YEAR: 2006
LAT/LONG: 048 18' 00" / 124 37' 36"	METHOD: 40	DECIMAL POSITIONER: 0
ELEVATION: 466	UNITS: DEG F	PROJECT: 05

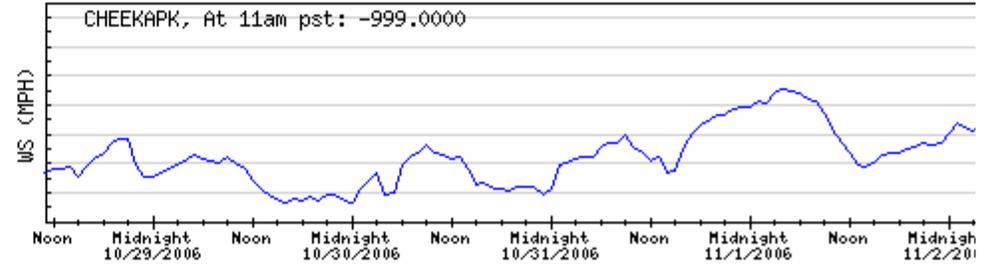
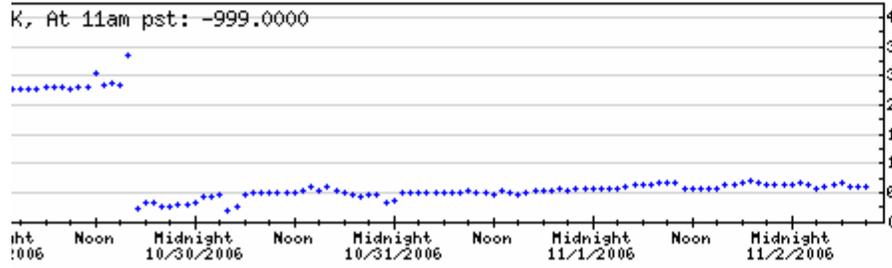
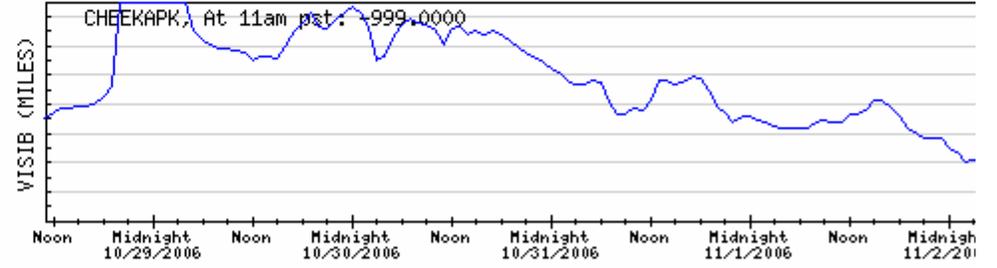
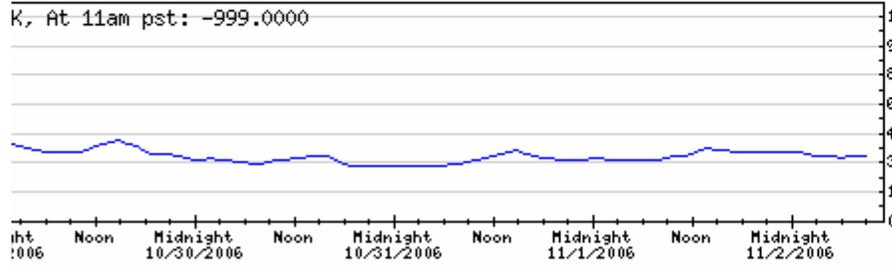
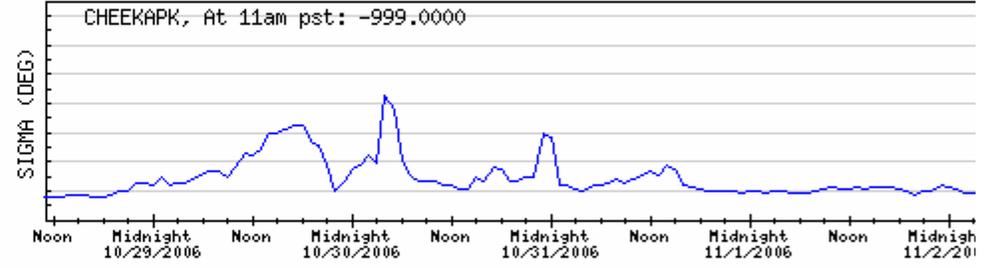
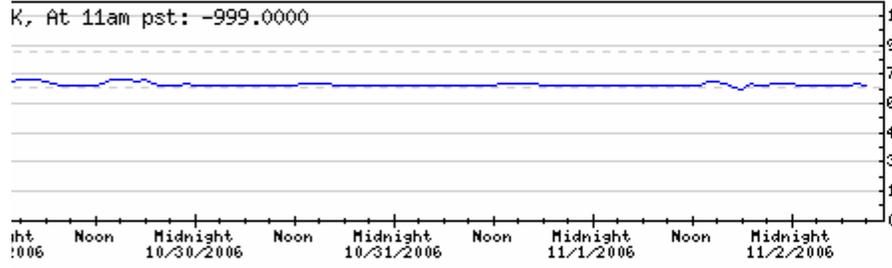
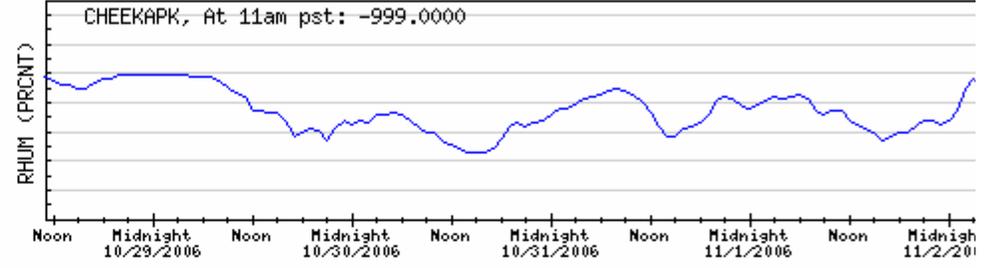
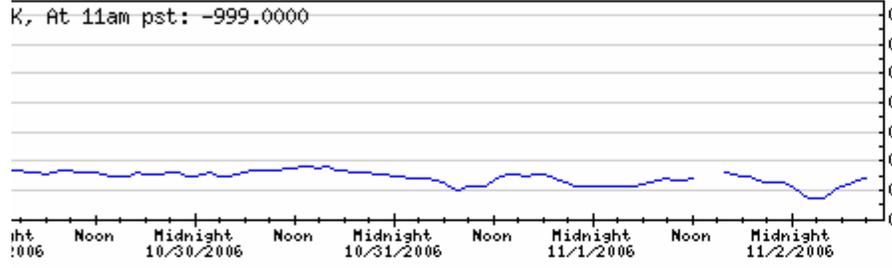
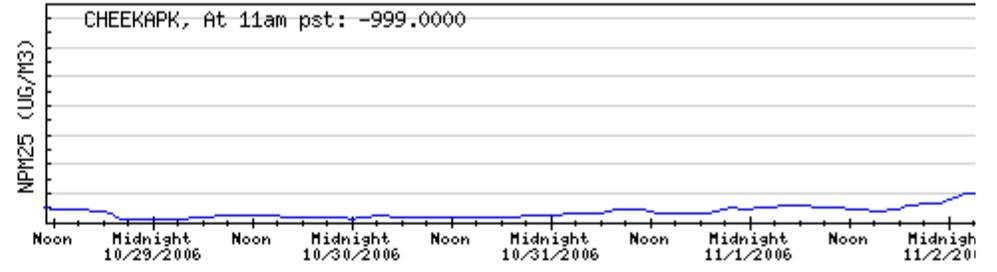
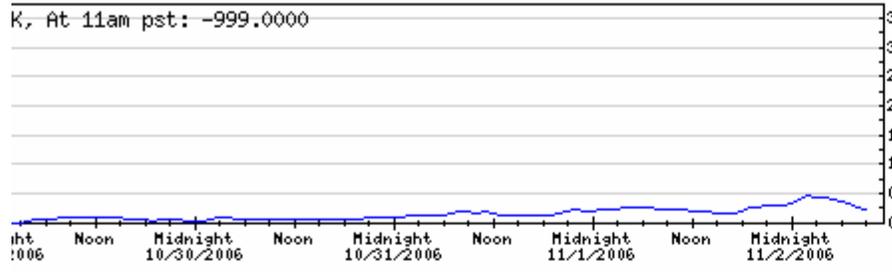
Hourly Averages
 Beginning Hour (PST)

DA	C	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	AVG	MAX	RDS
01	SU	71	72	72	72	72	72	72	72	72	72	71	71	71	71	71	71	71	71	72	72	72	72	72	72	72	72	24
02	MO	72	71	72	72	72	72	72	72	72	72	72	71	71	71	71	71	71	71	72	72	72	72	72	72	72	72	24
03	TU	72	71	72	72	72	72	71	72	72	72	72	71	71	71	71	71	71	71	72	72	72	72	72	72	72	72	24
04	WE	72	72	71	72	72	71	72	72	72	72	72	71	71	71	71	71	71	71	72	71	71	71	71	71	71	71	24
05	TH	71	71	72	72	72	72	72	72	72	72	71	71	71	71	71	71	71	72	71	72	72	72	71	72	72	72	24
06	FR	72	71	72	71	72	71	72	72	71	71	72	72	70	72	72	71	71	72	71	72	72	72	72	72	72	72	24
07	SA	72	72	72	72	72	72	72	72	72	72	72	72	72	72	71	71	71	72	72	72	72	72	72	72	72	72	24
08	SU	72	71	72	71	72	72	72	72	72	72	72	72	72	72	71	71	71	72	72	72	72	72	72	72	72	72	24
09	MO	72	72	72	72	72	72	72	72	72	72	72	72	72	72	71	71	71	71	72	72	72	72	72	72	72	72	24
10	TU	72	72	72	72	72	72	72	72	72	72	72	72	71	71	71	71	71	71	71	72	72	72	72	71	72	72	24
11	WE	72	72	72	72	72	72	72	72	72	72	72	71	71	71	71	71	71	71	71	72	72	72	72	71	72	72	24
12	TH	72	72	72	72	72	72	72	72	72	72	72	71	71	71	71	71	71	71	71	72	72	72	72	71	72	72	19
13	FR	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	71	72	71	72	72	72	72	72	72	72	72	24
14	SA	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	24
15	SU	72	72	72	72	72	72	72	72	72	72	72	72	72	72	72	71	72	72	72	72	72	72	72	72	72	72	24
16	MO	72	72	72	72	72	72	72	72	72	72	72	71	71	71	71	71	71	72	72	71	72	72	72	72	72	72	24
17	TU	72	72	72	72	71	72	72	72	72	72	72	72	72	72	71	71	71	72	72	72	72	72	72	72	72	72	24
18	WE	72	72	72	72	72	72	72	72	72	64	62	67	73	71	72	71	72	72	72	72	71	72	71	72	71	72	24
19	TH	72	71	71	72	71	71	72	71	72	71	72	71	70	72	72	72	72	71	71	71	70	70	72	72	72	71	24
20	FR	72	72	72	72	71	70	71	69	71	72	72	72	72	72	72	72	71	72	71	72	71	72	72	72	72	72	24
21	SA	72	72	72	72	72	71	71	72	71	72	71	72	72	72	72	71	71	72	71	72	72	72	72	71	72	72	24
22	SU	72	72	72	72	72	71	72	72	72	72	72	72	72	72	71	71	72	71	72	72	71	72	72	71	72	72	24
23	MO	72	71	72	71	72	72	72	71	72	72	72	72	71	72	72	72	71	72	71	72	72	72	72	72	72	72	24
24	TU	72	72	71	71	72	71	72	72	71	72	72	71	72	72	71	72	71	71	72	71	72	71	72	72	72	72	24
25	WE	72	71	71	72	72	72	72	71	72	72	72	72	72	72	72	71	71	72	71	72	72	72	72	72	72	72	24
26	TH	72	72	71	72	72	71	72	72	72	72	71	72	71	72	71	72	71	72	72	72	72	72	72	72	72	72	24
27	FR	71	72	71	72	71	72	71	72	71	72	71	72	71	72	72	71	72	71	72	71	72	71	72	72	72	72	24
28	SA	71	72	72	72	72	72	72	72	72	72	72	72	72	72	71	72	72	72	72	72	72	72	72	72	72	72	24
29	SU	72	71	72	72	72	71	70	69	69	69	69	69	70	72	72	72	71	72	70	69	69	69	69	69	69	69	24
30	MO	69	69	69	69	69	69	69	69	69	69	69	69	70	70	70	70	69	69	69	69	69	69	69	69	69	69	24

Edit View Insert Format Tools Data Window Help
 [Icons: Save, Print, Copy, Paste, Undo, Redo, Find, etc.] 100% Courier New 10 B U [Icons: Bold, Underline, etc.]
 A1 = Periodic Station Report Cheeka Peak - Interval 60 Min

New System Example.xls

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q		
Report Cheeka Peak	Interval 60 Min																	
Station: Cheeka Peak																		
3/2006 24:00 - 7/13/2006 24:00																		
Monitor: All																		
Time Base: 1 Hour																		
Date Time-PST	Neph	Ozone	CO	SO2	NO	NOy	Diff	SO2_Analog	Temp	RH	WSpeed	WDir	Rain	Radiometer	NO Analog	Diff Analog	NOy	
	Mm-1	ppb	ppb	ppb	ppb	ppb	ppb	ppb	C	%	m/s	degrees	mm/hr	W/m2	ppb	ppb		
06/30/2006 09:00:00	0.112	31.8	0.00	_N 0.95	-0.03	0.32	0.35	1.811	15.3	53	1.845	243.31	0	2120.54	-0.02	0.36		
06/30/2006 10:00:00	0.107	26.3	0.00	_N 0.16	0.049	0.55	0.5	0.162	16.5	60.3	1.894	243.01	0	2614.23	0.05	0.5		
06/30/2006 11:00:00	0.122	24.3	0.00	_N 0.15	0.17	0.93	0.76	0.154	16.5	68.3	1.955	237.09	0	3010.19	0.16	0.77		
06/30/2006 12:00:00	0.182	27.3	0.00	_N 0.14	0.141	1.01	0.87	0.141	16.9	68.7	2.25	241.84	0	3246.63	0.13	0.88		
06/30/2006 13:00:00	0.132	29.2	0.00	_N 0.12	0.012	0.48	0.47	0.122	17	59.2	2.855	258.67	0	3299.46	0.01	0.48		
06/30/2006 14:00:00	0.152	28.3	0.00	_N 0.12	0.004	0.46	0.46	0.125	16	67.6	3.166	265.42	0	3204.56	0.01	0.47		
06/30/2006 15:00:00	0.187	29.7	0.00	_N 0.14	-0.01	0.57	0.58	0.143	16.1	69.5	2.915	265.39	0	2933.12	0	0.59		
06/30/2006 16:00:00	0.204	28.7	0.00	_N 0.12	0.024	0.63	0.61	0.119	15.5	72.9	3.167	266.89	0	2526.17	0.02	0.62		
06/30/2006 17:00:00	0.168	26.8	0.00	_N 0.1	-0.03	0.37	0.4	0.097	15	72.2	3.288	269.71	0	1983.86	-0.02	0.41		
06/30/2006 18:00:00	0.198	29.9	0.00	_N 0.09	-0.02	0.42	0.43	0.094	13.9	71.7	3.768	273.84	0	1378.25	-0.01	0.44		
06/30/2006 19:00:00	0.1	31.3	0.00	_N 0.09	-0.05	0.11	0.16	0.09	14.3	58.3	4.908	271.08	0	810.96	-0.06	0.18		
06/30/2006 20:00:00	0.094	32.9	0.00	_N 0.09	-0.07	0.06	0.13	0.088	13	54.2	4.537	279.28	0	300.39	-0.08	0.14		
06/30/2006 21:00:00	0.16	37.3	0.00	_N 0.12	-0.07	0.28	0.34	0.123	9.94	76.2	4.22	289.03	0	38.07	-0.08	0.35		
06/30/2006 22:00:00	0.116	35.7	0.00	_N 0.11	-0.07	0.17	0.24	0.106	9.68	77	3.927	293.53	0	17.79	-0.08	0.24		
06/30/2006 23:00:00	0.064	31	0.00	_N 0.09	-0.02	0.25	0.26	1.871	7.65	92.3	3.058	270.97	0	19.8	3.62	0.19		
07/01/2006 00:00:00	0.014	29.1	0.00	_N 0.08	-0.07	0.3	0.37	0.531	7.25	99	4.205	260.18	0	22.61	-0.07	0.32		
07/01/2006 01:00:00	0.014	30.2	0.00	_N 0.07	-0.07	0.62	0.69	0.067	7.29	99.6	3.954	263.19	0	22.51	-0.08	0.7		
07/01/2006 02:00:00	0.011	29.2	0.00	_N 0.1	-0.07	1.62	1.69	0.103	7.7	99.9	5.172	270.16	0	23.38	-0.08	1.7		
07/01/2006 03:00:00	0.004	51	0.00	_N 0.08	-0.07	0.55	0.62	0.081	7.93	100	6.443	271.31	0.4	23.85	-0.09	0.62		
07/01/2006 04:00:00	0.004	25.8	0.00	_N 0.07	-0.07	0.32	0.39	0.068	7.93	100	5.541	276.03	0	23.95	-0.09	0.4		
07/01/2006 05:00:00	0.006	23.1	0.00	_N 0.11	-0.05	1.92	1.97	0.106	7.89	100	5.026	270.86	0	84.69	-0.05	1.99		
07/01/2006 06:00:00	0.007	23.8	0.00	_N 0.09	0.062	2.09	2.03	0.093	7.83	100	5.028	265.07	0	393.97	0.05	2.03		
07/01/2006 07:00:00	0.006	26.6	0.00	_N 0.07	-0.03	0.22	0.25	0.068	7.81	100	4.601	258.42	0	798.69	-0.01	0.25		
07/01/2006 08:00:00	0.005	25.1	0.00	N 0.07	-0.01	0.2	0.2	0.067	8.33	99.9	4.799	254.91	0	1211.19	0	0.21		

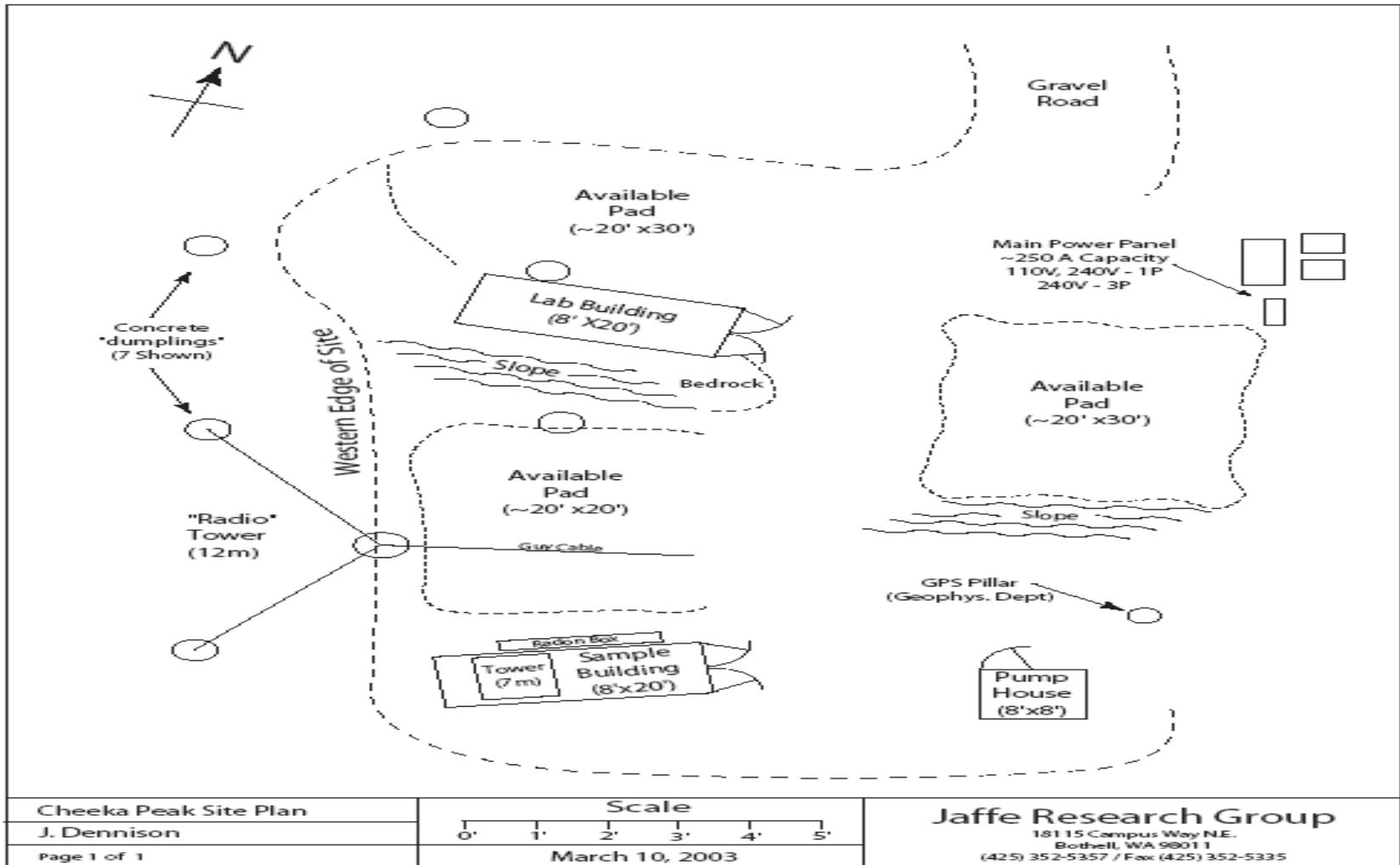


Cheeka Peak Observatory

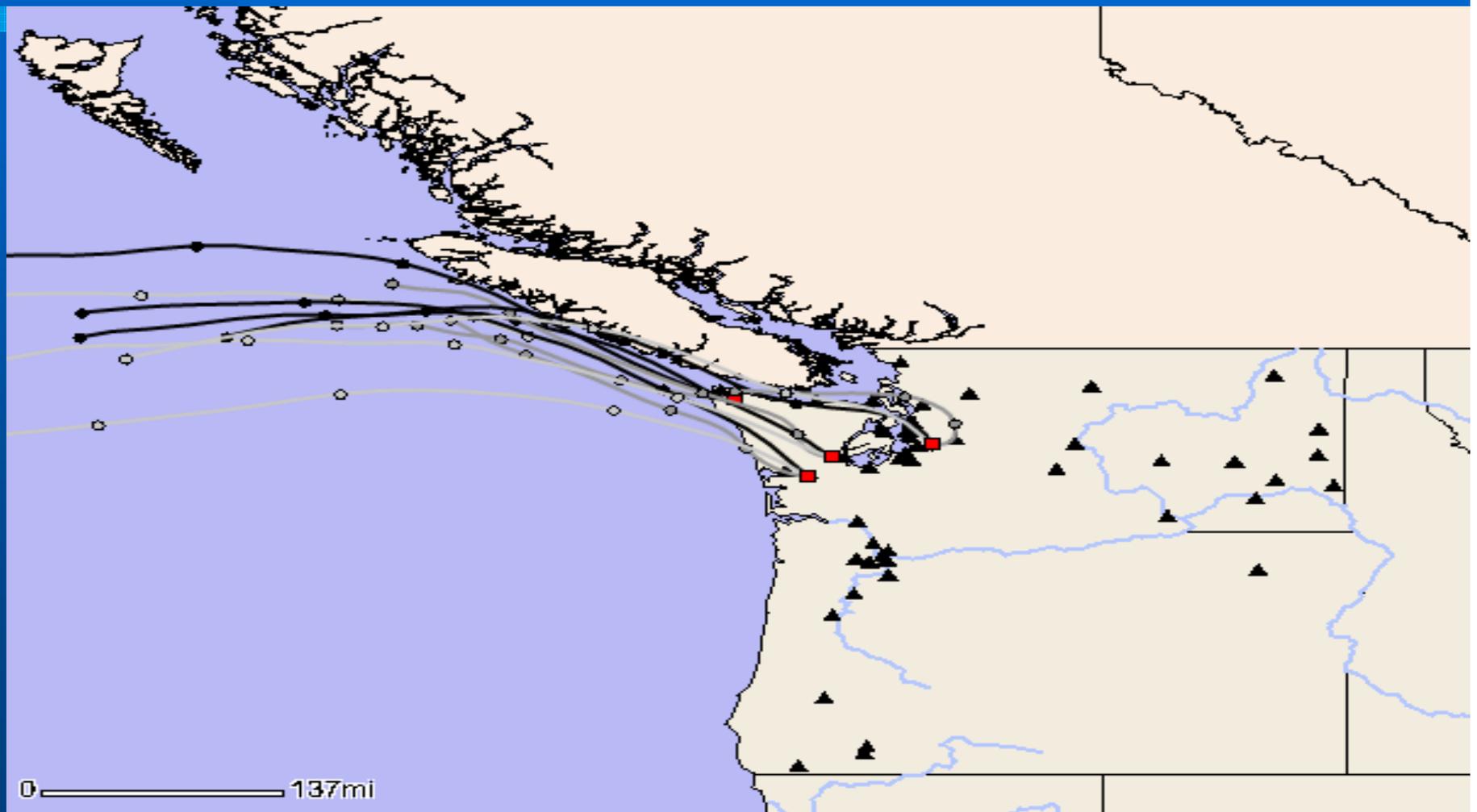
Latitude: 48.3 N, Longitude: 124.6 W, 480 m asl

Dates	Species Measured	Interesting Features	References
Spring 1997	O ₃ , CO, NO, NO ₂ , PAN, NMHCs, aerosol scattering, Rn and met	First detection of LRT of Asian pollutants	Jaffe et al., 1999; 2001
Spring 1998	Same as above	Large Asian Dust Storms; Contribution from marine vessels to PM and NOx	Jaffe, et al., 2001; Husar, et al., 2001 Jaffe et al., 2003a,b; 2005; Jaeglé, et al. 2003; Weiss-Penzias, et al., 2003;
March 2001 - May 2002	O ₃ , CO, aerosol scattering, Rn, elemental and speciated Hg, PM _{2.5} and PM ₁₀ , mass and chemical composition and met; SOC, PAH, pesticides	Largest Asian dust episode ever observed. Comparisons of CPO data with GEOS-CHEM.	2004 Gong, et al, 2003; Killin, et al, 2004; Liang, et al, 2004; Price, et al, 2004;
April 2003-present	O ₃ , CO, aerosol scattering, and met	Annual and diurnal cycles, comparison with GEOS-CHEM.	Weiss-Penzias, et al., 2004

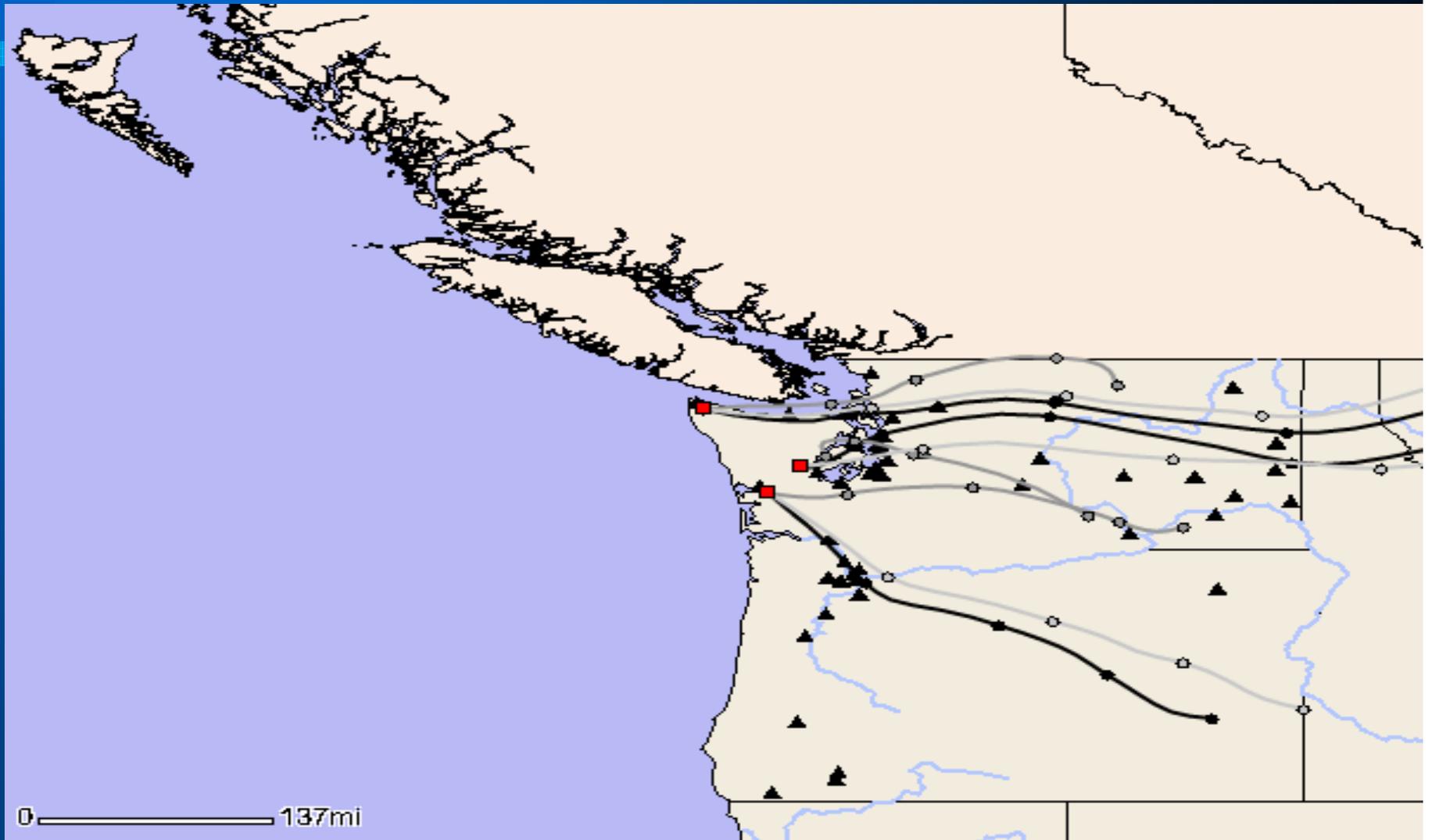
Site Plan



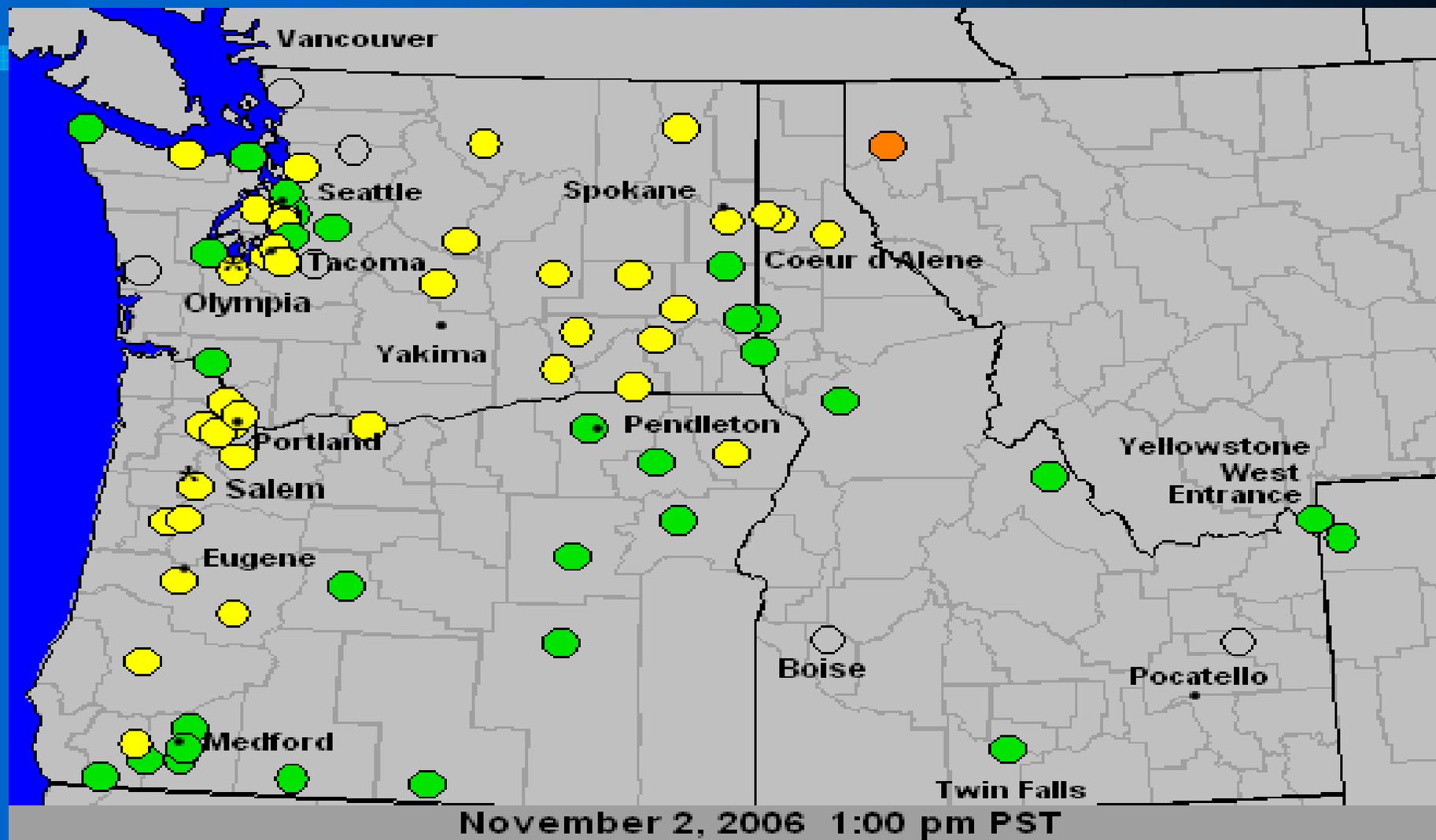
Backward Trajectory



Forward Trajectory



AirNOW Regional PM2.5 Map



Georgian Basin



Anderson Head



