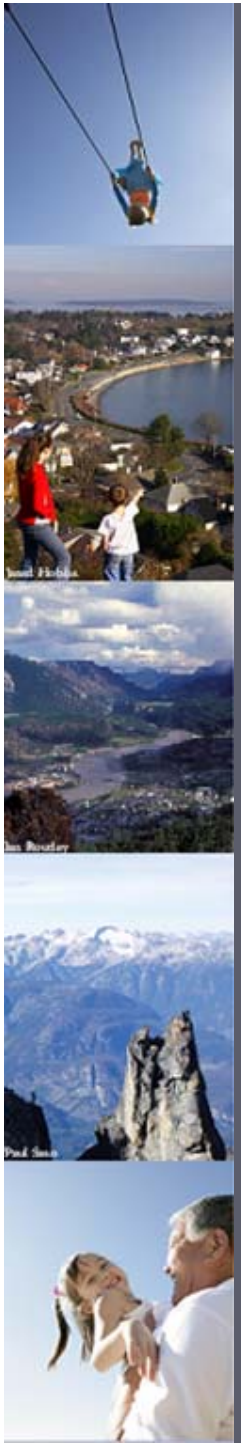


BVLD Airshed Management Society Burn Operator's Forum

Highlights from the 2006 Fall Burn Season: How Did We Do?

Ben Weinstein
Air Quality Meteorologist

September 6th, 2007

BRITISH COLUMBIA
Ministry of Environment

bvld airshed management society

*Clean air solutions we can **all** live with!*

cleanairplan.ca

Overview

- Smoke Management Plan Status (15 min)
- Open Burning (45 min)
  - OBSCR venting requirements in different forest districts
    - Future direction of regulation
  - Burn Reporting
    - Emissions Calculations
  - 2006 emissions and comparison to 2002
  - RESULTS & other reporting systems
  - CVF highlights from burn season (MoE perspective)
  - Introduction of Uwe Gramann
- Break (15 min)
  - Chance to see air quality monitoring station and ask questions
- 2006 Air Quality Review (1 hour)
  - Annual results
  - Fall / winter air quality
    - Interesting observations

Smoke Management Plans

- Purpose
  - Add flexibility to licensees to open burn while protecting air quality
- Similarities
  - All plans reduce minimum venting requirements in less sensitive 'zones'
  - Some plans add restrictions for more sensitivity 'zones'
- Differences
  - Minimum venting requirements differ for each forest district

Status of Smoke Management Plans

- Skeena Stikine Forest District (Bulkley TSA)
  - Currently expired and should be renewed
- Nadina Forest District
  - Recently renewed until August 31st 2008 or such time as the new OBSCR comes into effect
- Vanderhoof Forest District
  - Good through April 30th, 2008

Skeena Regional Issue: Mountains

- Open burning under the inversion layer in mountain – valley topography traps smoke

Non-compliant burn in the Kalum Forest District

Oct 30th, 2006

OBSCR Key Points

- Taking Smoke Management Plans into account:
  - Skeena Stikine FD (Bulkley TSA)

Burn Periods are from 2 hours after SUNRISE to 4 hours before SUNSET (see section 4.2)		
High Zone	**Upper Winds (based on location of piles relative to population centre)**	
Venting Day1/Day2/Day3	**Away from Population Centre*** **	**Toward a Population Centre*** **
good/good/rain**	**No Daily Total**	**No Daily Total**
good/good	Daily Total = 1275 piles* PIR= 900 piles BCTS = 350 piles Kyahwood = 25 piles	Daily Total = 425 piles PIR = 300 piles BCTS = 100 piles Kyahwood = 25 piles
good/fair	Daily Total = 800 piles PIR= 550 piles BCTS = 225piles Kyahwood = 25 piles	Daily Total = 225piles PIR= 150 piles BCTS = 50 piles Kyahwood = 25 piles

Low Smoke Sensitivity Zone

VENTING Day1/Day2/Day3	Cloud Ceiling	
	<1000m or >2000*m	**1000-2000m**
good/good/good	**No Limit on Daily Total**	**NOTIFY AIR CHARTERS[6]** Daily Total = 650 piles** PIR= 475 piles BCTS = 150 piles Kyahwood = 25 piles
good/good or good/fair	Daily Total = 1275 piles PIR= 900 piles BCTS = 350 piles Kyahwood = 25 piles	**NOTIFY AIR CHARTERS[6]** Daily Total = 650 piles PIR= 475 piles BCTS = 150 piles Kyahwood = 25 piles
fair/fair	Daily Total = 350 piles PIR= 250 piles BCTS = 100 piles Kyahwood = 25 piles	**NOTIFY AIR CHARTERS** Daily Total = 225piles PIR= 150 piles BCTS = 50 piles Kyahwood = 25 piles

- Taking Smoke Management Plans into account:
  - Nadina FD

Sensitivity	Venting Conditions on Day of Ignition		Ignition Guidelines
Rating	Day One	Day Two Forecast	
Zone A High	Good	Good or Fair	Unrestricted burning as specified in OBSCR
	Fair	Good or Fair or Poor	No ignition (OBSCR)
	Poor	Good or Fair or Poor	No ignition (OBSCR)
Zone B Moderate	Good	Good or Fair	Unrestricted burning as specified in OBSCR
	Fair	Good or Fair	Only material dried in piles over at least one summer or from beetle (red/grey) infested stands. No ignition within 1 km of year round residences and/or when smoke is blowing into high sensitivity areas
	Poor	Good or Fair or Poor	No ignition
Zone C Low	Good	Good or Fair	Unrestricted burning as specified in OBSCR
	Fair	Good or Fair	No ignition within 1 km of year round residences, otherwise unrestricted burning.
	Poor	Good or Fair or Poor	No Ignition

- Taking Smoke Management Plans into account:
  - Vanderhoof FD

Sensitivity Rating	Venting Conditions on day of Ignition		Ignition Guidelines
	day one	day two forecast	
High	Good	Good or Fair	Unrestricted burning as specified in the OBSCR
	Fair	Good or Fair or Poor	No ignition (OBSCR)
	Poor	Good or Fair or Poor	No ignition (OBSCR)
Moderate	Good	Good or Fair	Unrestricted burning as specified in the OBSCR
	Fair	Good or Fair or Poor	Only material dried in piles over at least one summer; no ignition within 1 km of residences; avoid igniting new piles if smoke build-up is visible in area, and if smoke is blowing into High sensitivity area.
	Poor	Good or Fair or Poor	No ignition
Low	Good	Good or Fair or Poor	Unrestricted burning as specified in the OBSCR
	Fair	Good or Fair or Poor	Unrestricted burning
	Poor	Good or Fair or Poor	Unrestricted unless the VI remains in the Poor category for three consecutive days; at this point no further ignition of piles can occur until the VI improves to at least the Fair category.

Future Direction of OBSCR

- OBSCR is currently being revised
  - **Scoping** – including a review of lessons learned through implementation and of ad-vances in science, law and the management of open burning smoke control since the regulation was en-acted in 1993.
  - **Policy Intentions Paper for Consultation** (intentions paper) – out-lining the ministry's proposed revi-sions for the regulation and any outstanding issues or questions.
  - **Consultation** – with affected stakeholders and the general public, using the intentions paper and response forms posted on the ministry website, and other means as required.
  - **Drafting** – preparation of legal language for consideration by the Minister and Lieuten-ant Governor-in-Council.
  - **Implementation** – informing ministry staff and external stakeholders, and developing guidelines and/or best management practices.

Future OBSCR

- Current process is somewhere between scoping and intentions paper.
- What we know (and can talk about)
  - Review of open burning legislation in other jurisdictions has taken place
  - BC is only jurisdiction that has the approach of regulation instead of permitting
  - It is possible that future provincial regulation will resemble a Smoke Management Plan (more restrictive in high sensitivity zones and less restrictive in low sensitivity zones)

Future OBSCR & Reporting

- Side project of new OBSCR is to streamline burn registration process and improve data collection
  - This may be done through MoFR Burning Registration system
- Commitment was made at 2006 Burn operators forum to report on 06 / 07 burning activities.
  - This was not part of any regulatory reporting requirement (there are none)

Calculating Emissions

- Total Emissions = Base Quantity x Emission Facor
  - Base Quantity = Pile number x Pile mass
  - Pile Mass = Pile volume x Pile denisty
    - (pile size and shape)
    - (tree species, moisture content)
  - Emission Factor depends on wood species, and pile cleanliness

$$E_{PM} = BQ \times \frac{EF_{PM}}{1000}$$

$$BQ = \#Piles \times M_{W/P}$$

$$M_{W/P} = V_{W/P} \times \rho$$

Reported Burns

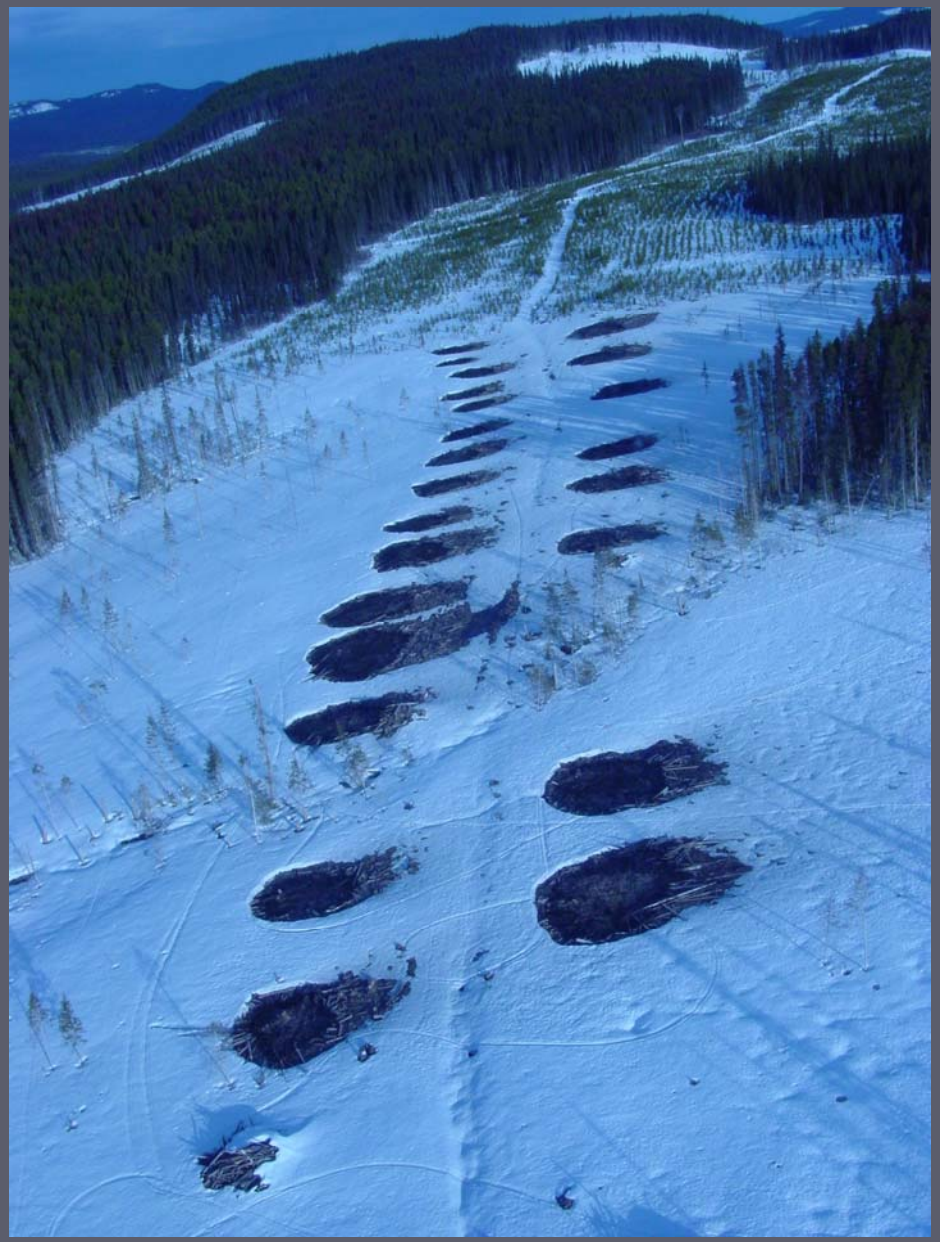
- What can be reported (missing ½ Canfor and BFP)

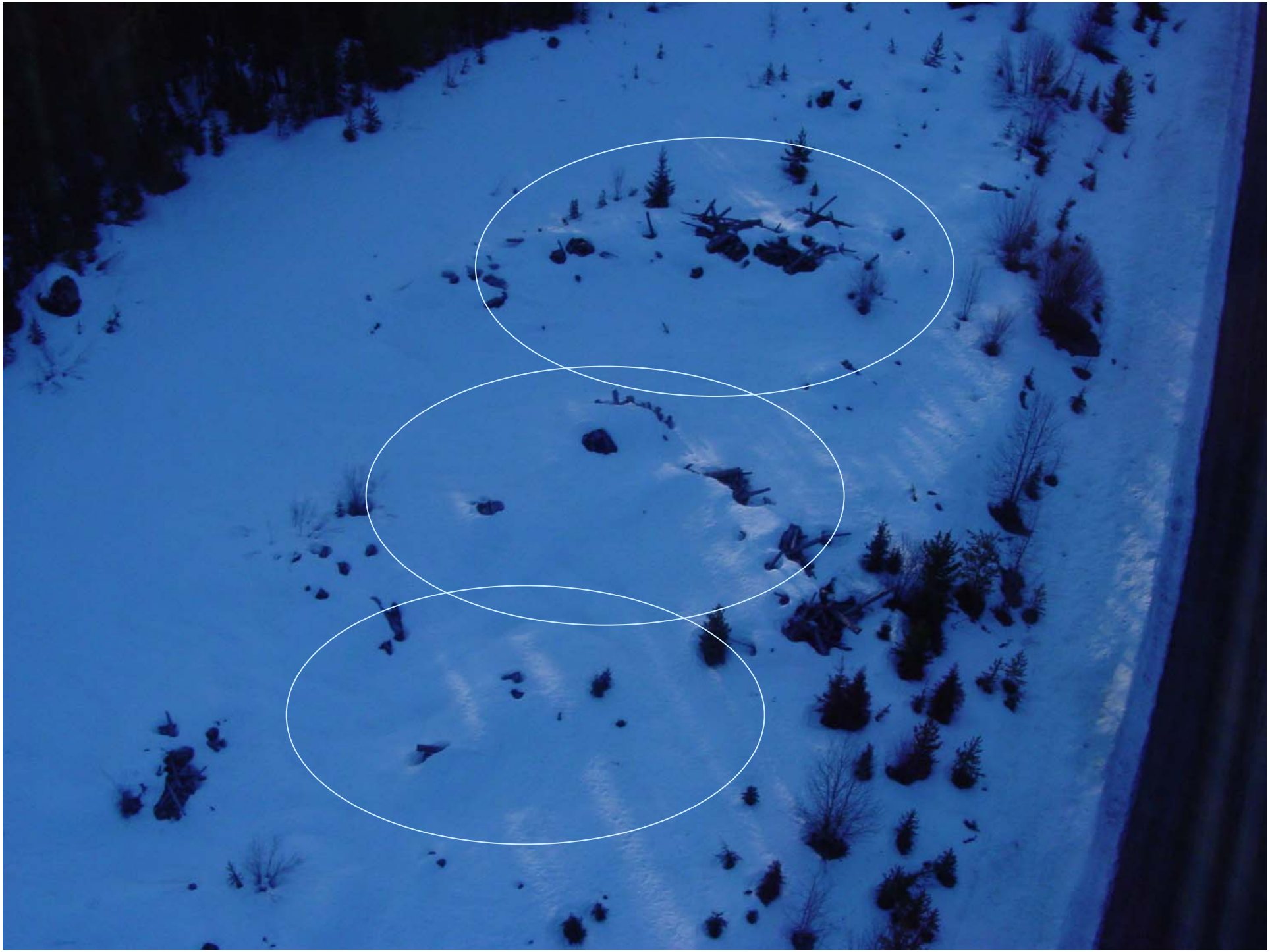
	Total 06 Burn Piles	Estimated Mass (tonnes)	Volume Burned (m3)	PM2.5 Emissions (tonnes)
PIR	1,393	23,993	54,327	154
Canfor (1/2 of program)	2,524	42,369	98,436	271
HFP	2,104	38,397	82,056	221
2006 total	**6,021**	**104,759**	**234,819**	**646**

2002 total	**12,660**	**228,027**	**n/a**	**1,430**

Reporting

- Will complete and report out when more data is made available
- Observationally, the early snowfall limited access to piles and thus burning
- Even considering uplift for MPB harvesting, 2006 burning was likely $\frac{3}{4}$ 2002 levels
- Big snowfall Oct 27, 28 2006 (54.9cm at Smithers airport)





Future Reporting – Ben's Questions

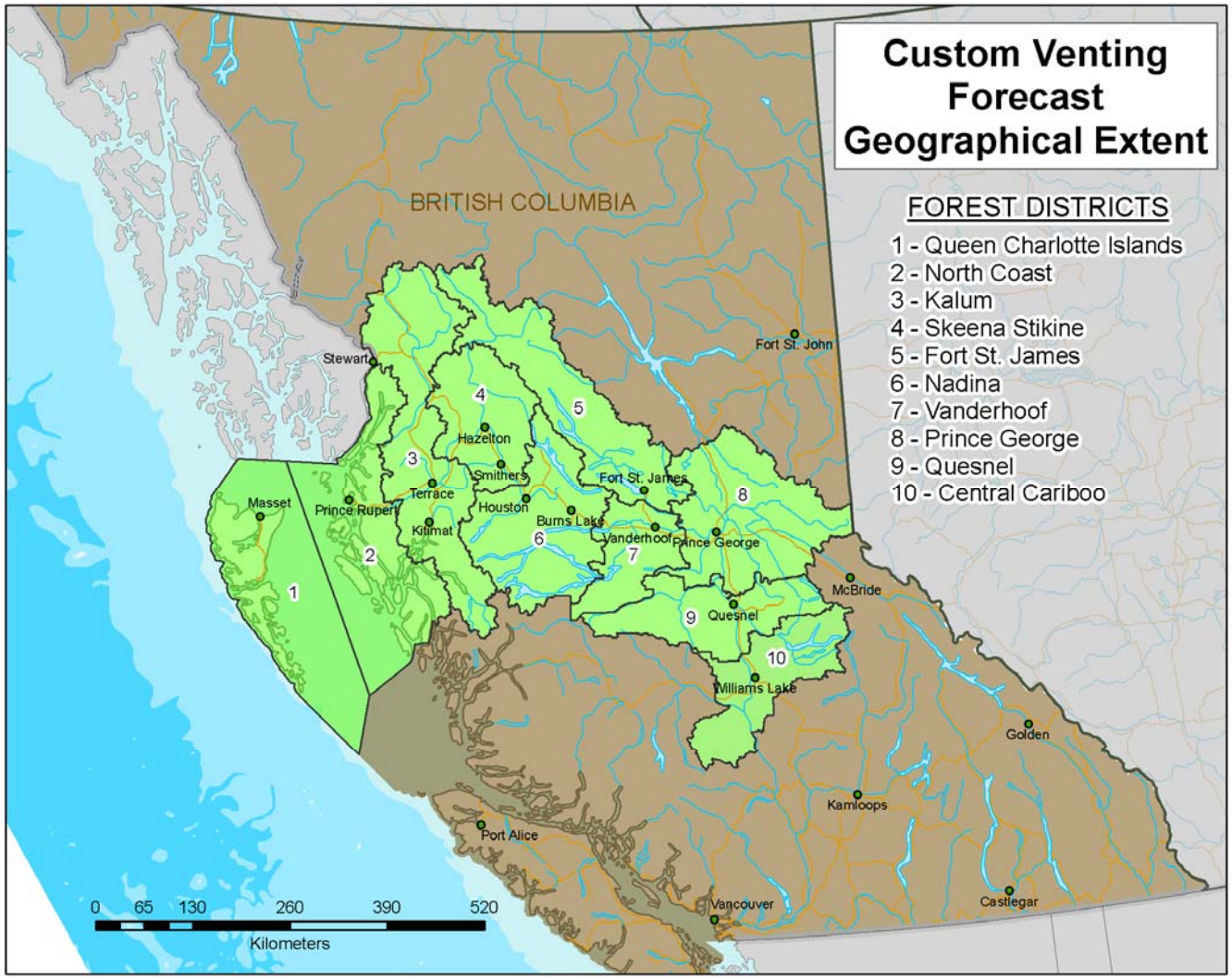
- It is important for the province to track open burning emissions
- Only Skeena Region is actively doing this with major licensees
- Currently MoE Provincial Emission Inventory uses RESULTS to estimate annual emissions
- Cross referencing reported burn data with RESULTS for 2006 found only 1 match (!)
  - What is results anyway?
  - Who uses the information?
  - Why is some open burning information included while others is not?
  - Are there other ways to estimate volume burned based on any current reporting system? (ie: waste and residue checking?)
  - (this information will be relayed to emission specialist in Victoria)

Break ?

Check out Houston's AQ monitoring equipment

Custom Venting Forecasting: Highlights from 2006

- Geographical extent
- Annual Summary
- Openings / Closures
- Consistency



Facts Summary table for burn seasons: 2003 - 2004 - 2005 - 2006

	Forecast season	Forecasts written	Recipients	Opened days for burning	Days forecasted	AQ episodes/ burn bans
2003	October 17- December 22	~175	17	6	34	**2**; October: 4-6 days November 7-9 days
2004	September 13 - December 19	~330	16	39	74	none
2005	September 11 - December 19	801	27	60	82	**2**; November 22-23 & Nov 30-Dec 1
2006	September 21 – December 19	685	30	91	73	**2**; October 20 & November 30-December 2


October 15 2006
15 1:25PM

2006 Burn Season Custom Venting Forecast Openings and Closures

Forecast Location	Net opened days	Days opened	Days closed	Forecast days
Smithers	26	29	3	72
Burns Lake	23	27	4	73
Quesnel	2	2	0	11
Stewart	15	15	0	30
Terrace	25	25	0	54
Totals	**91**	98	7	

October 24 2006

Consistency

2006	Environment Canada Venting Index Forecast			Ministry of Environment Custom Venting Forecast		
	Change to Better (i.e. poor to fair)	Change to worse (i.e. good to poor)	**Total inconsistent days**	Change to Better (i.e. poor to fair)	Change to worse (i.e. good to poor)	**Total inconsistent days**
Smithers	14	10	**24**	8	11	**19**
Burns Lake	16	13	**29**	7	11	**17**
Quesnel	0	1	**1**	1	2	**3**
Stewart	7	1	**8**	1	1	**2**
Terrace	18	8	**26**	4	8	**12**
Totals	**55**	**33**	**88**	**21**	**33**	**53**

Armel Says So Long

Looking Ahead

- New Forecaster:
  - Uwe Gramann, MSc. (pronounced 'Oova')
    - 1997 – 2005 worked for Meteorological Service of Canada
    - Now has weather consulting company but is a MoE employee for CVF purposes
- Contact Information:
    - 250 847 7547
    - uwe.gramann@gov.bc.ca

This Year's CVF Programme

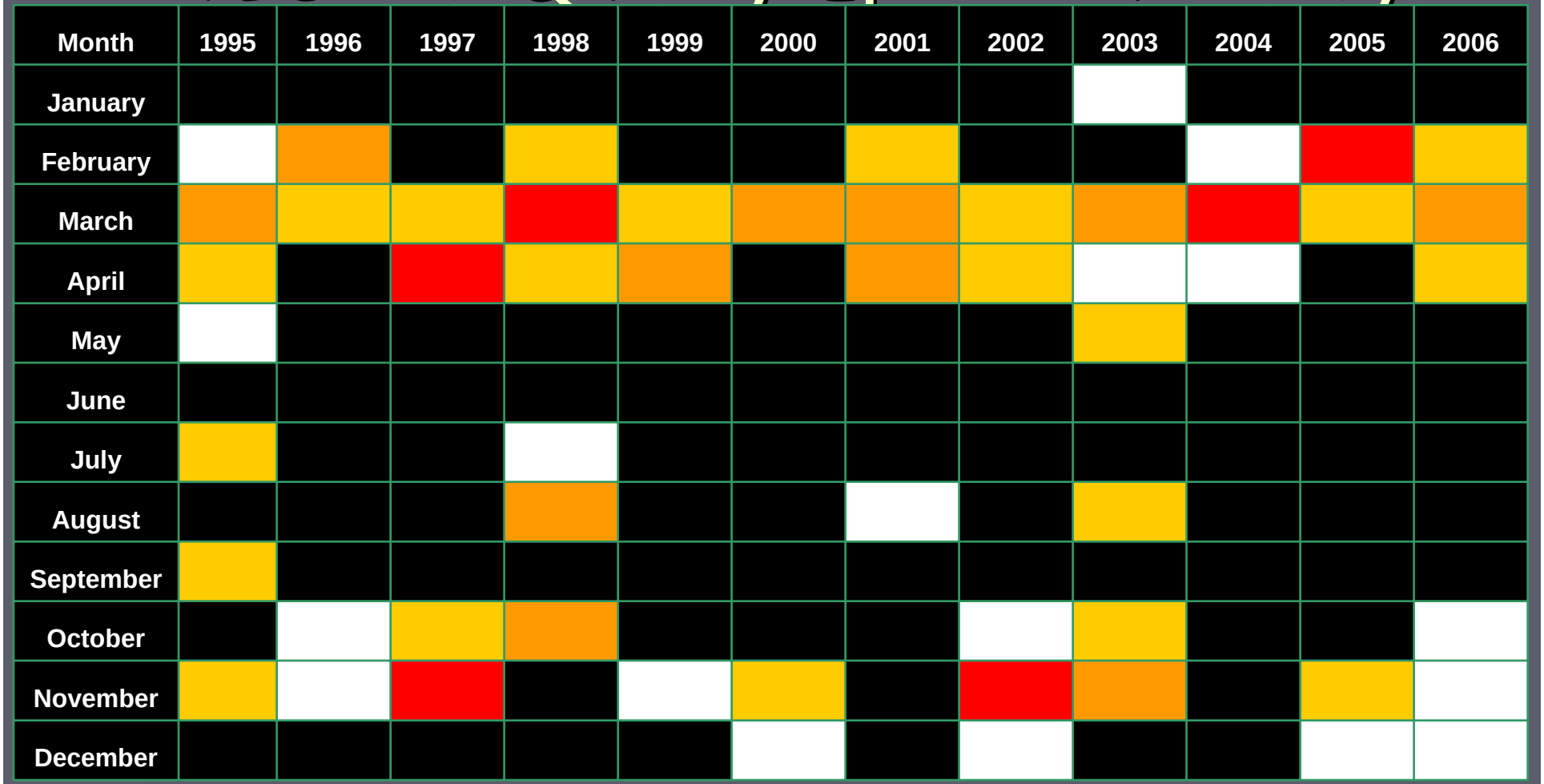
- Funding Formula remains the same
  - $ = 0.0015 x AAC
- Minimum contribution now required to account for time
  - Minimum = $300
  - Equivalent to 200,000 m3


DEERE
2006 Air Quality Review
30 9:46AM

Managing Air Quality

- The Ministry begins to directly manage air quality when it becomes degraded.
  - Issue health and air quality advisories
  - Restrict open burning in accordance to the *Environmental Management Act* / Open Burning Smoke Control Regulation
  - Beehive burner / industrial shutdown plans
  - Mandatory / Voluntary woodstove reduction requests

Previous Air Quality Management: BVLD Air Quality Episode History

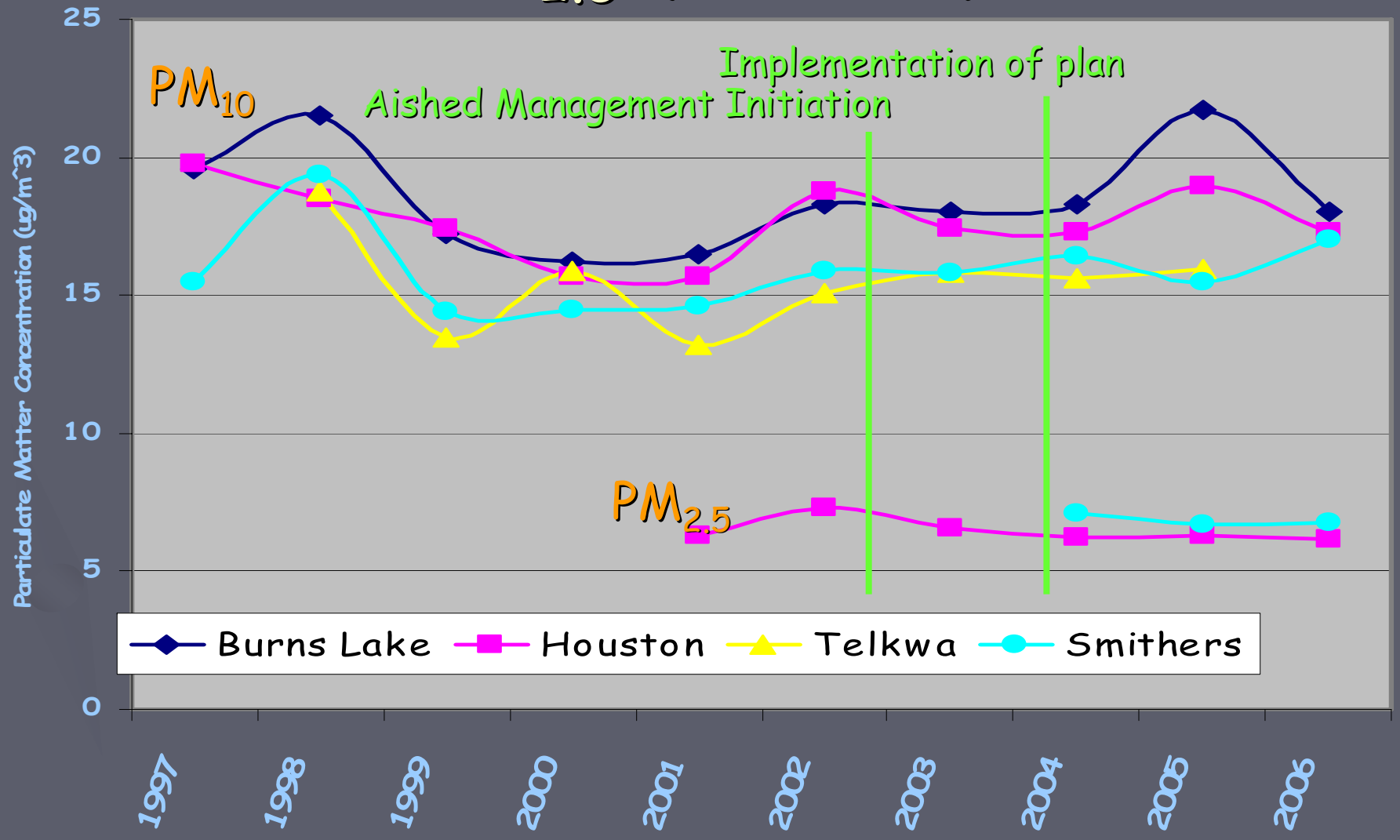


1-3 days
4-6 days
7-9 days
10+ days

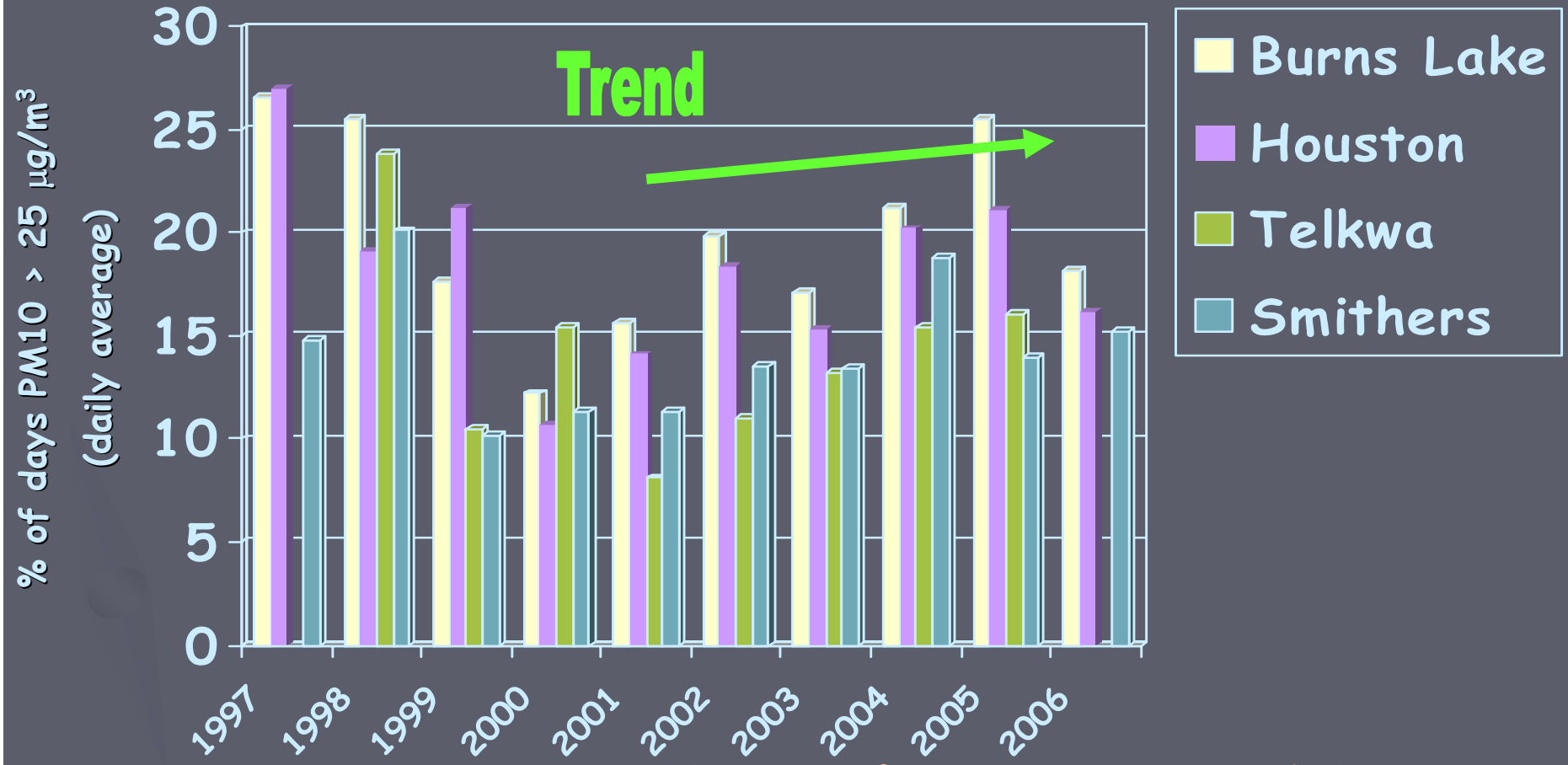
25 13 28 33 12 12 19 20 26 12 19 18

Numbers do not single out individual communities – think of airshed as a whole

BVLD Annual Average PM_{10} (top) and $PM_{2.5}$ (bottom)



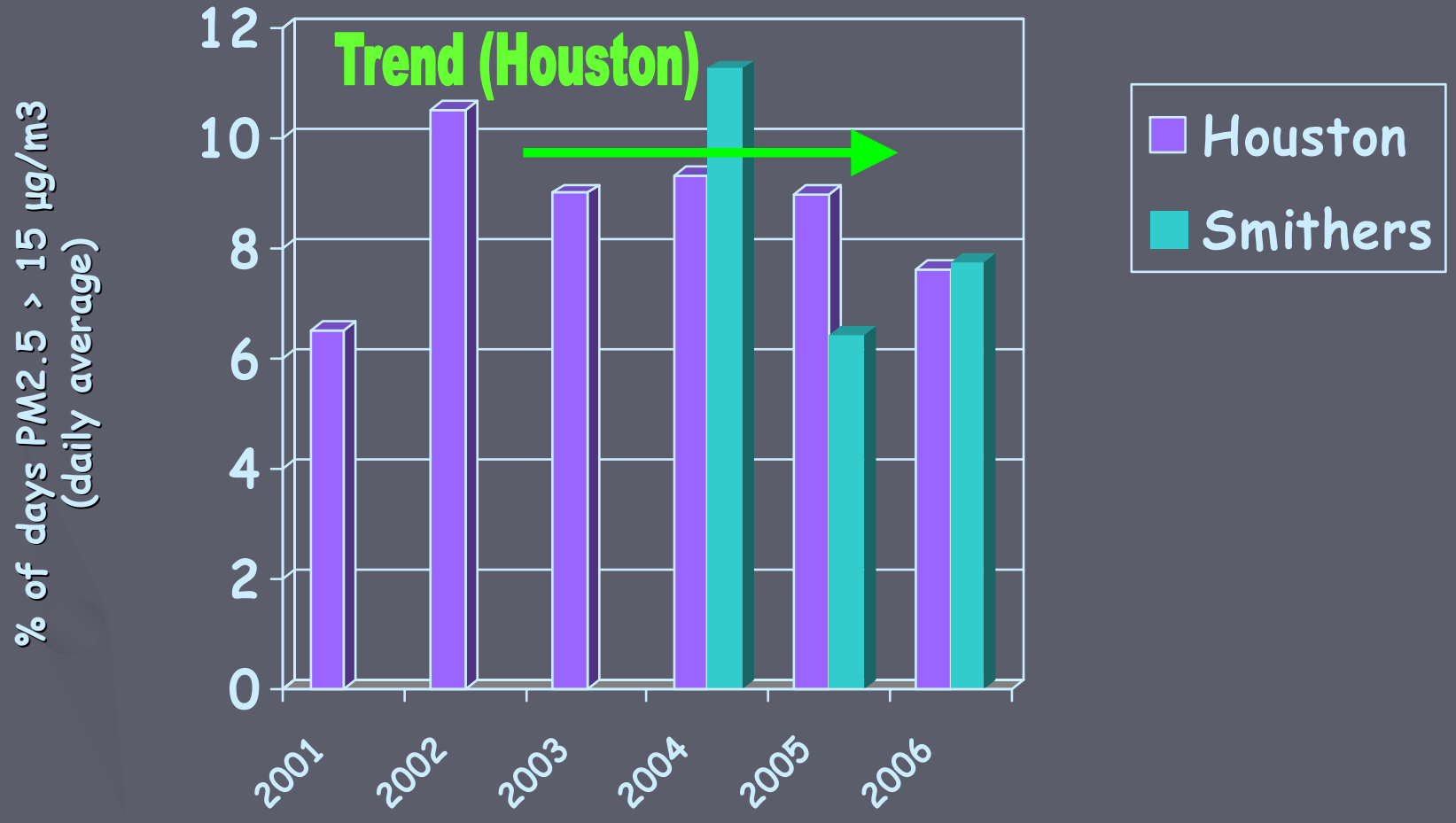
Indicator: % days PM_{10} > 25 μg/m^3 (daily average)



Note: These data include the % days PM_{10} > 50μg/m^3

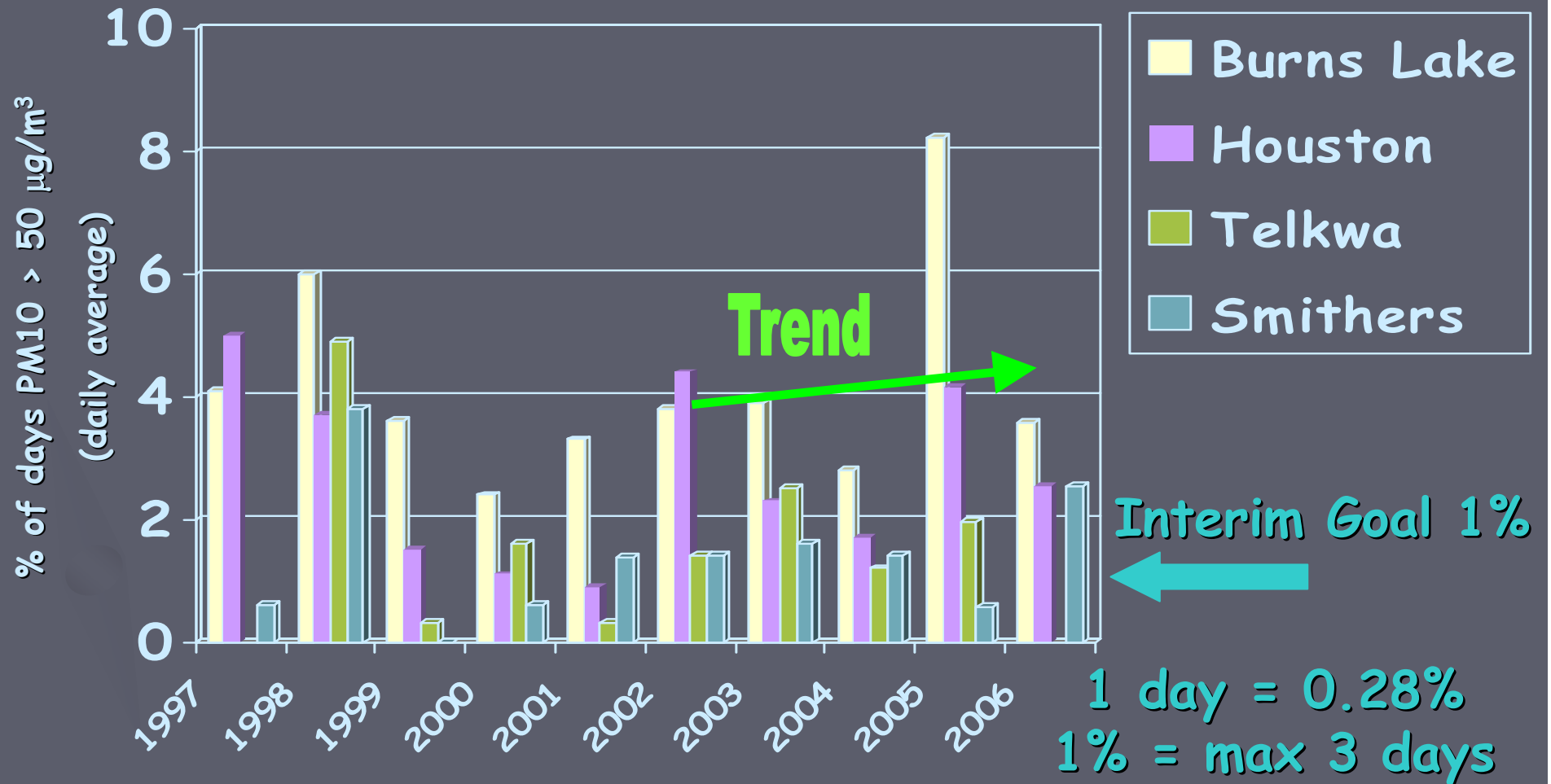
Note: Telkwa PM_{10} monitoring began in 1998 and ended in Oct 2005

Indicator: % Days $PM_{2.5}$ > 15 µg/m^3 (daily average)



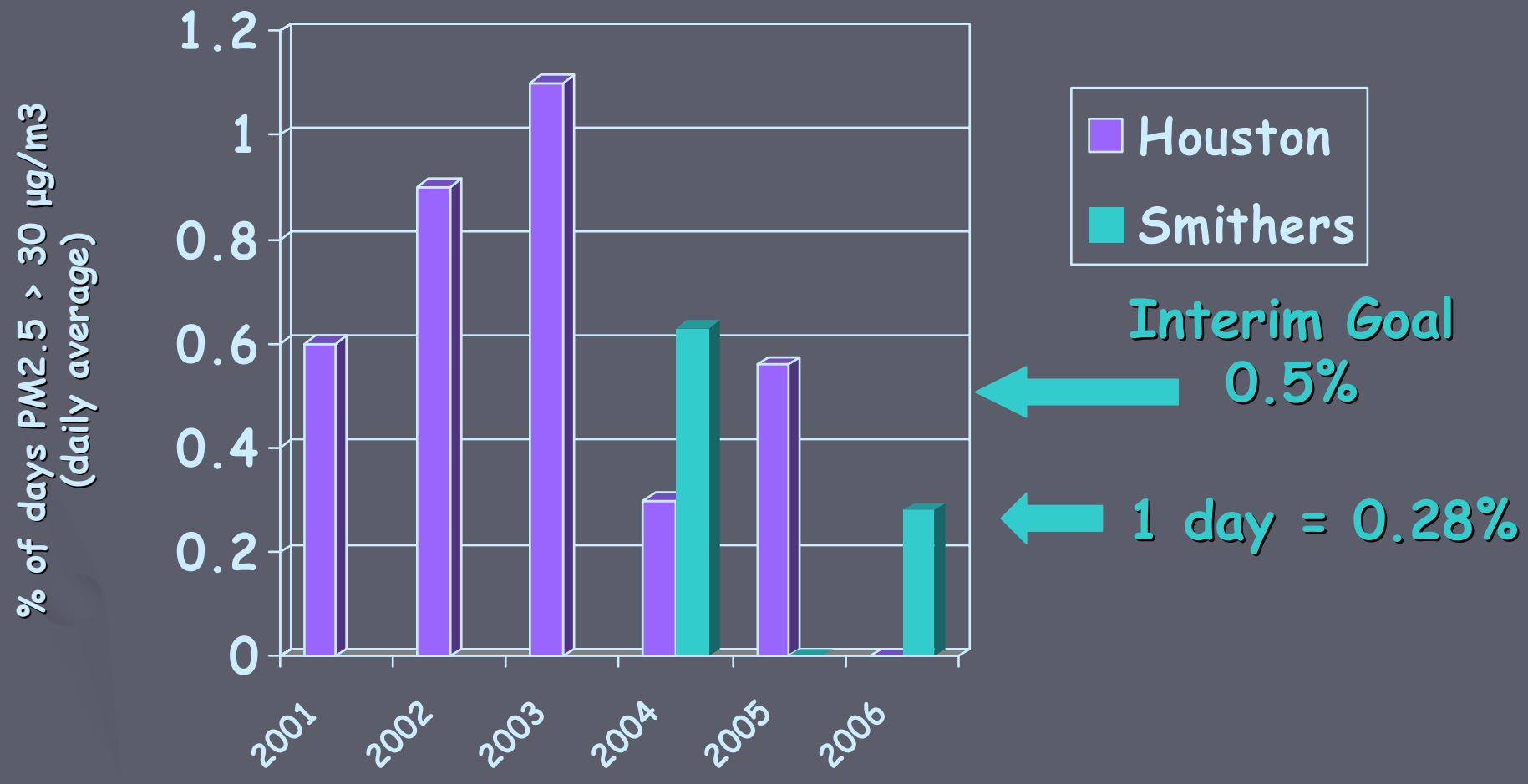
Note: These data include the % days $PM_{2.5}$ > 30mg/m3

Indicator: % episode days PM_{10} > 50 $\mu g/m^3$ (daily average)



Note: Telkwa PM_{10} monitoring began in 1998 and ended in Oct 2005

Indicator: % epidoe days $PM_{2.5}$ > 30 $\mu g/m^3$ (daily average)



Some Conclusions

- For PM_{10}
  - In Smithers, we're seeing increases in all indicators over short and long term.
  - Houston and Burns Lake shows a decrease this year compared to last year and (but) overall steady increase in indicators.
- For $PM_{2.5}$
  - Houston trend appearing but will take some time for other communities because monitoring has just begun

Case Study: Airshed Characteristics

- Air quality episode from November 30th until December 3rd, 2006

Determining Impacts

Emissions

- *Wood stoves*
- *Industry*
  - *Permitted*
  - *Open Burning*
- *Motor Vehicles (highways)*

Dispersion, Transport and Distance

- *Wind speed*
- *Wind direction*
- *Vertical turbulence*

Receptors

- *City*
- *Wilderness*
- *Healthy person*
- *Asthmatic, cardiac or respiratory patient*
- *Children or elderly*

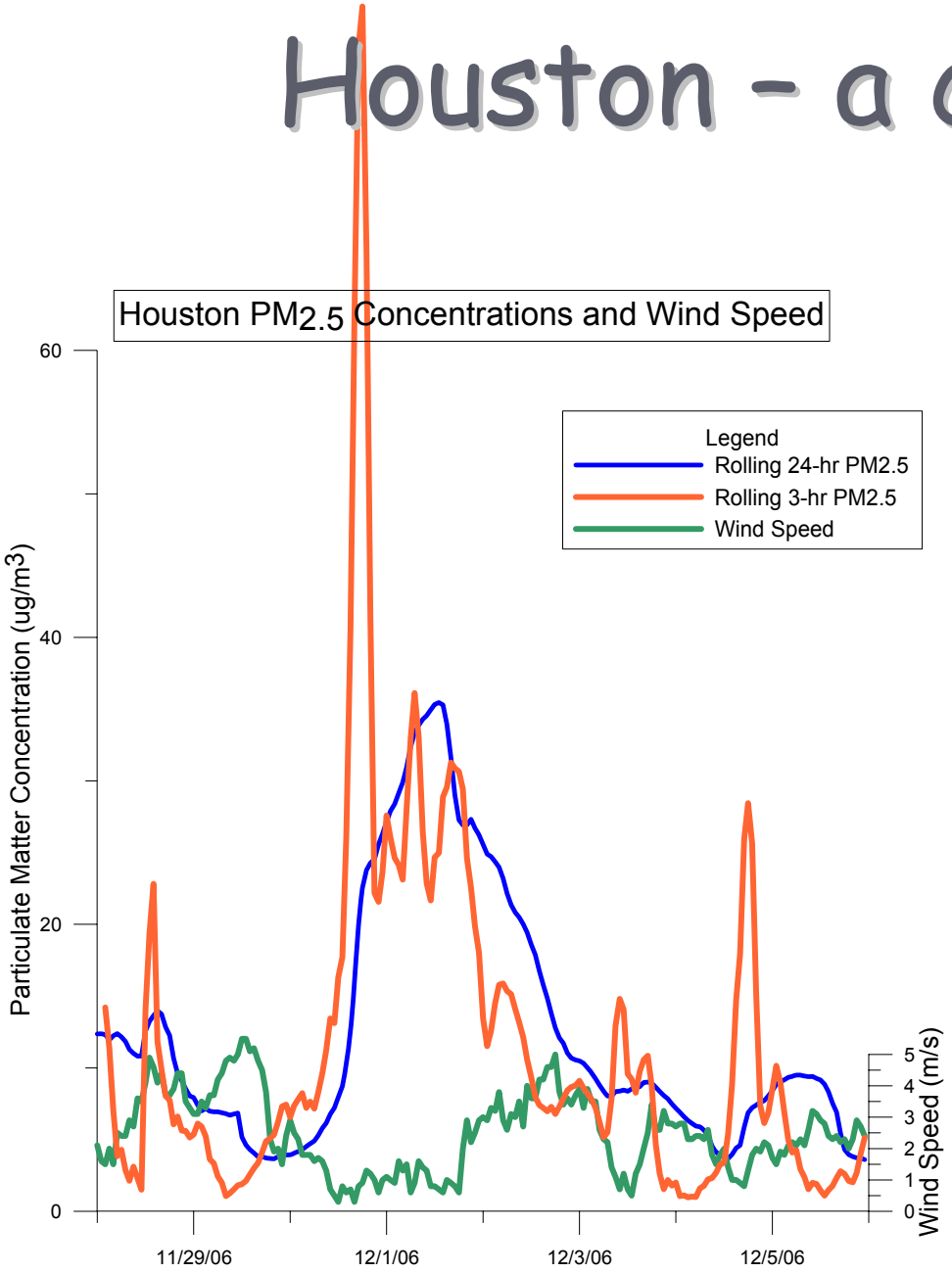
Open Burning November 30th, 2006

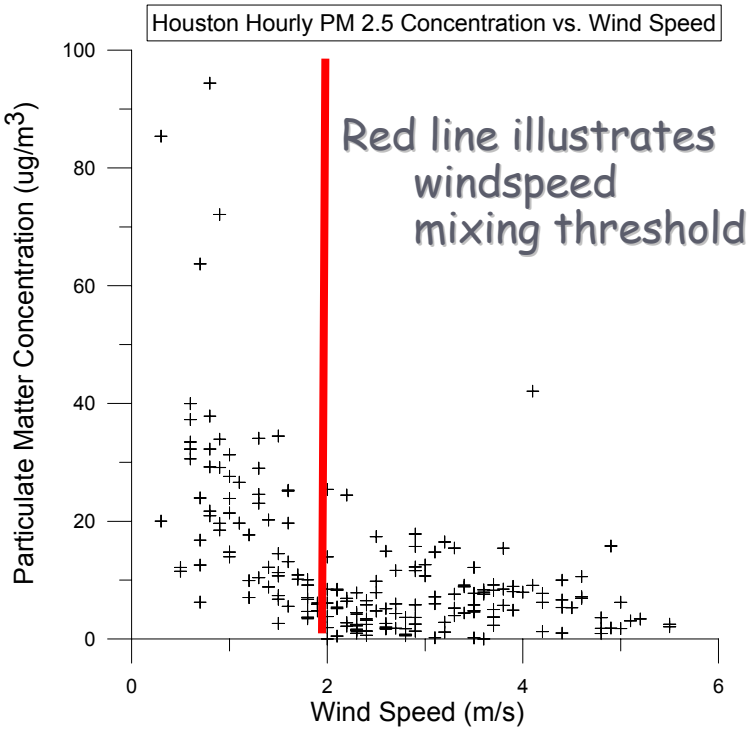
- This picture was taken near Canfor

Smithers Dec 1st, 2006

- This picture was taken from a vantage point on Hislop Rd.

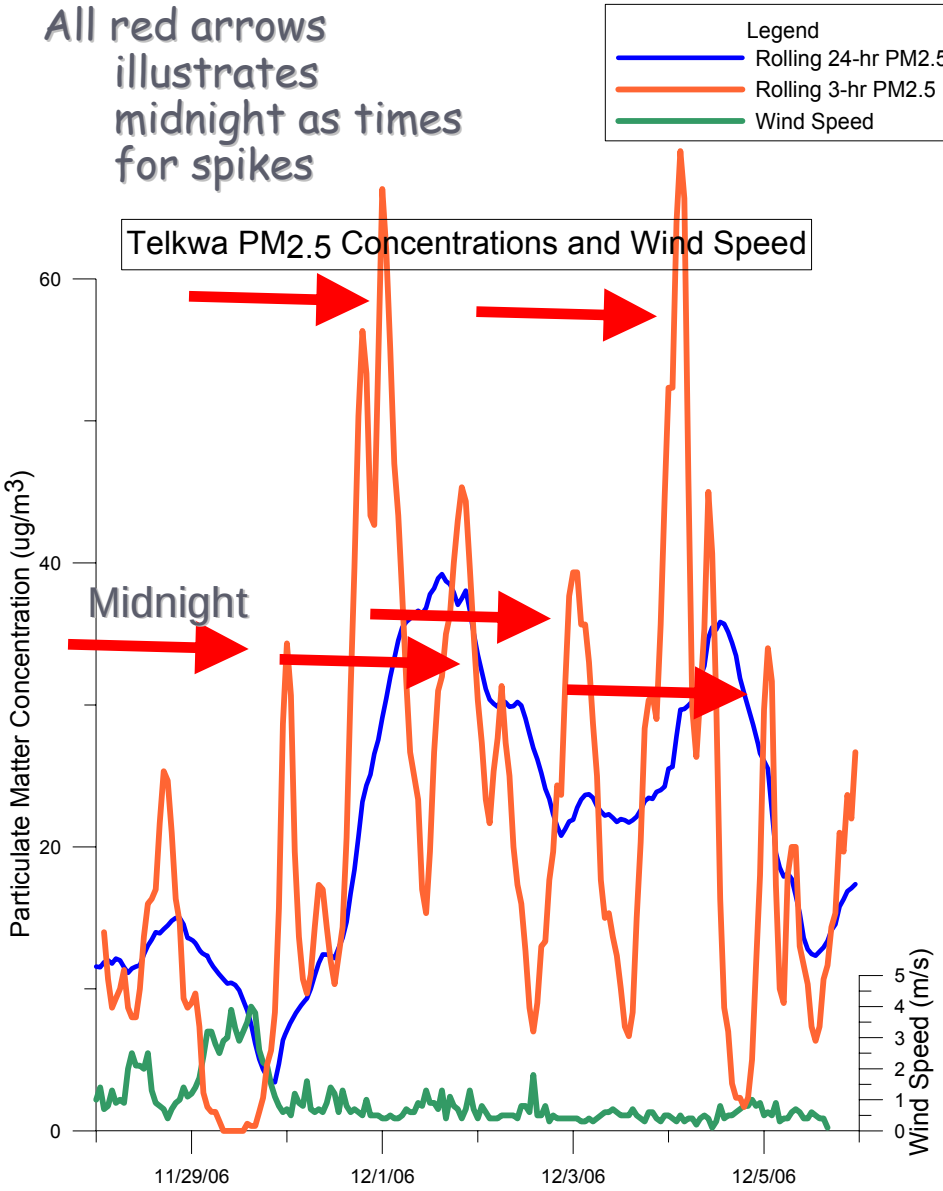
Houston - a closer look

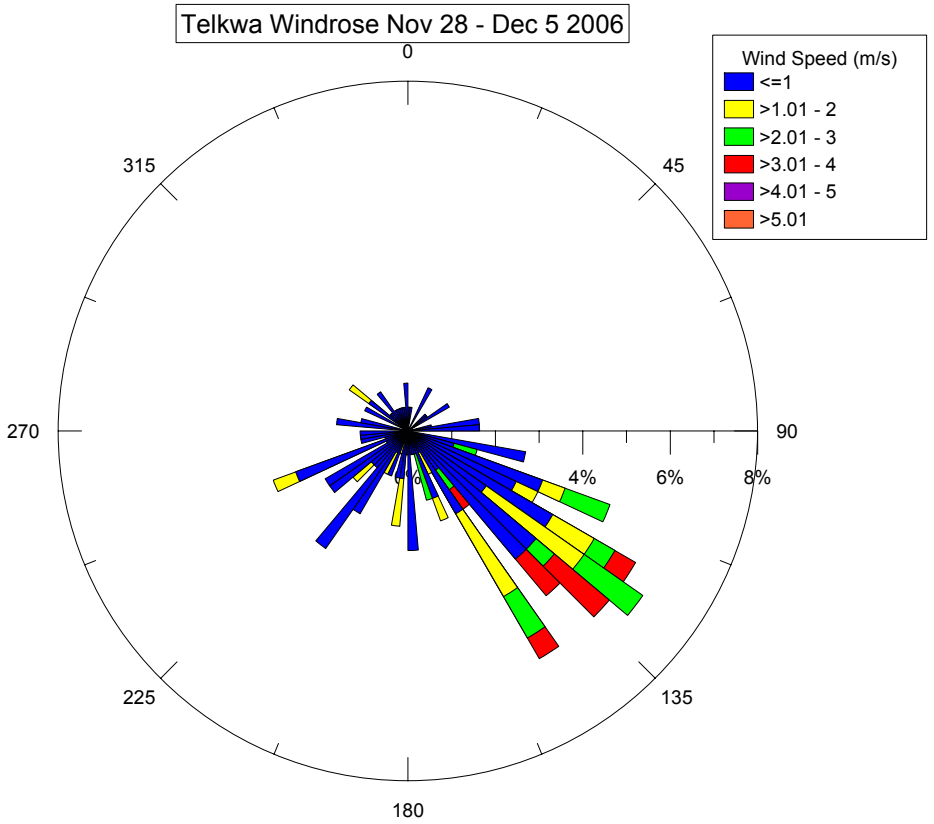




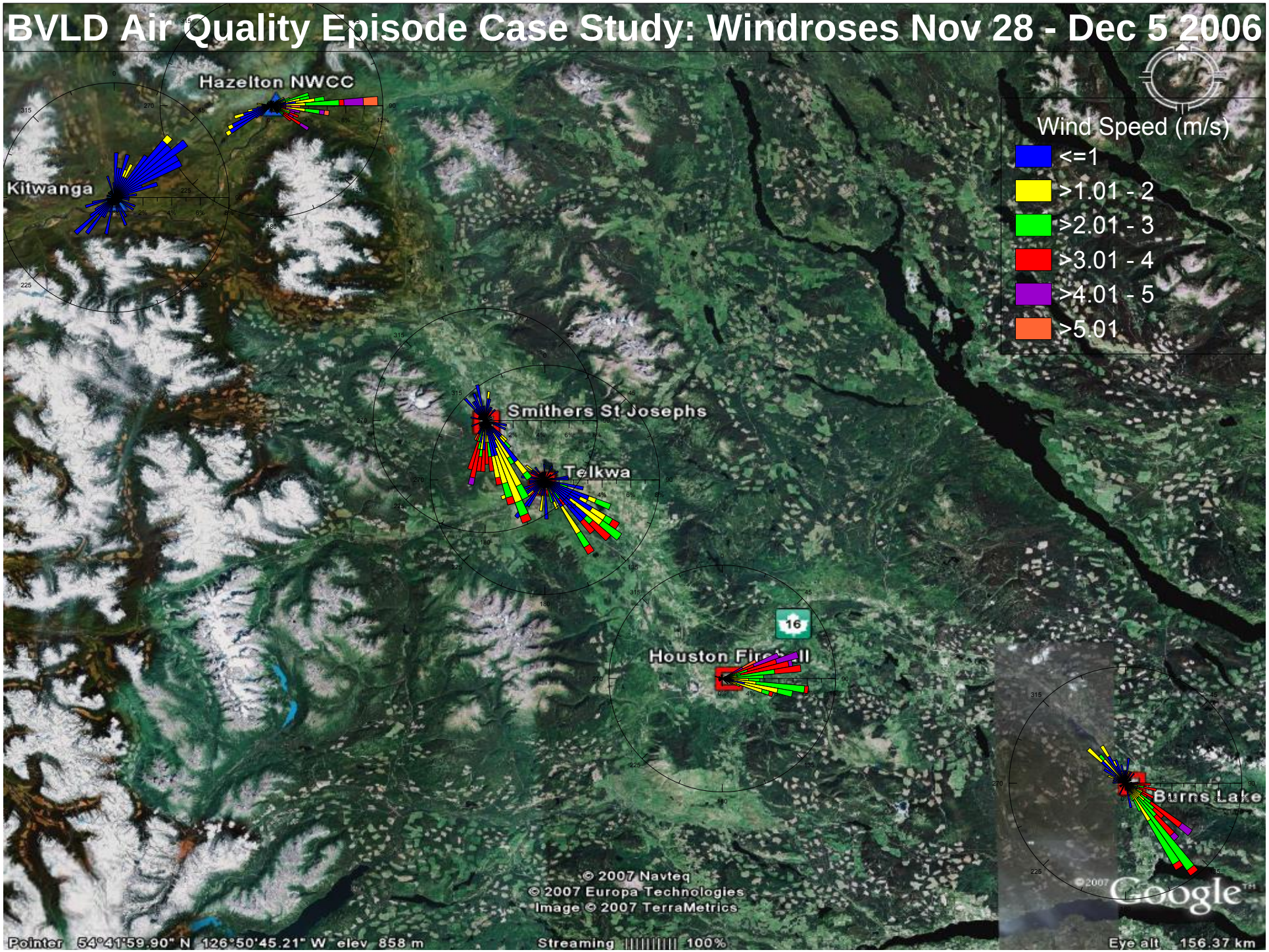
Telkwa - very different

All red arrows illustrates midnight as times for spikes

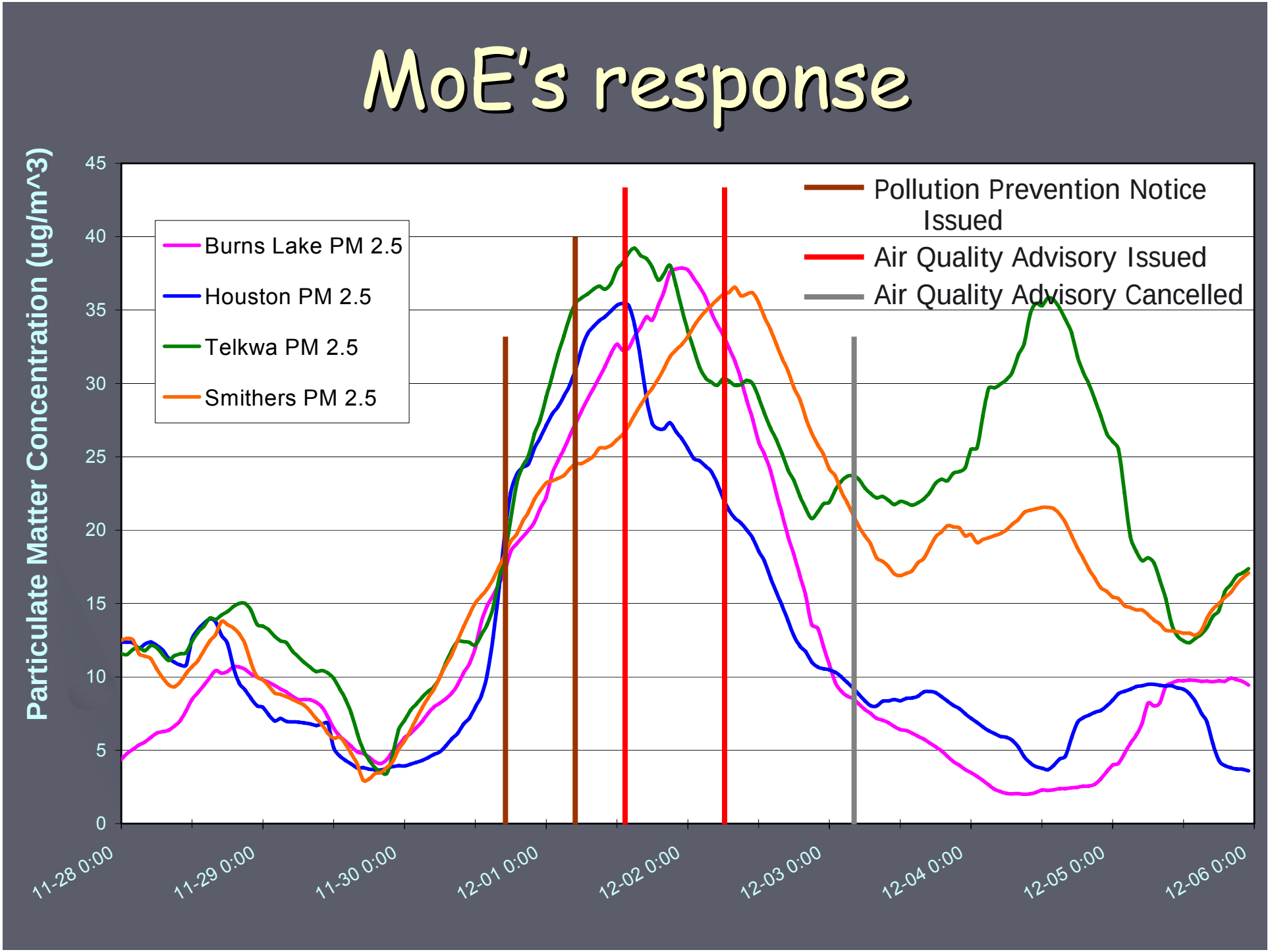




BVLD Air Quality Episode Case Study: Windroses Nov 28 - Dec 5 2006



MoE's response



Open Burning and This Episode

- According to CVF forecast records, fcsts issued on Nov 29th (for Nov 30th) to
  - BFP
  - Nadina Woodlot Assn
  - BCTS
  - HFP
  - Fraser Lake SM
  - Cheslatta
  - Canfor
  - Bulkley Woodlot Assn
- Most forecasts were good (Nov 30) / fair (Dec 1) / poor (Dec 2)
- Hindsight is 20/20, venting was actually fair (Nov 30) / poor (Dec 1) / poor (Dec 2)

Open Burning Cont'd

- According to MoE records, only
  - BFP
  - Canfor

  Indicated they would be burning on the 30th.

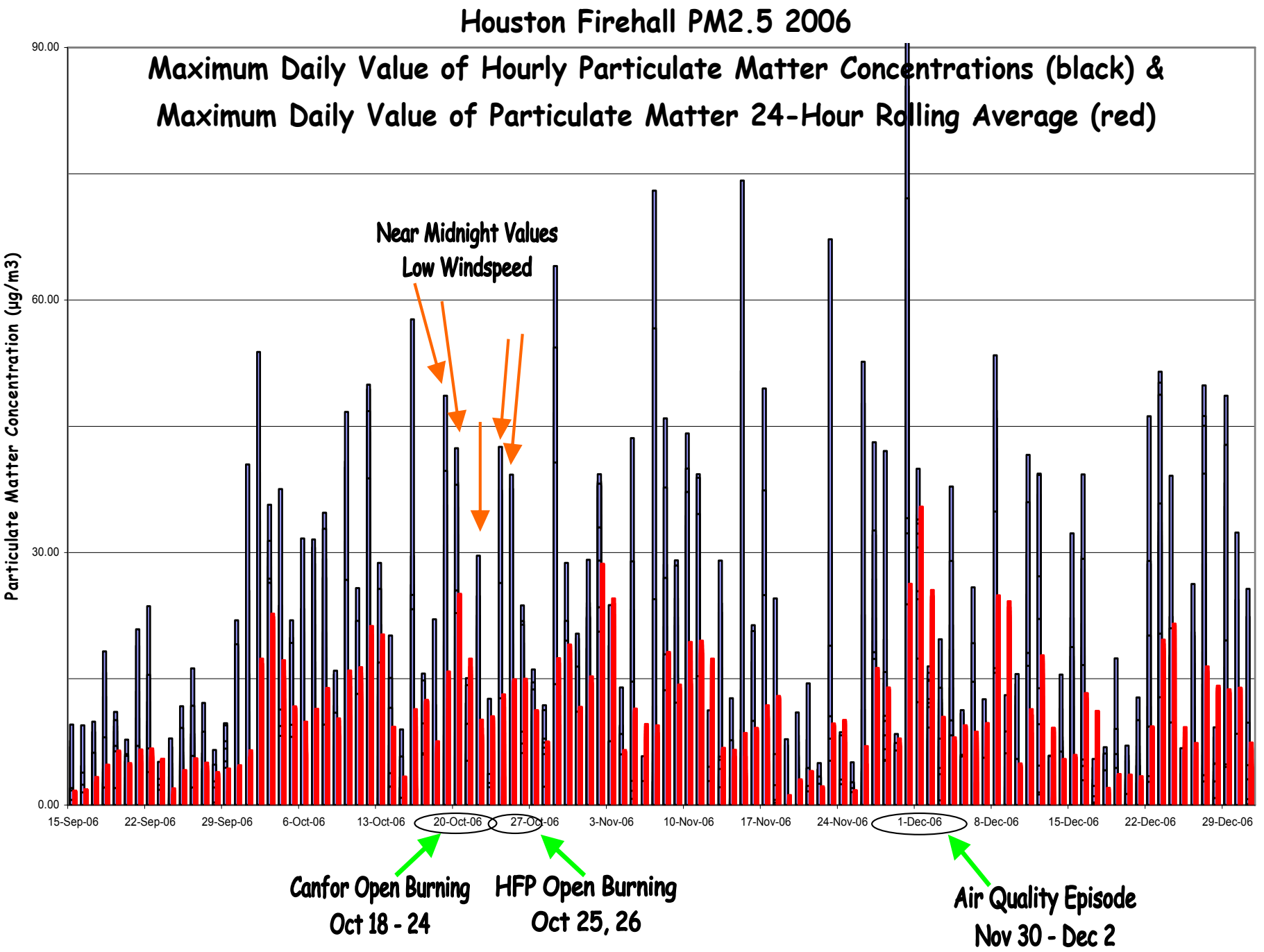
- This underscores the need to communicate burning activities to the group.

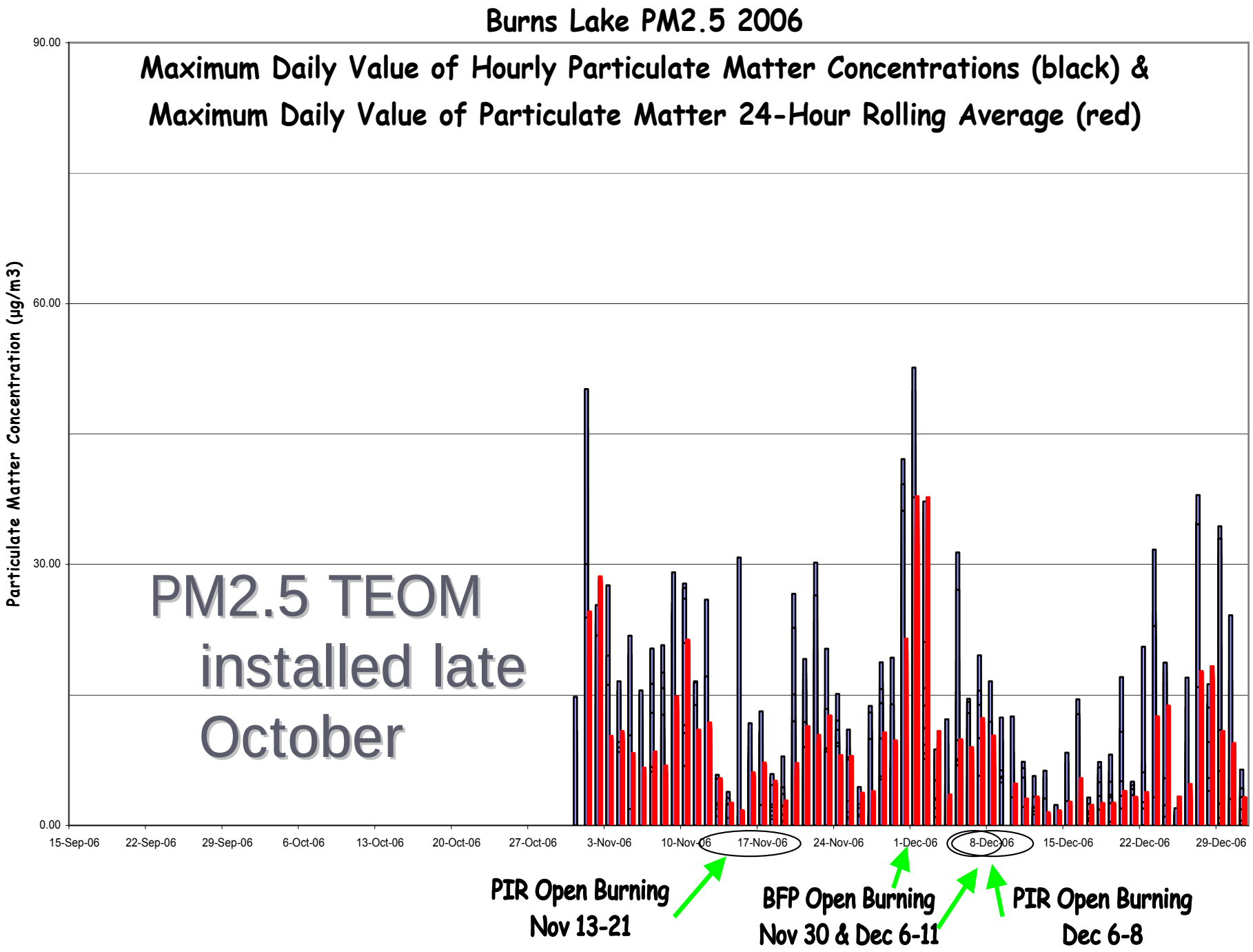
Episode Contributors

- It is possible that open burning did contribute to this episode along with
- Sawmill fire in Burns Lake was just extinguished
- Industrial emissions
- Woodstoves

Burn Season AQ Overview

- Houston and Burns Lake daily AQ
- Conclusions


Houston Firehall PM2.5 2006
Maximum Daily Value of Hourly Particulate Matter Concentrations (black) &
Maximum Daily Value of Particulate Matter 24-Hour Rolling Average (red)
Particulate Matter Concentration (µg/m3)
90.00
60.00
30.00
0.00
Near Midnight Values
Low Windspeed
15-Sep-06
22-Sep-06
29-Sep-06
6-Oct-06
13-Oct-06
20-Oct-06
27-Oct-06
3-Nov-06
10-Nov-06
17-Nov-06
24-Nov-06
1-Dec-06
8-Dec-06
15-Dec-06
22-Dec-06
29-Dec-06
Canfor Open Burning
Oct 18 - 24
HFP Open Burning
Oct 25, 26
Air Quality Episode
Nov 30 - Dec 2


Burns Lake PM2.5 2006
Maximum Daily Value of Hourly Particulate Matter Concentrations (black) &
Maximum Daily Value of Particulate Matter 24-Hour Rolling Average (red)
Particulate Matter Concentration (µg/m3)
90.00
60.00
30.00
0.00
15-Sep-06
22-Sep-06
29-Sep-06
6-Oct-06
13-Oct-06
20-Oct-06
27-Oct-06
3-Nov-06
10-Nov-06
17-Nov-06
24-Nov-06
1-Dec-06
8-Dec-06
15-Dec-06
22-Dec-06
29-Dec-06
PM2.5 TEOM installed late October
PIR Open Burning Nov 13-21
BFP Open Burning Nov 30 & Dec 6-11
PIR Open Burning Dec 6-8

Conclusions

- Practically speaking, burn season was short
- Known impacts from 2006 / 07 season are minimal
- We must attempt to increase communication from BCTS and woodlots

- Many remaining piles
- 2007 / 08 could be very busy year
- Hopefully precip over summer will allow for earlier start to season in Lakes TSA to take advantage of better venting


Thanks!