



## SMOKE MANAGEMENT AND PRESCRIBED BURNING

# WHAT IS SMOKE MANAGEMENT

The control of smoke produced by burning

A determination of where the smoke is going to go.

A determination of whether the smoke will vent away or not

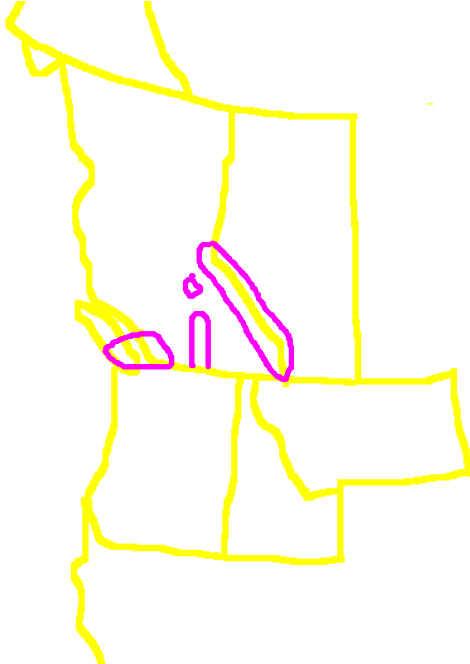
# WHY IS SMOKE MANAGEMENT IMPORTANT

Health reasons

The effects on tourism

Stress to the local population

Smoke sensitive areas in B.C.



WHAT IS THE MAIN DETERMINANT RE HOW BAD THE SMOKE WILL BE AND WHERE IT IS GOING TO GO

- The days venting
- Wind direction and strength
- The time of day of the light up

VENTING IS USUALLY POOR IN THE MORNINGS AND AFTER  
SUNSET. WHY?

- PWC issues a forecast for certain spot locations across the province. This is the FLCN39 CWVR
- For more localized information use the actual and prog tephis.

AMCIR <1> 1  
 FLCN39 CUVR 251430  
 SMOKE CONTROL FORECAST FOR BC AND YUKON ISSUED BY ENVIRONMENT CANADA AT 7:00 AM  
 PST  
 WEDNESDAY 25 FEBRUARY 2009 FOR TODAY.

MIXING HEIGHTS IN METRES ABOVE SEA LEVEL. AVERAGE WINDS IN KM/H.

25-FEBRUARY-2009

SOUTHERN INTERIOR

	7:00 AM			TODAY 4:00 PM			TOMORROW 4:00 PM	
	VI	WND	MXG HT	VI	WND	MXG HT	VI	WND
MXG HT								
		KM/H	M		KM/H	M		KM/H
FRASER CANYON 663	38/FAIR	11	768	50/FAIR	16	794	11/POOR	1
KAMLOOPS 912	31/POOR	10	788	51/FAIR	17	903	27/POOR	6
OKANAGAN 1005	29/POOR	23	629	65/GOOD	10	1843	23/POOR	5
CASTLEGAR 2013	32/POOR	13	855	56/GOOD	12	1388	50/FAIR	6
CRANBROOK 1466	38/FAIR	19	1249	84/GOOD	17	2248	15/POOR	2
REVELSTOKE 1164	22/POOR	8	758	30/POOR	8	961	28/POOR	5
GOLDEN 1363	19/POOR	4	1238	20/POOR	6	1122	24/POOR	5

FORECAST UPPER WINDS FOR THIS AFTERNOON

	900M	1800M	2700M
PENTICTON	SW 30	SW 29	W 18
CRANBROOK	SW 32	SW 32	W 23

CENTRAL INTERIOR

	7:00 AM			TODAY 4:00 PM			TOMORROW 4:00 PM	
	VI	WND	MXG HT	VI	WND	MXG HT	VI	WND
MXG HT								
		KM/H	M		KM/H	M		KM/H
QUESNEL 990	69/GOOD	25	1167	80/GOOD	23	1421	27/POOR	8
100 MILE 1423	54/FAIR	19	1477	64/GOOD	22	1558	17/POOR	3
WILLIAMS LAKE	55/GOOD	19	1494	65/GOOD	20	1627	17/POOR	3

VENTILATION GUIDELINES:  
 POOR: 0-33  
 FAIR: 34-54  
 GOOD: 55-100

VENTILATION INDICES NORMALLY DROP TO POOR AFTER SUNSET.



## SMOKE DISPERSION DEPENDS ON:

- ATMOSPHERIC STABILITY
- THE HEIGHT OF THE MIXING LEVEL
- THE STRENGTH OF THE WIND BETWEEN THE GROUND AND THE MIXING HEIGHT.



## COMPUTED VENTILATION

Mixing height  $\times$  the mean wind speed in the layer  
between the ground and the mixing ht.

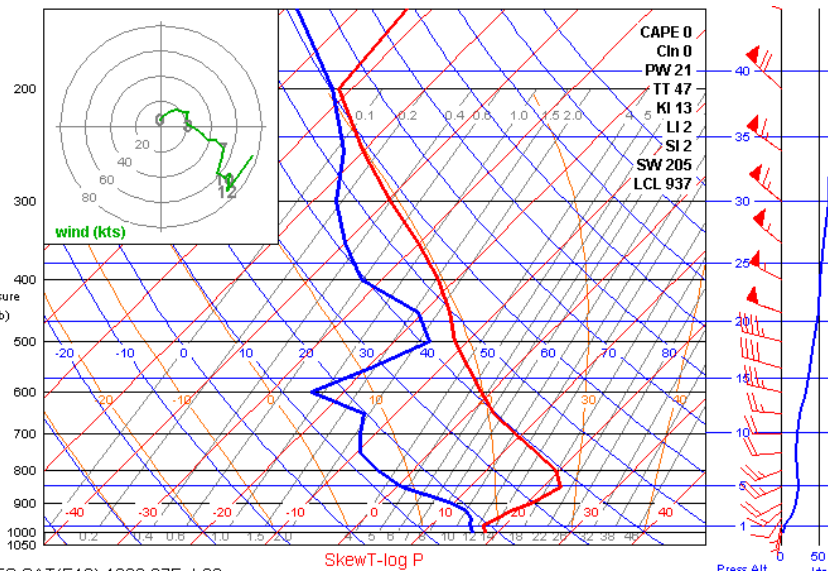
Example - mixing height = 6000 feet  
mean wind speed = 5 knots

Thus  $6000 \times 5/1000 =$  Vent factor 30

Then by applying to tables we come up with a  
venting index of 64 which is good.

## WHAT IS THE MIXING LEVEL

To derive mixing heights, we lift a parcel of air adiabatically from the surface with a starting temperature near the maximum expected for that day. The mixing height is defined as that level where the temperature of the adiabatically lifted parcel becomes less than the measured ambient temperature. Once this occurs, it is assumed that the parcel, being cooler than its surroundings, will sink back towards the surface.



1000mb = sfc  
900mb = 3500ft  
850mb = 4200ft

1. What is sfc temp
2. What is the mxg hgt
3. Using mxg hgt x mean wind speed div by 1000 = vent #

4. The high temp for today is forecast to be 30 C. Recalculate the venting for mid afternoon.  
Recalculate the venting expected

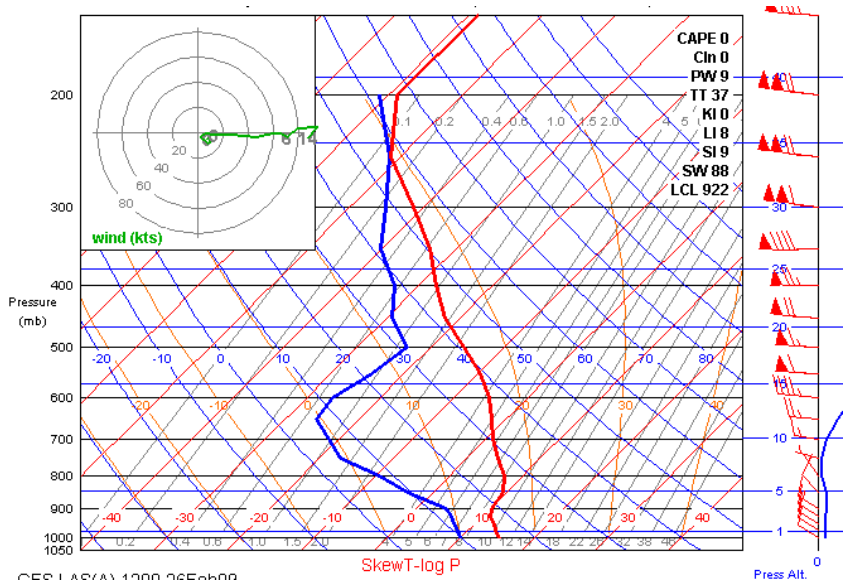
The sounding shown on the next page is for 12Z - 4am local time

1). What is the current venting # using the formula:

$$\text{mixing height} \times \text{wind speed in layer} \div \text{by } 1000 = \text{vent \#}$$

2). Do a calculation for mid afternoon venting using a max temp of 23 C.

3). Do a calculation of mid afternoon venting if your burn site was at the 900 mb level.



VENT NUMBERS AS THEY RELATE TO ACTUAL VENTING

- Vent # 0 - 10 - Poor venting
- 11 - 22 - Fair venting
- 22+ - Good venting

BURN PILES AND PRESCRIBED BURNS ARE USUALLY  
LIT UP EARLY AFTERNOON. WHY???

Answers on the next page



- The best time of day for staff
- The best venting
- The best mixing thus the highest mixing ratio
- Allows time for the smoke to disperse before late day poor venting.

## HOW THE FIRE WEATHER FORECASTER GETS INVOLVED

- Early in the season contact re what indicies will be required for a particular prescribed burn. ie what do they want to accomplish with this burn
- A few days ahead looking for a planning forecast.
- Day of the burn for expected weather/venting and smoke drift.

## GOOD INDICE NUMBERS FOR A PRESCRIBED BURN

- Some variability depending on what is trying to be accomplished.
- FFMC - 85 - 90
- DMC - 20 - 30
- DC - 200 - 300
- For example, if you just want a surface burn then you would go for a higher ffmc and lower values for dmc and dc

## MAIN REASONS FOR BURNING

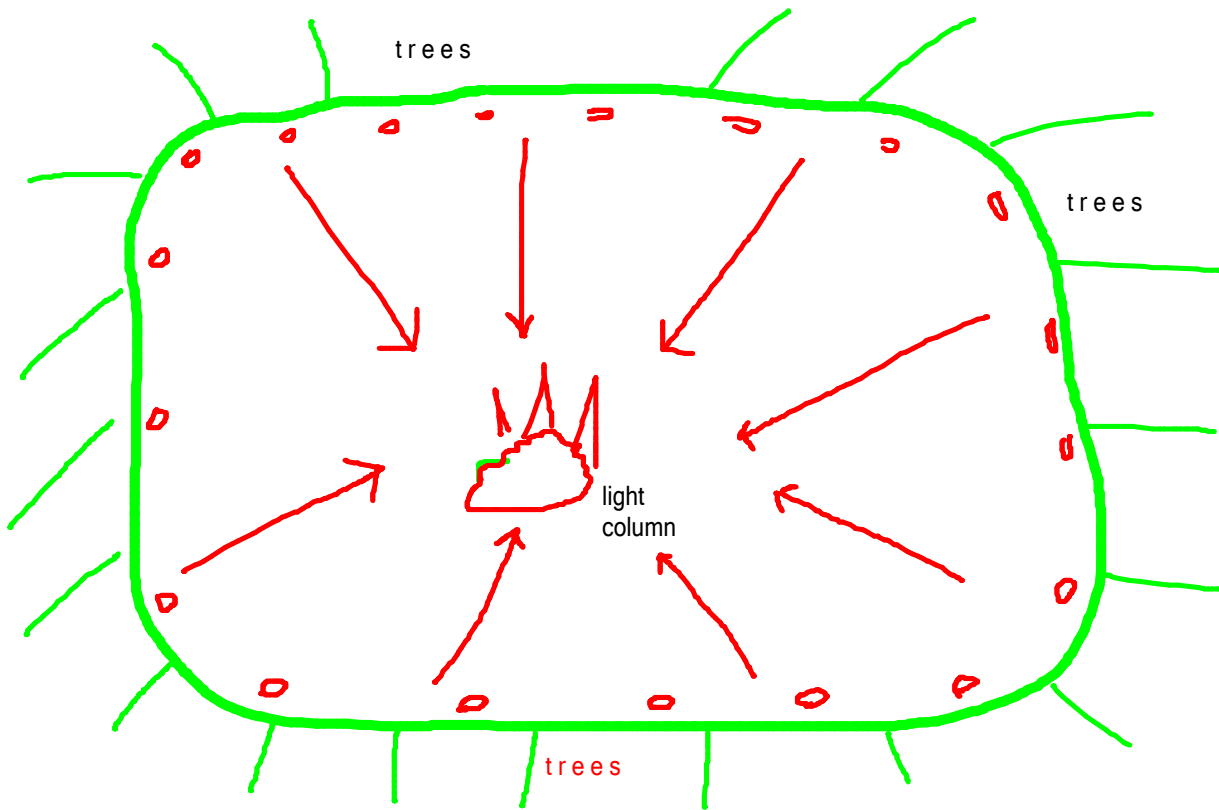
- Hazard abatement
- To help prepare the ground for re-planting

## REASONS A BURN CAN BE POSTPONED

- Indice numbers too high or too low
- Venting not good enough
- Smoke forecast to move into smoke sensitive areas
- Too windy. Escape concerns
- Not enough ground personnel available
- Not able to get helicopter for drip torching light up
- Weather forecast not suitable

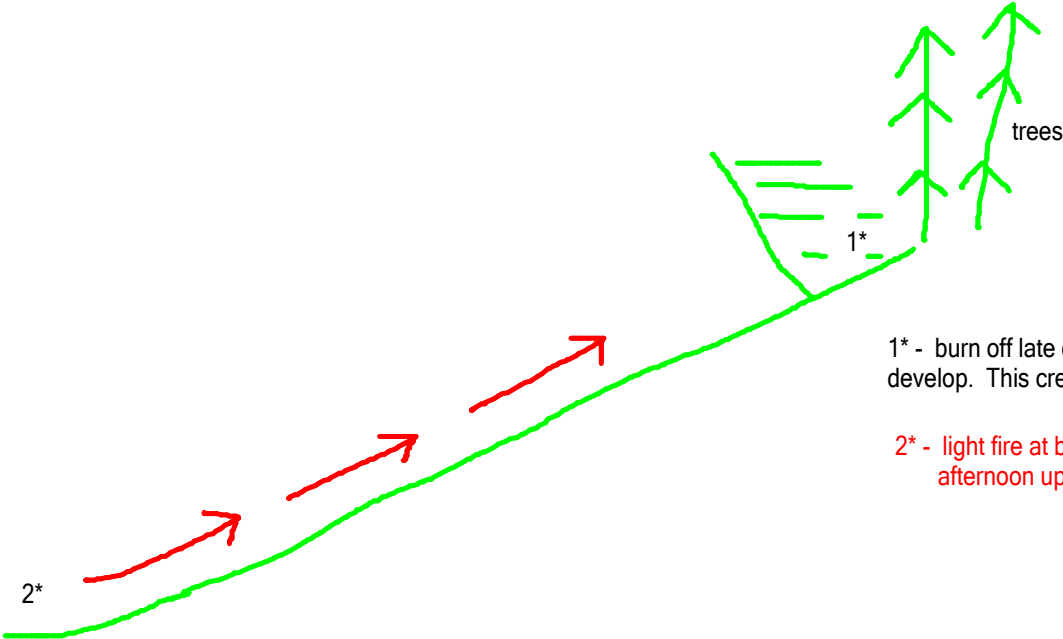
# PRESCRIBED BURNING METHODS

- A convective column



# PRESCRIBED BURNING METHODS

- using the slope



1\* - burn off late day when downslope winds develop. This creates a fire guard.

2\* - light fire at bottom to be driven uphill by afternoon upslope winds.

