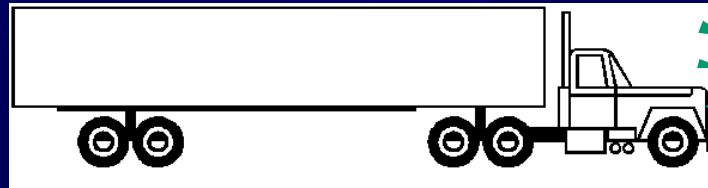
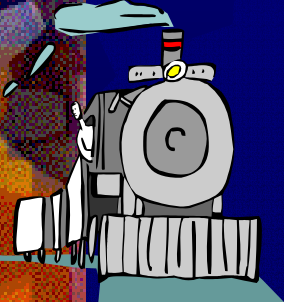
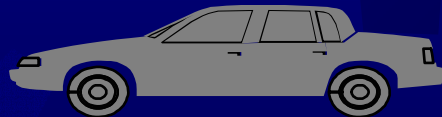
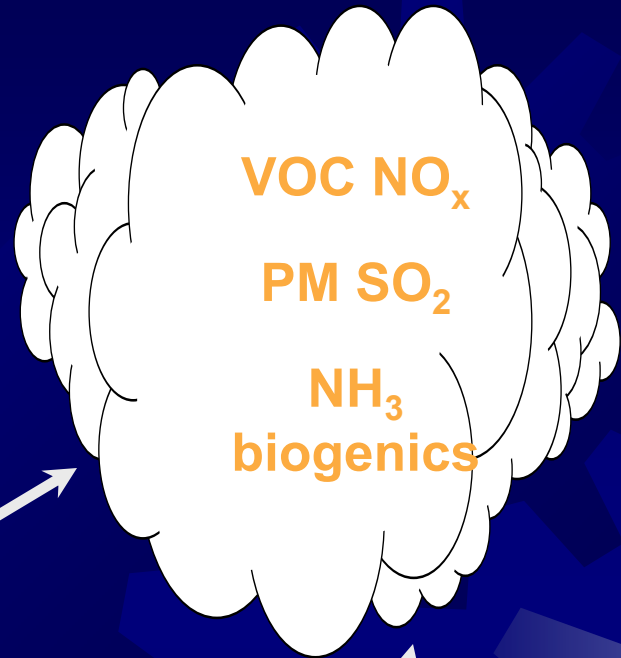


# Airshed Characterization

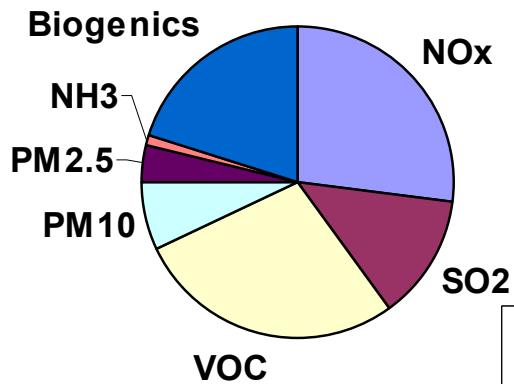
- ✦ Sources of pollutants - emissions
- ✦ Wind patterns that effect pollutant concentrations
- ✦ Concentration of pollutants against guidelines, standards or objectives
  - ✦ Ground level ozone ( $O_3$ ) and fine particulate matter (PM)



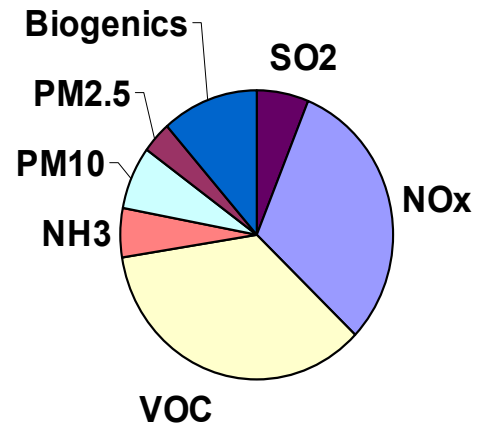
# Emissions



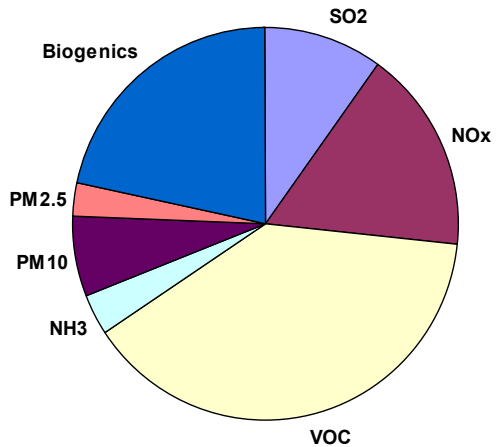
## Puget Sound 1996 Emissions Inventory



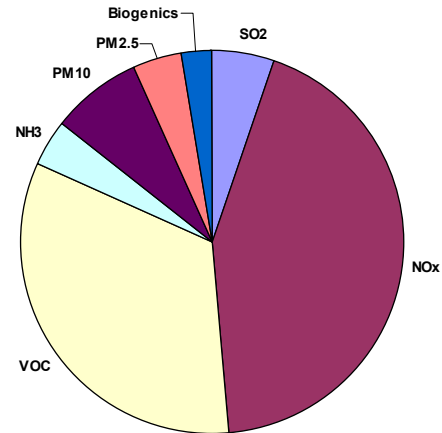
## Georgia Basin 2000 Emission Inventory



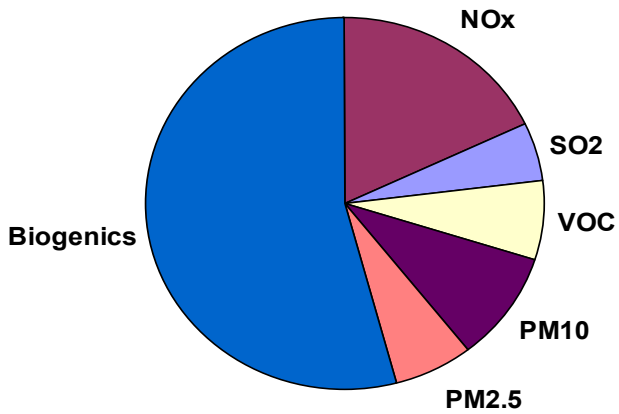
**Whatcom County 2000 Emissions Inventory**



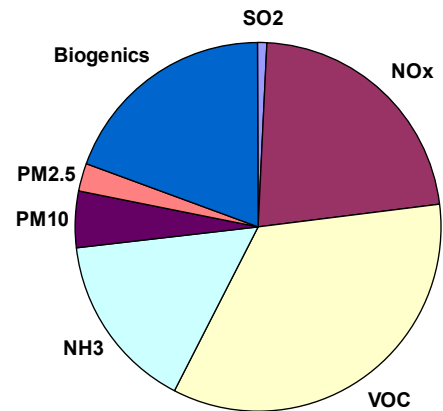
**GVRD 2000 Emission Inventory**

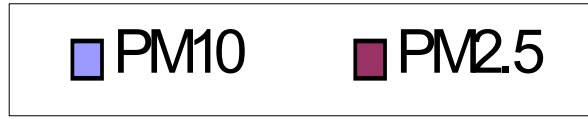
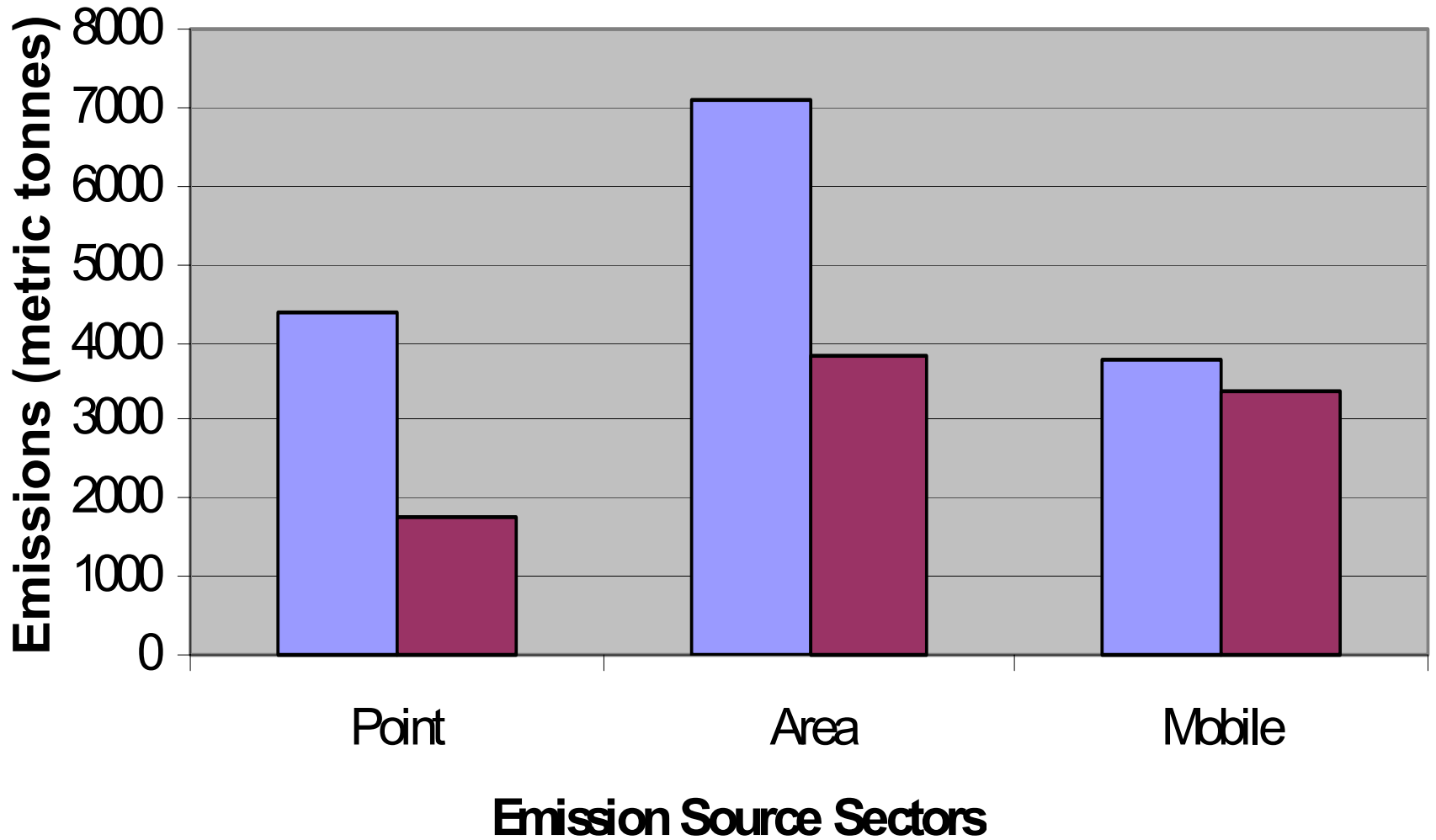


**Vancouver Island 1995 Emissions Inventory**



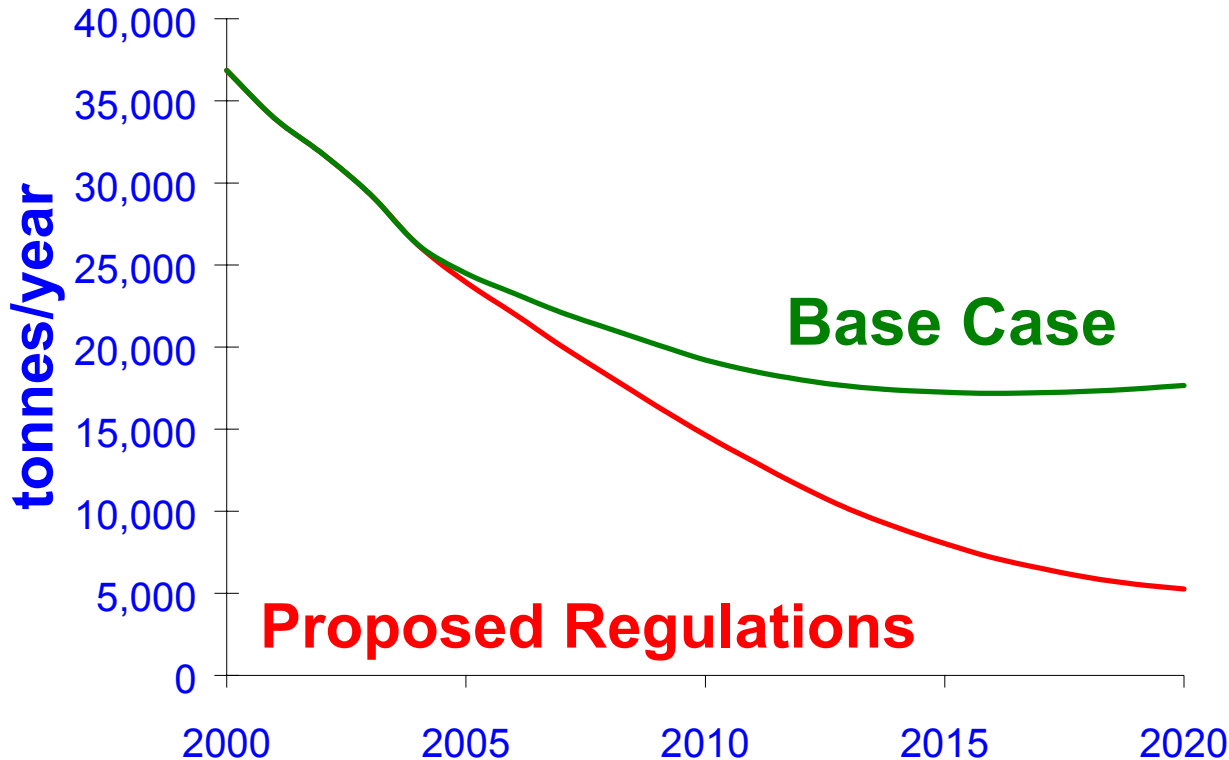
**FVRD 2000 Emissions Inventory**





# Forecast of Emissions from On-Road Vehicles

## NOx Emissions



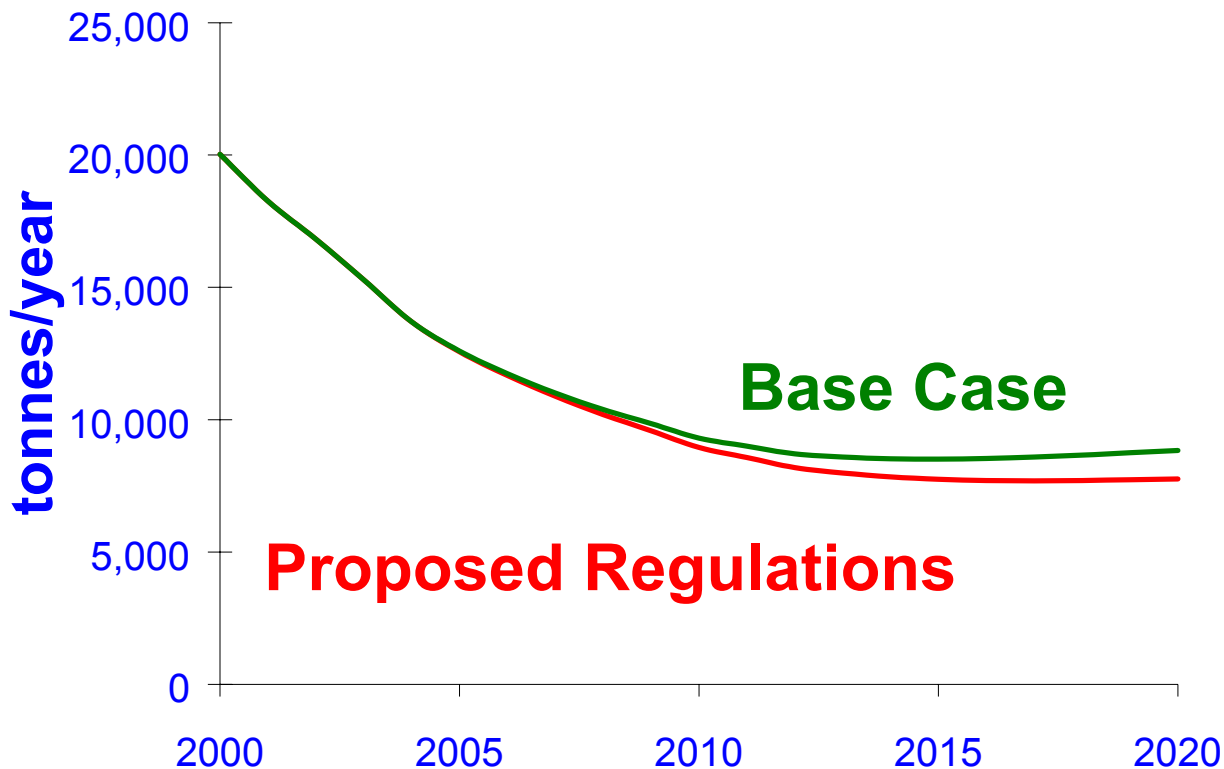
Base Case - current vehicle and fuel standards; current inspection and maintenance programs

Proposed Regulations - *On-Road Vehicle and Engine Emission Regulations; Sulphur in Diesel Regulations*

Source:  
SENES & AIR Inc.  
December 2001

# Forecast of Emissions from On-Road Vehicles

## VOC Emissions



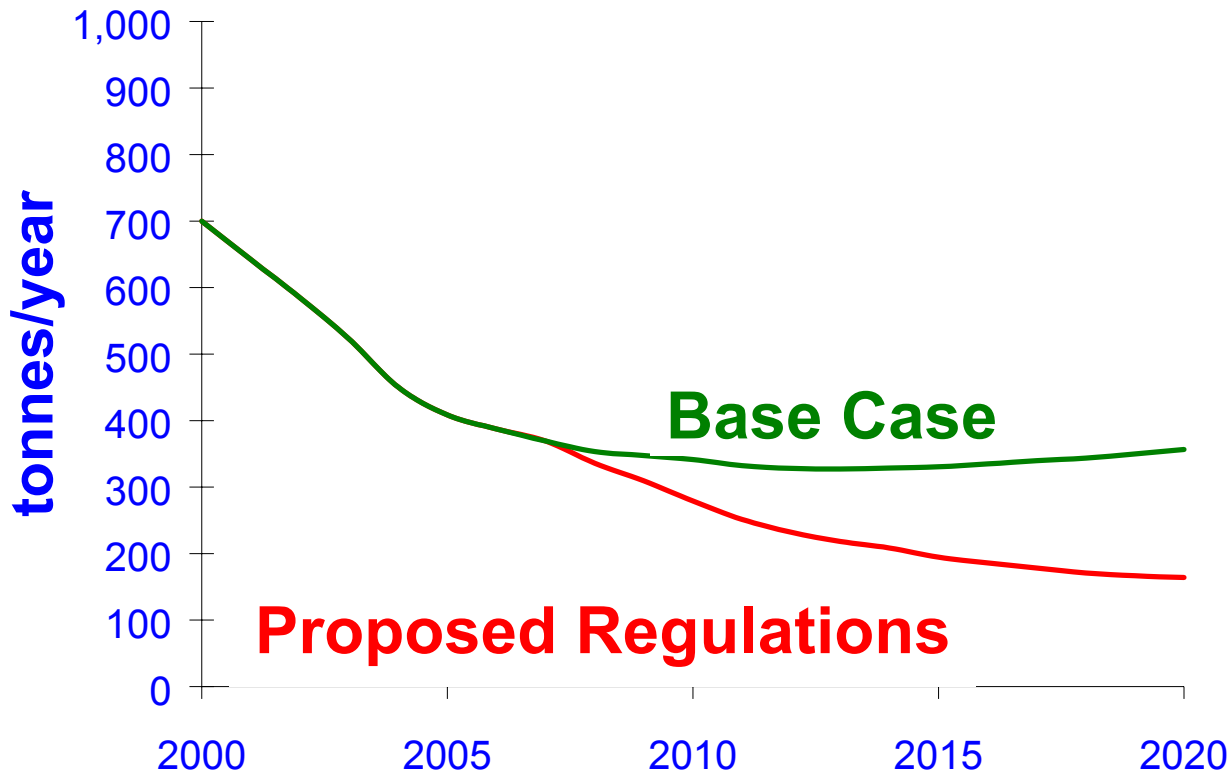
Base Case - current vehicle and fuel standards; current inspection and maintenance programs

Proposed Regulations - *On-Road Vehicle and Engine Emission Regulations; Sulphur in Diesel Regulations*

Source:  
SENES & AIR Inc.  
December 2001

# Forecast of Emissions from On-Road Vehicles

## PM<sub>10</sub> Emissions

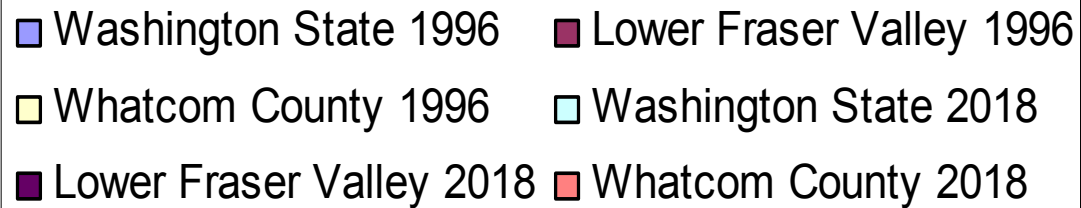
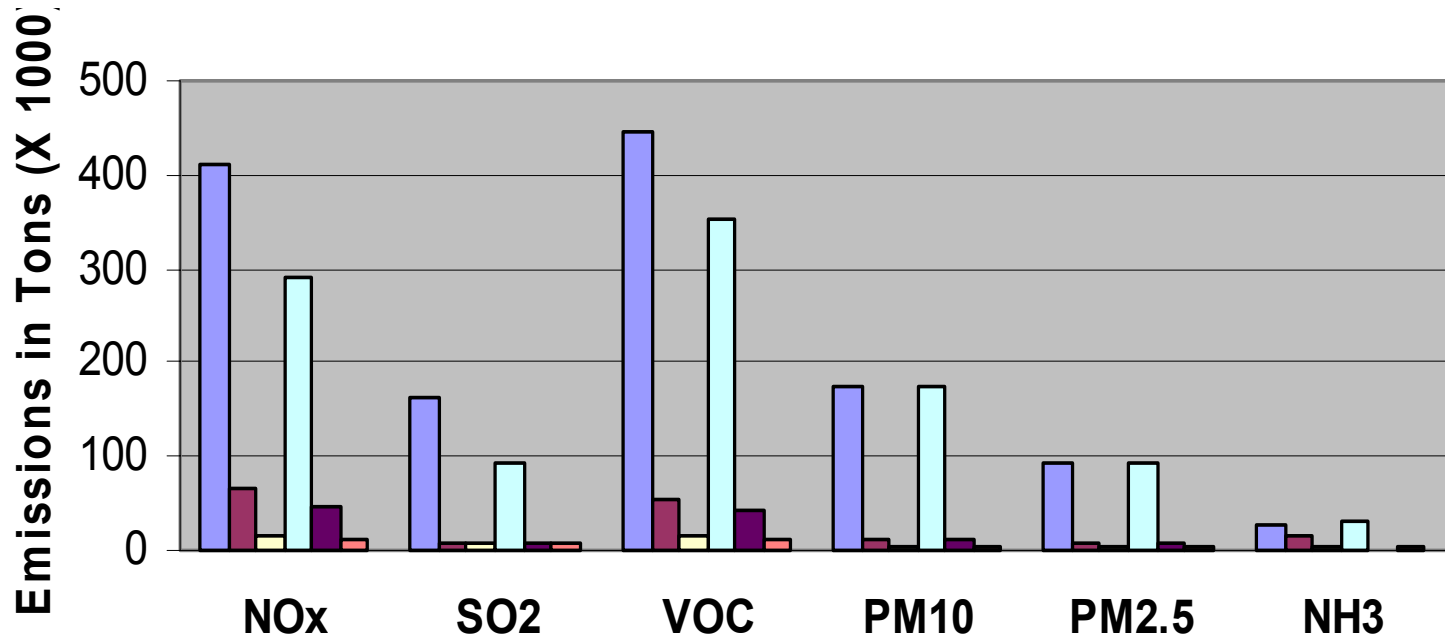


Base Case - current vehicle and fuel standards; current inspection and maintenance programs

Proposed Regulations - *On-Road Vehicle and Engine Emission Regulations; Sulphur in Diesel Regulations*

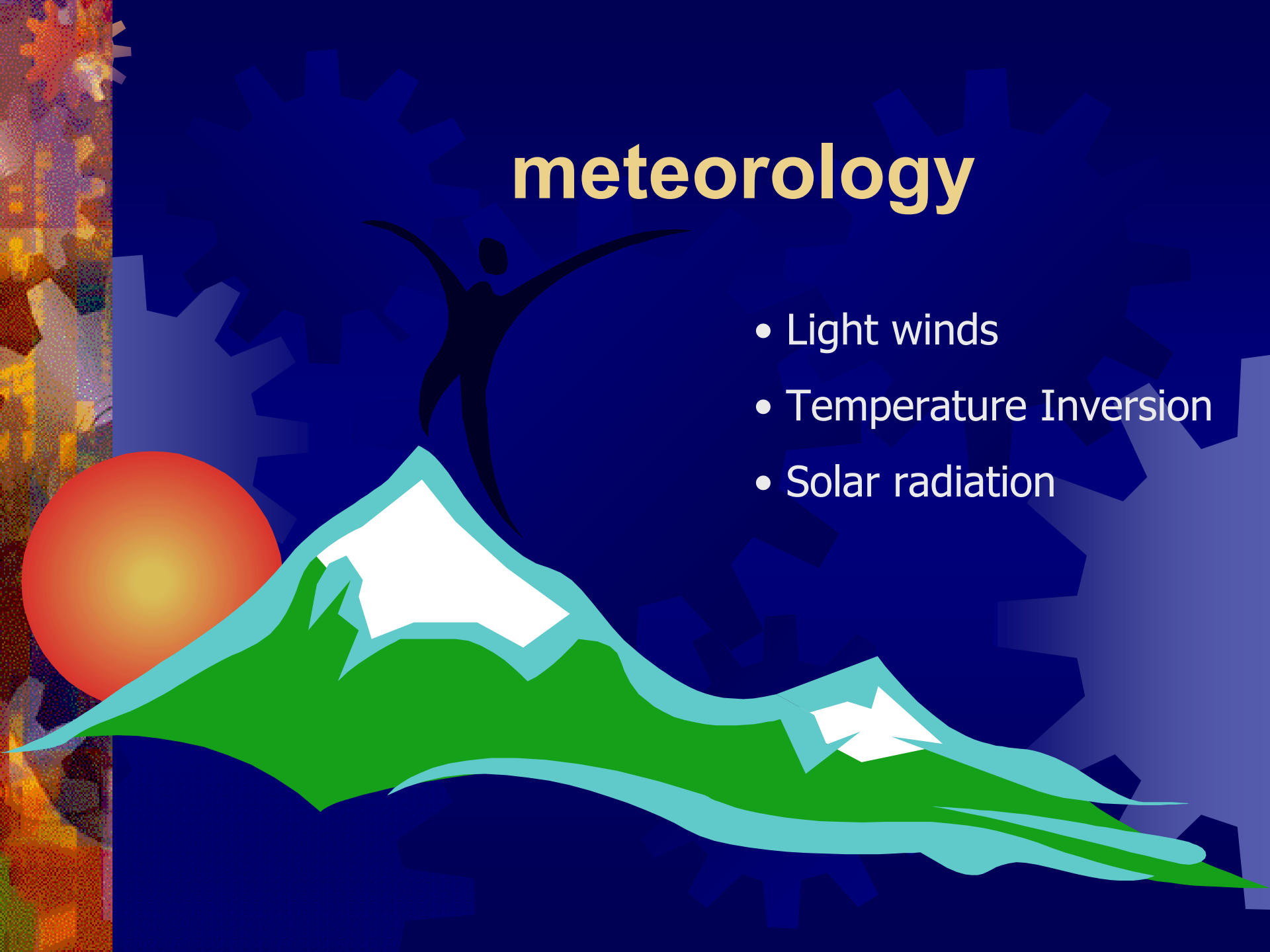
Source:  
SENES & AIR Inc.  
December 2001

## Emissions Inventory and Forecast

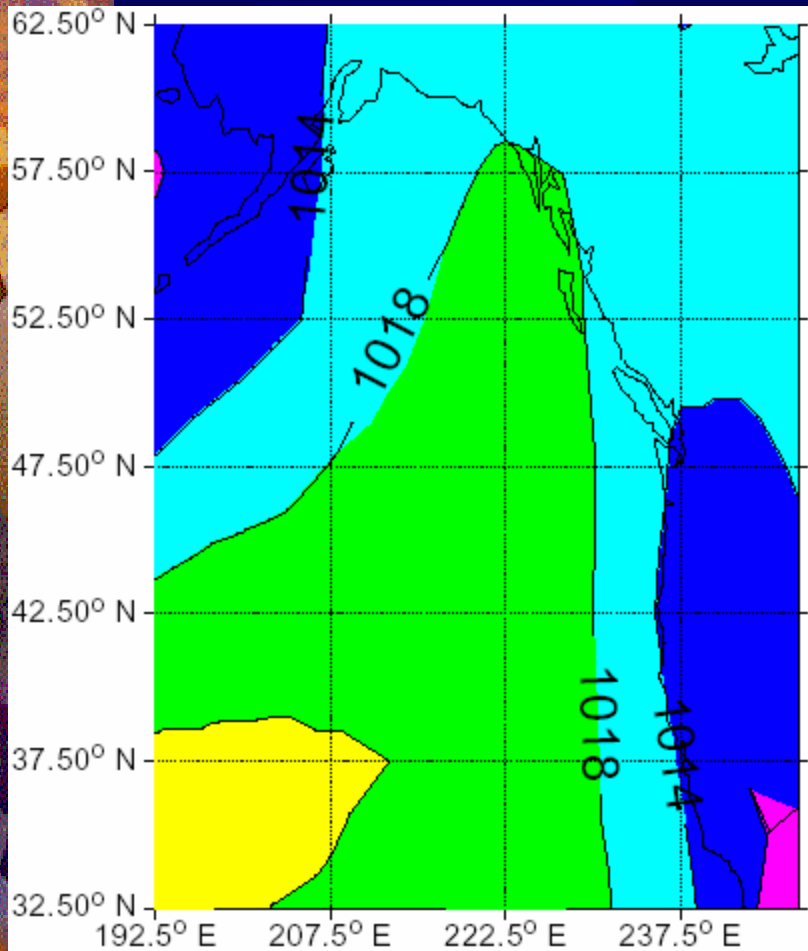


# meteorology

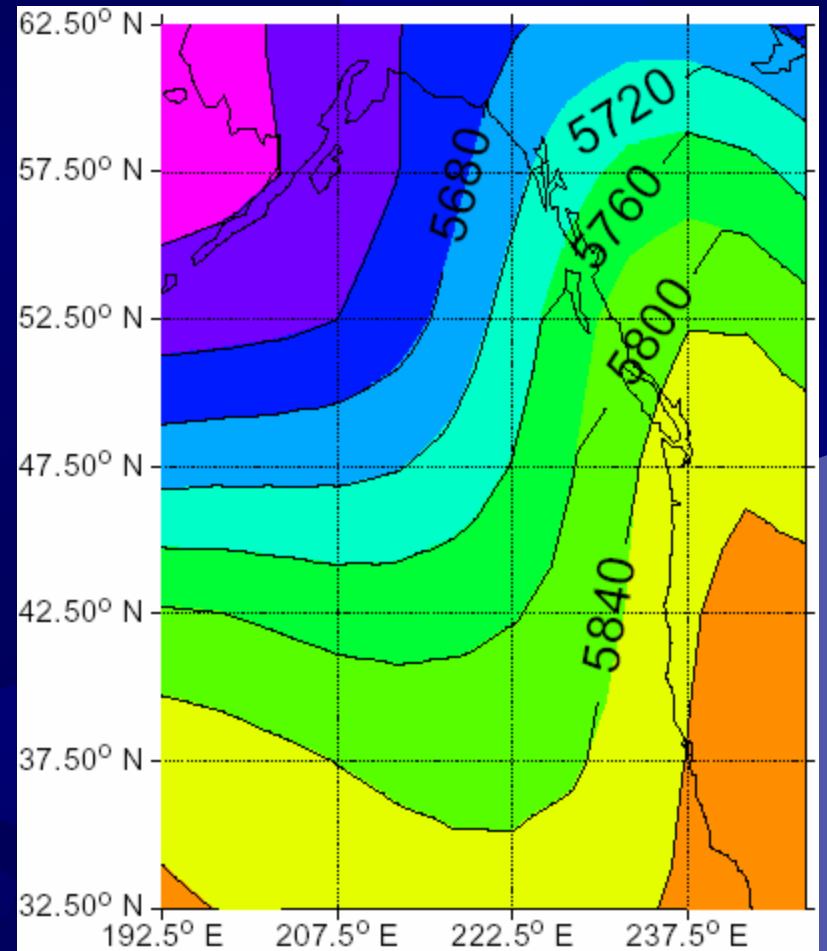
- Light winds
- Temperature Inversion
- Solar radiation



Surface pattern (mb)

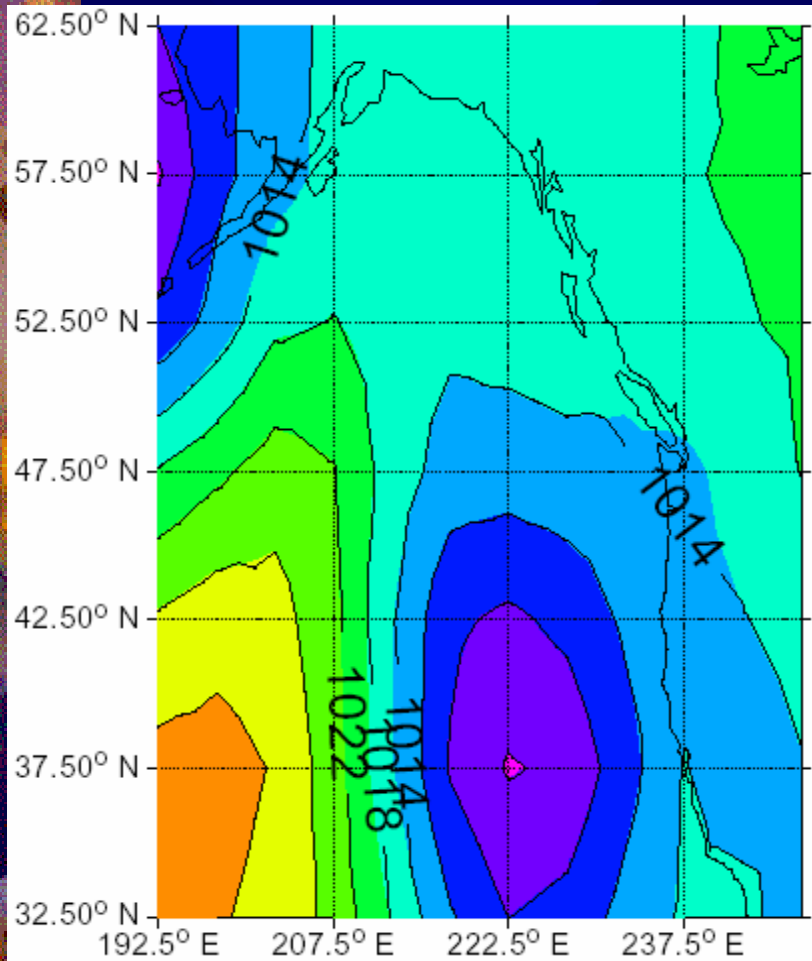


Upper level heights (m)

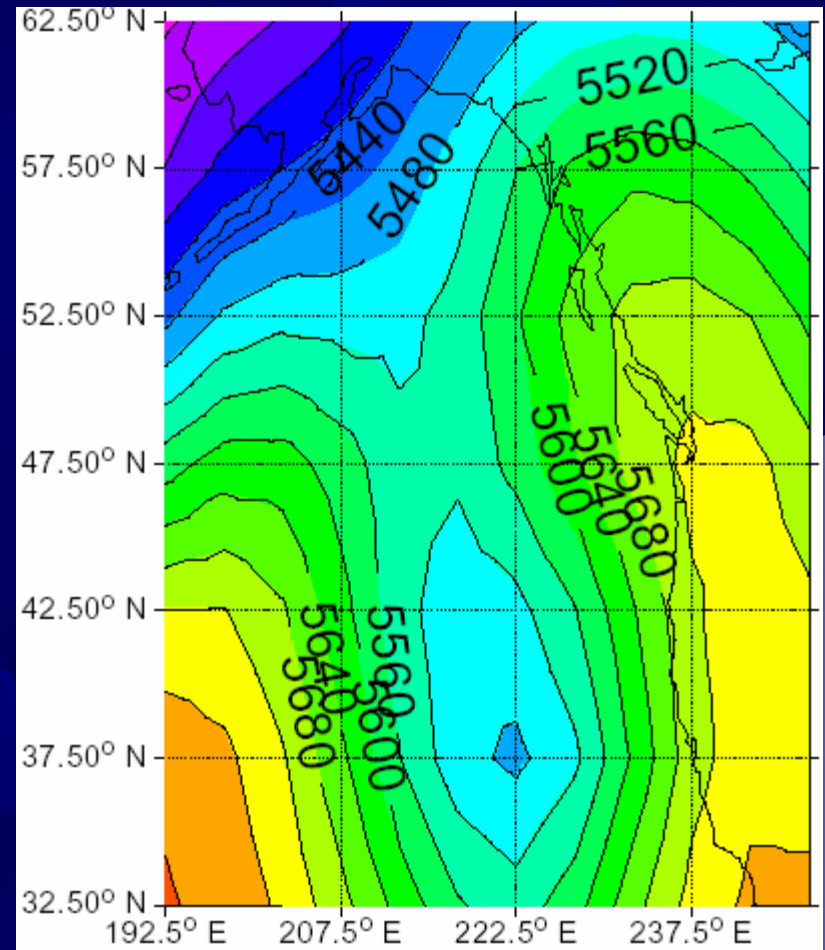


Weather pattern creating highest Ozone (occurred 78 times)

Surface pattern (mb)

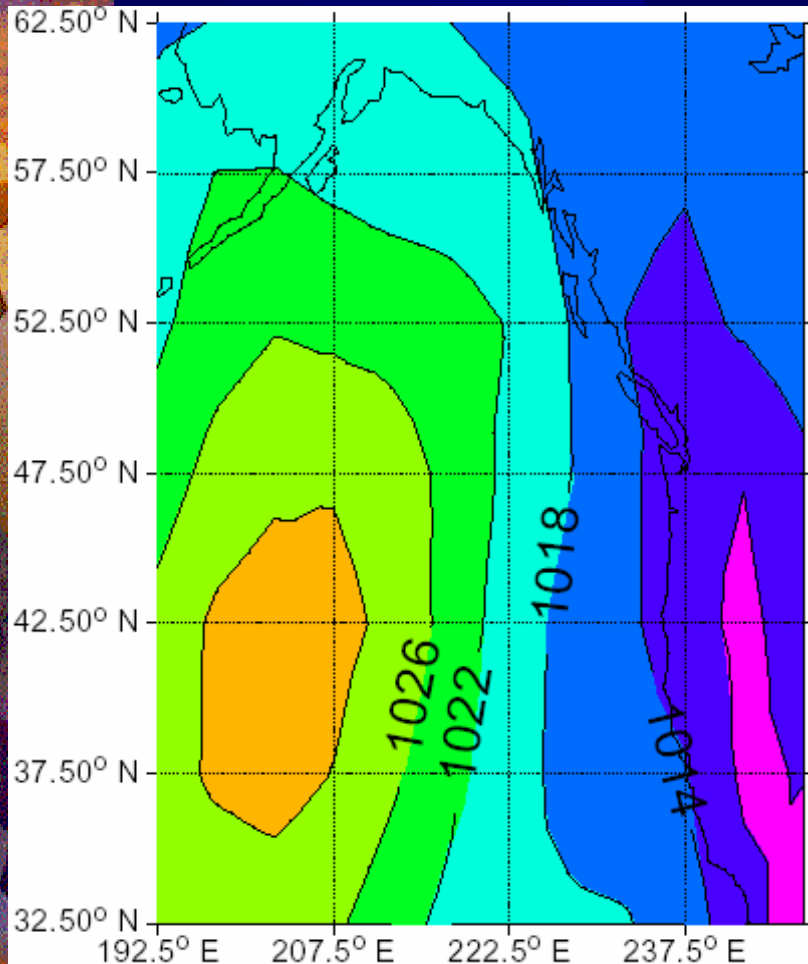


Upper level heights (m)

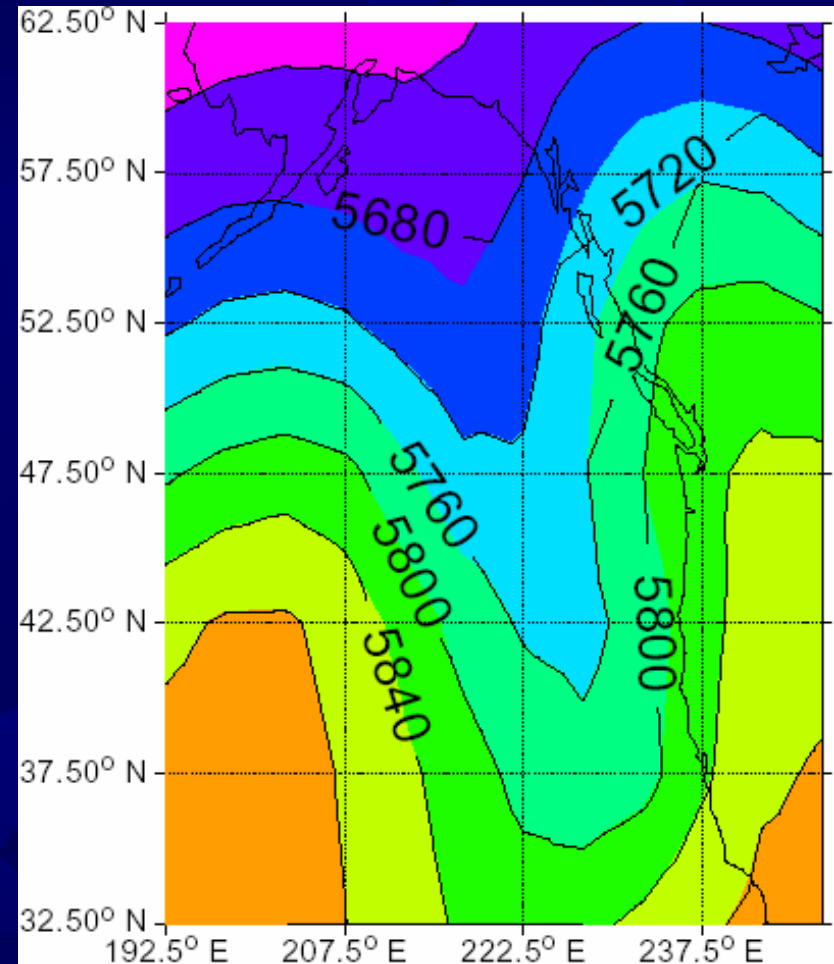


Weather pattern creating highest PM10 (occurred 6 times)

# Surface Pattern (mb)

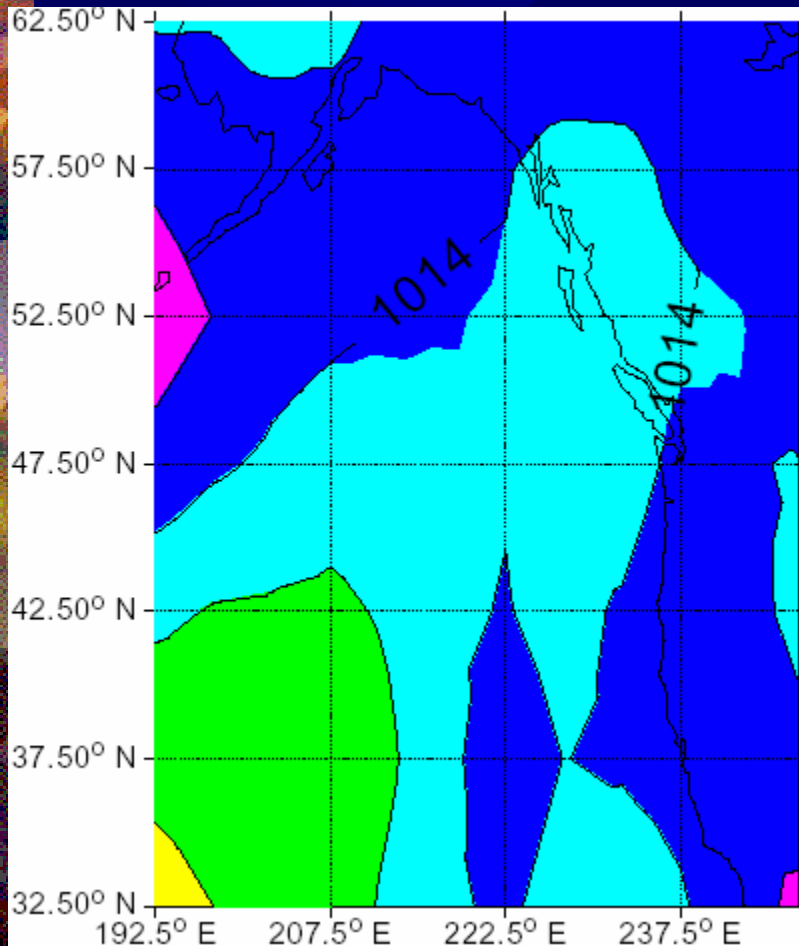


# Upper Level Heights (m)

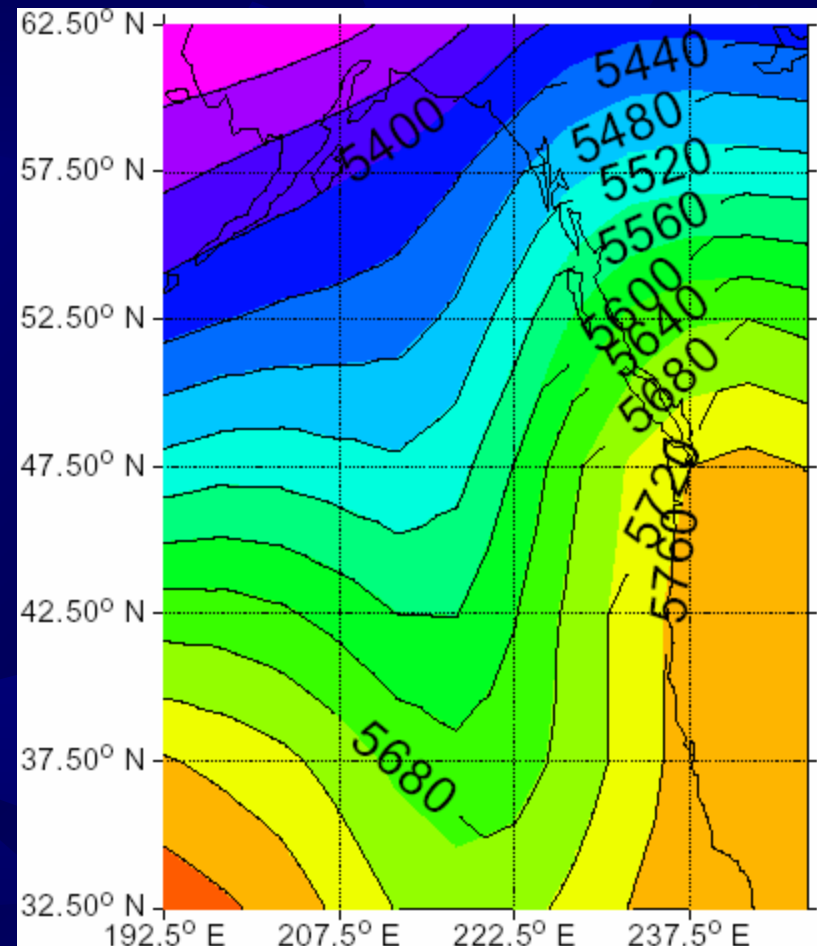


Weather pattern creating the highest concentration of Ozone and elevated PM10 (occurred 6 times – summer only)

Surface Pattern (mb)



Upper Level Heights (dm)

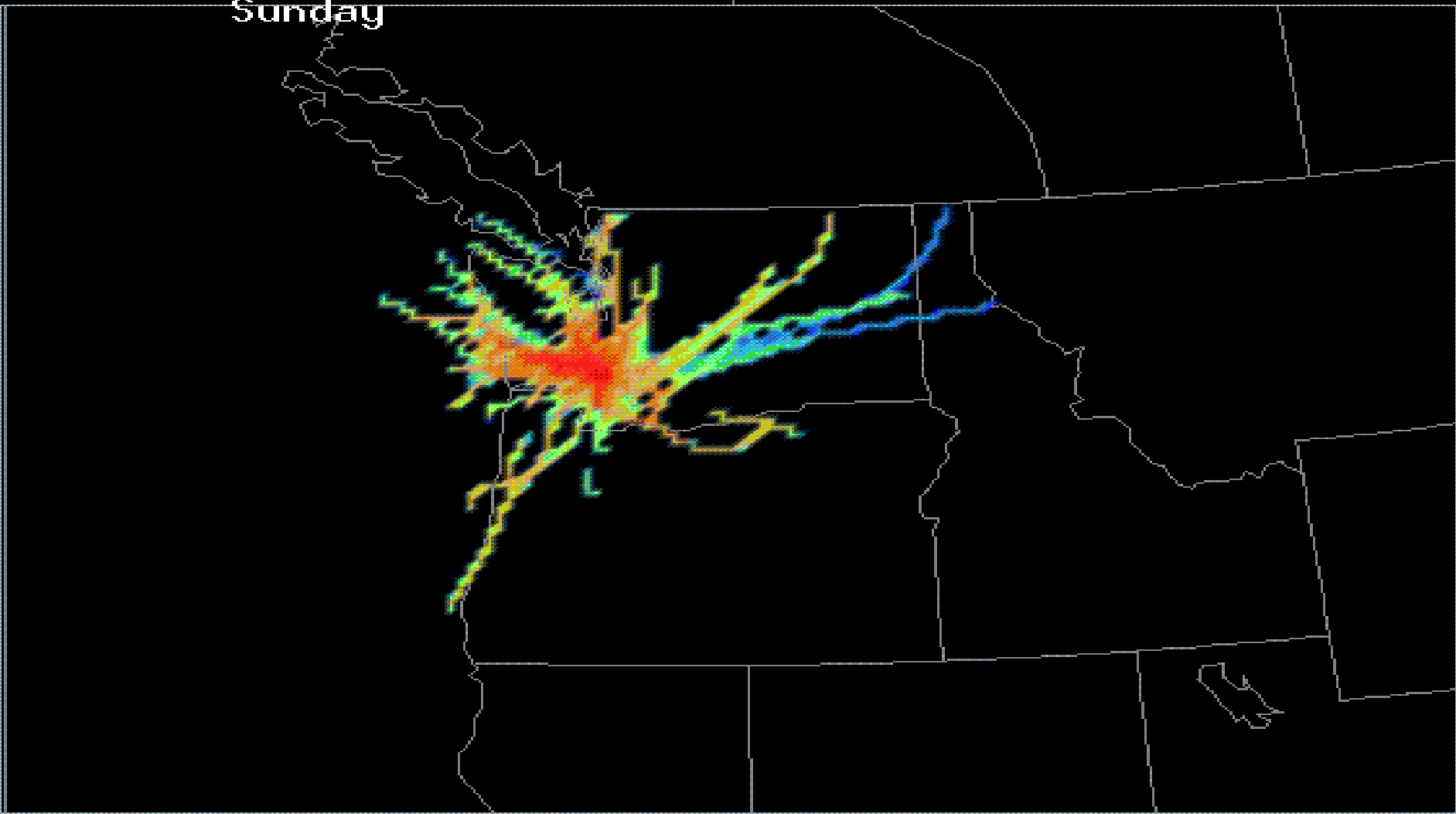


Weather pattern creating the highest concentration of PM10 and elevated Ozone (occurred 12 times – Spring and Fall)

00:00:00  
00338  
2 of 4  
Sunday



Worst pentile trajectories  
to Paradise (97, 98, 99)



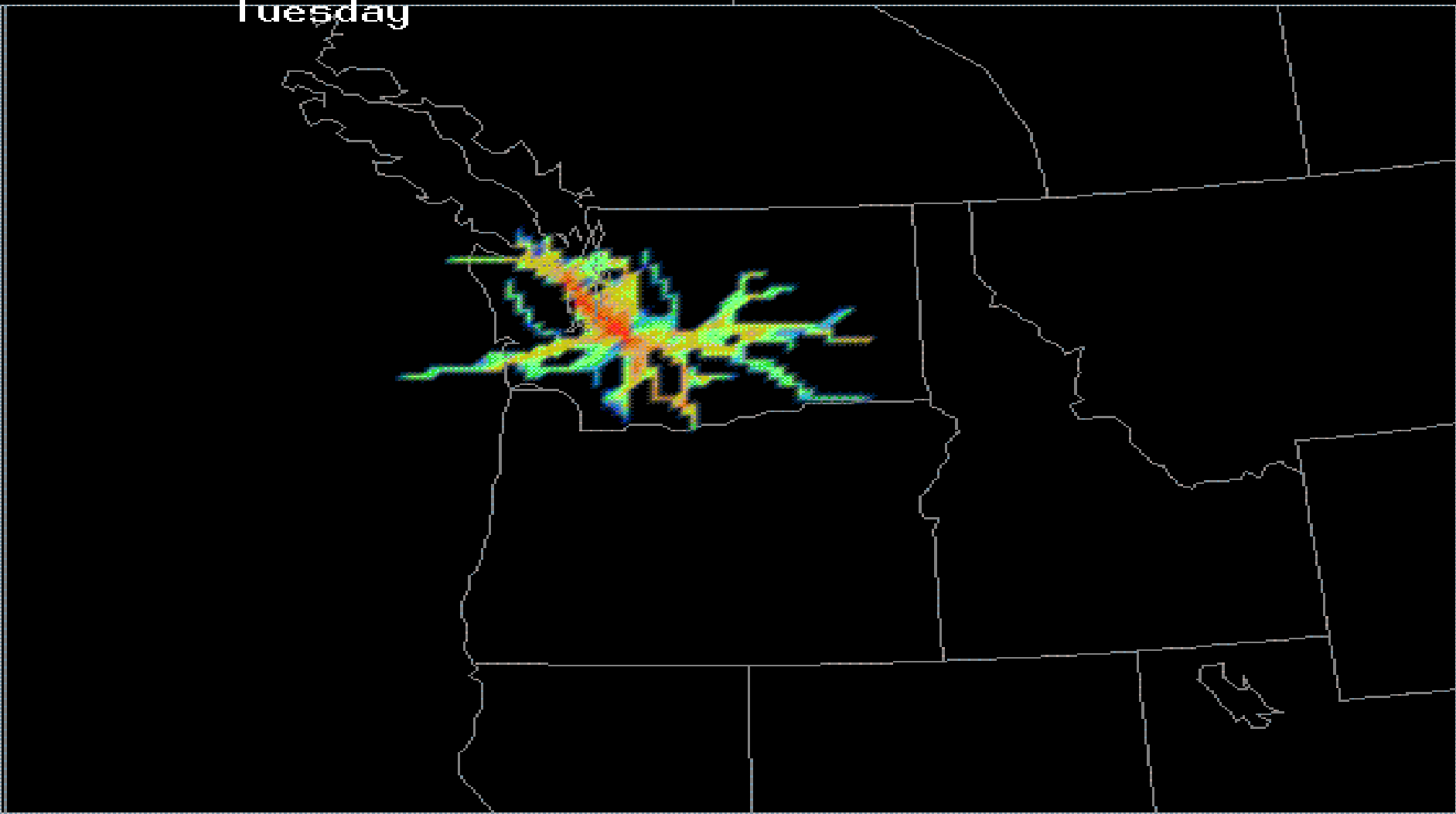
12 hour trajectories  
(<500m)

Vis5D

00:00:00  
00340  
4 of 4  
Tuesday



Worst pentile trajectories to  
Snoqualmie Pass (97, 98, 99)



12 hour trajectories  
(<500m)

Vis5D

# Ambient Air Quality



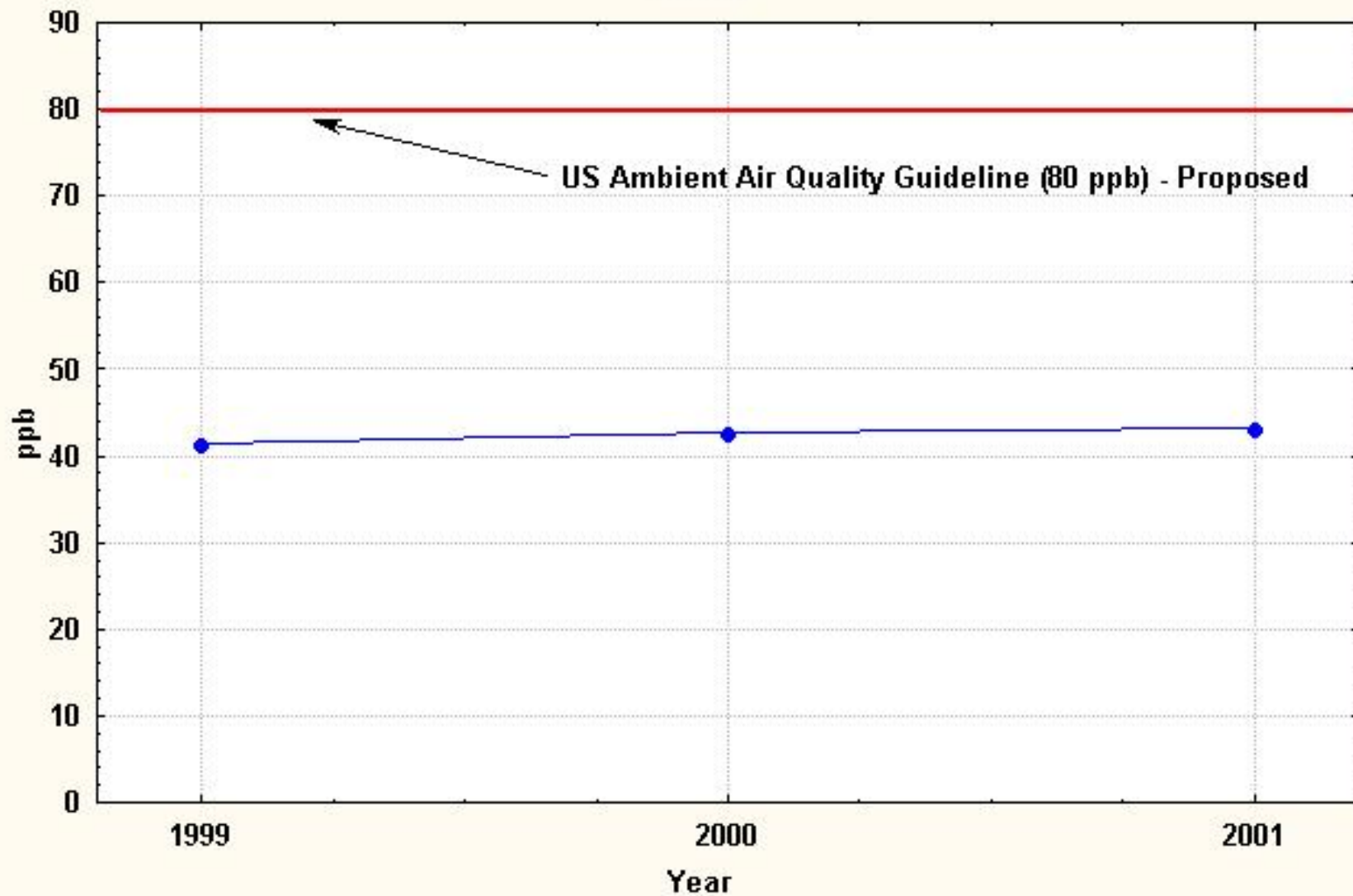
# Ozone standards/objectives comparison

Agency	Averaging Period	Current	Proposed
Canada NAAQO	1-hour	82 ppb	-
	24-hour	25 ppb	-
	annual	15 ppb	-
CWS	8-hour	-	65 ppb *
BC provincial objective	-	-	-
US EPA NAAQS	1-hour	120 ppb	-
	8-hour	-	80 ppb *

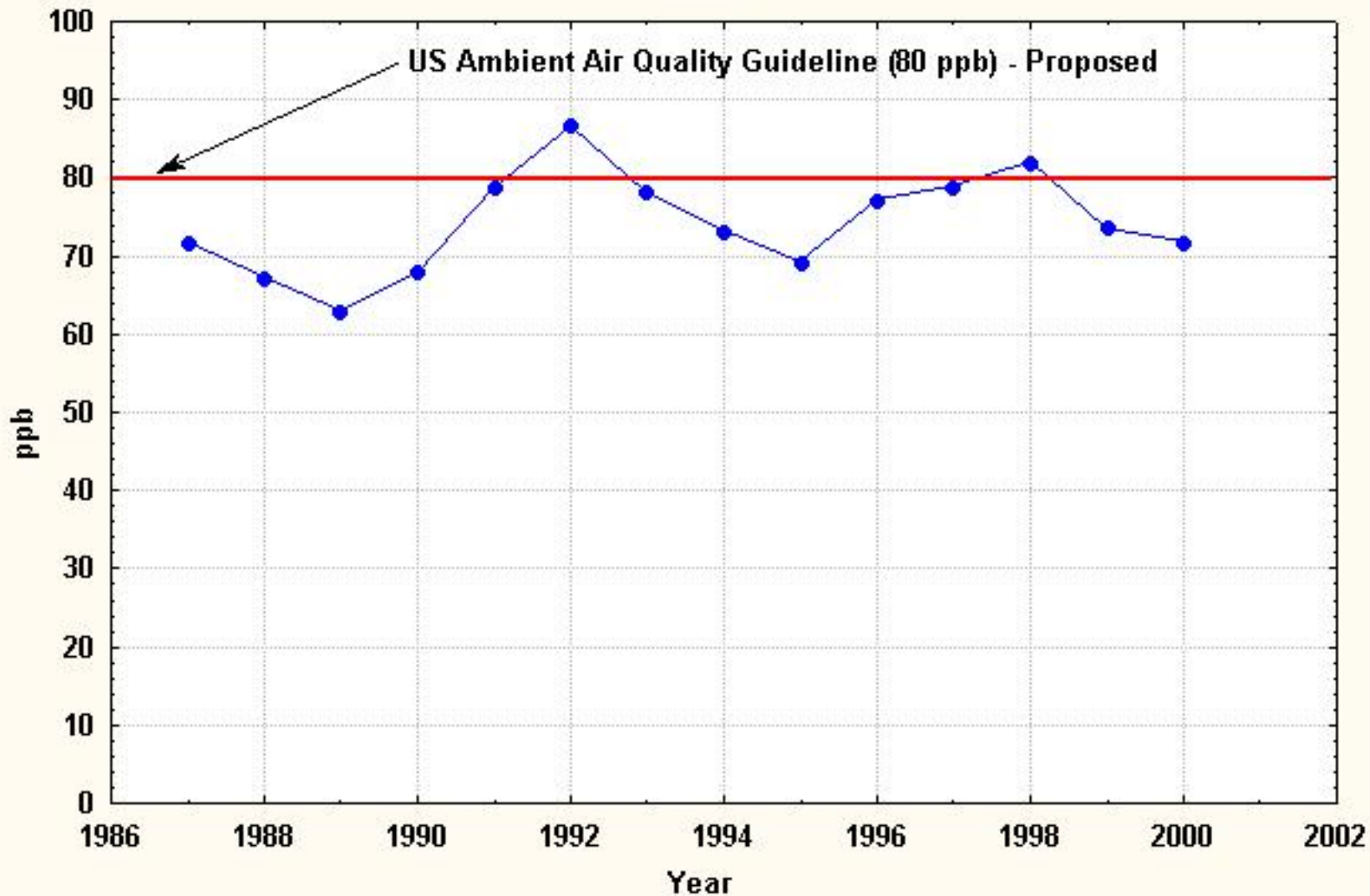
\* Achievement based on the 3-year average of the annual 4th-highest daily maximum 8-hour ozone concentrations

### Ozone at 33-80 SEATTLE BEACON HILL

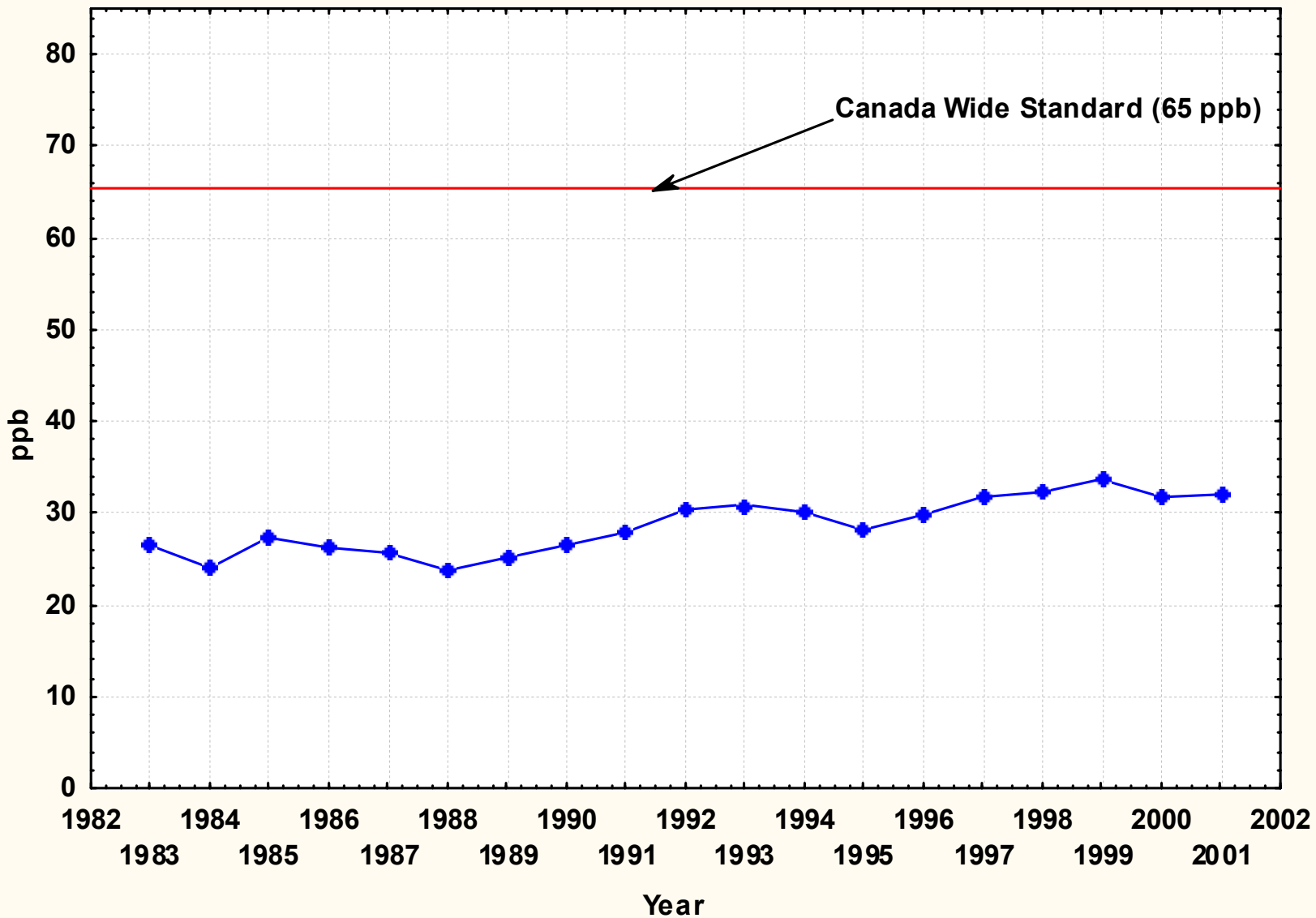
3 Year Running Means of 4th Highest Annual Daily Maxima Calculated from 8 Hour Running Means



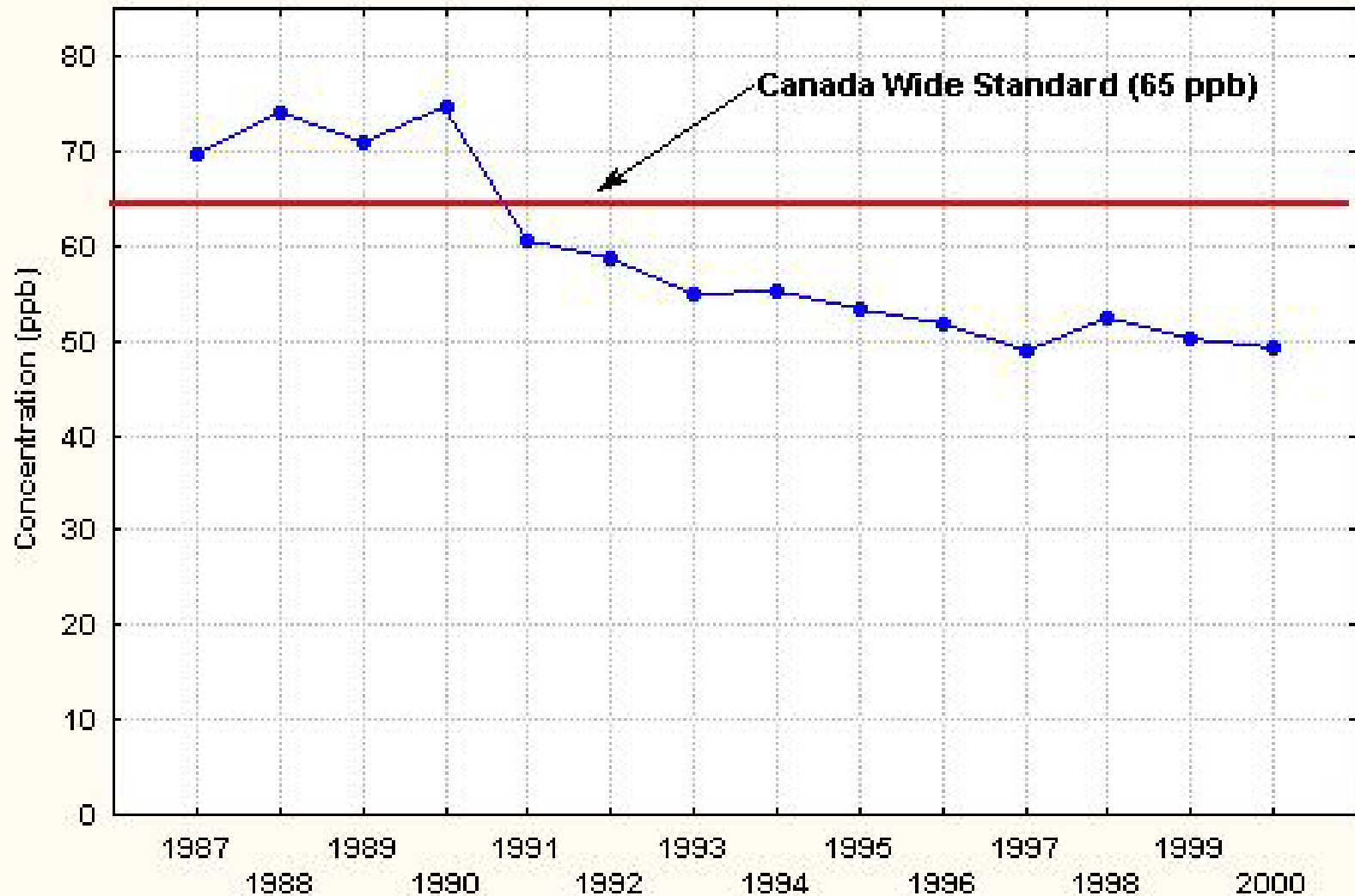
**Ozone at 33-7001 ENUMCLAW WEYERHAEUSER**  
**3 Year Running Means of 4th Highest Annual Daily Maxima Calculated from 8 Hour Running Means**



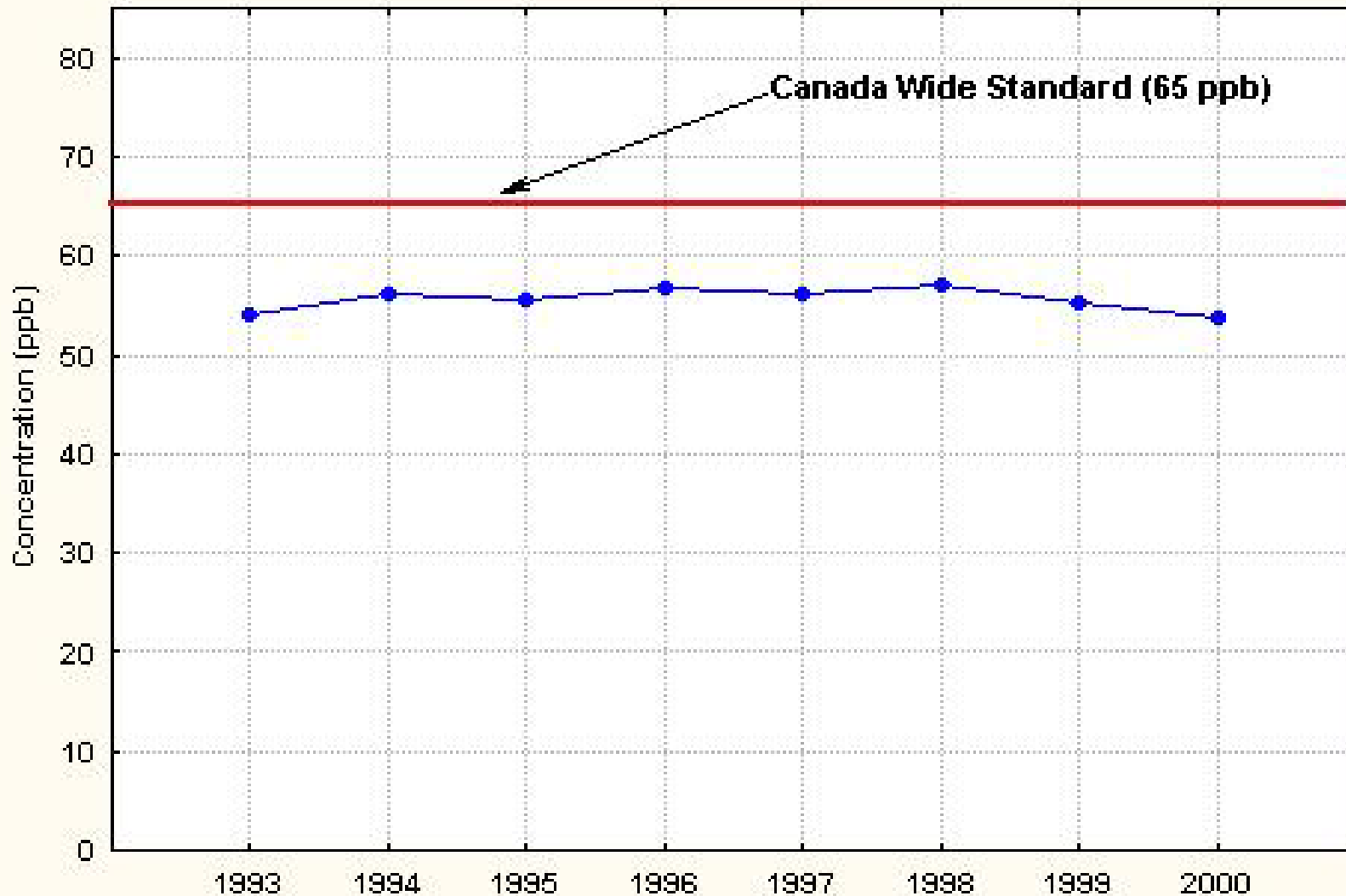
Ozone - 3 Year Running Mean of the Annual 8 Hour Maximum VANCOUVER ROBSON (N100112)



### Ozone - 3 Year Running Mean of the 4th Highest Daily Maximum Port Moody Rocky Point (100111)



### Ozone - 3 Year Running Mean of the Annual 4th Highest 8 Hour Maximum Saturna Island (102001)

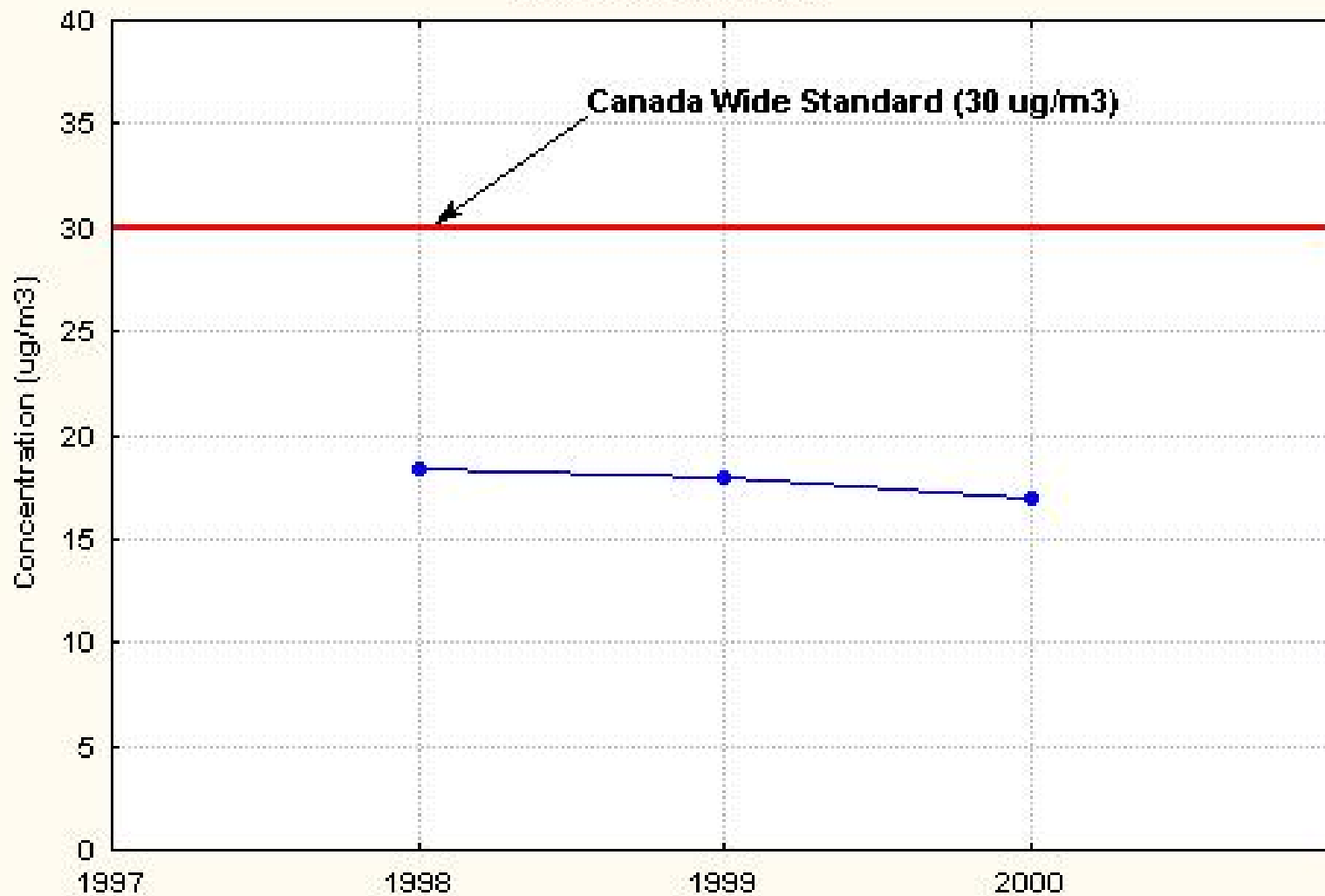


# Particulate Matter standards/objectives comparison

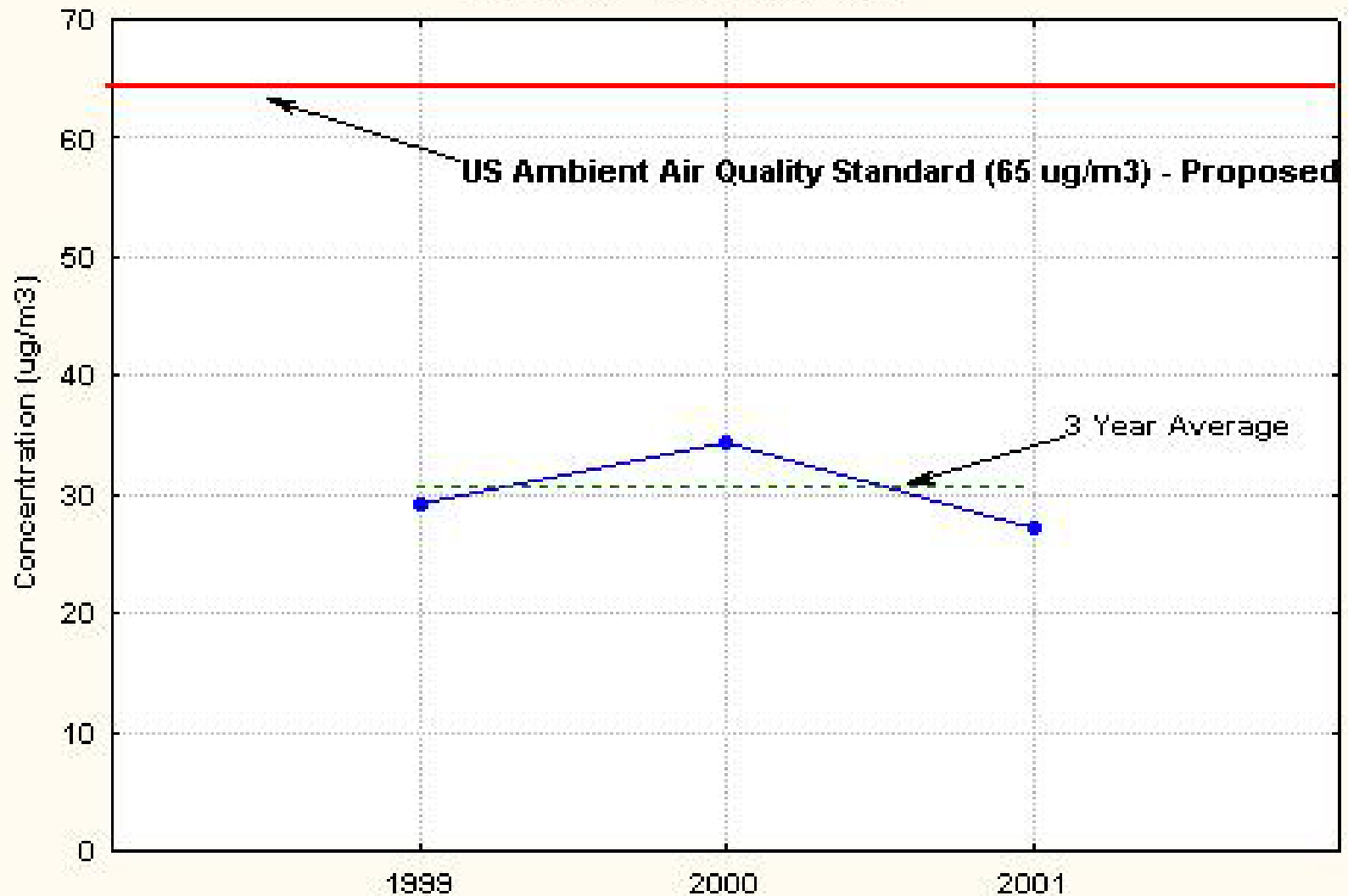
	Agency	Averaging Period	Current	Proposed
TSP	Canada	24-hour	120 $\mu\text{g}/\text{m}^3$	-
	NAAQO	annual	70 $\mu\text{g}/\text{m}^3$	-
PM10	BC Provincial	24-hour	50 $\mu\text{g}/\text{m}^3$	-
	US EPA	24-hour annual	150 $\mu\text{g}/\text{m}^3$ 50 $\mu\text{g}/\text{m}^3$	150 $\mu\text{g}/\text{m}^3$ 50 $\mu\text{g}/\text{m}^3$
PM2.5	CWS	24-hour	-	30 $\mu\text{g}/\text{m}^3$ *
	US EPA	24-hour annual	- -	65 $\mu\text{g}/\text{m}^3$ * 15 $\mu\text{g}/\text{m}^3$

\* Achievement based on the 98<sup>th</sup> percentile 24-hour ambient measurement annually, averaged over 3 consecutive years

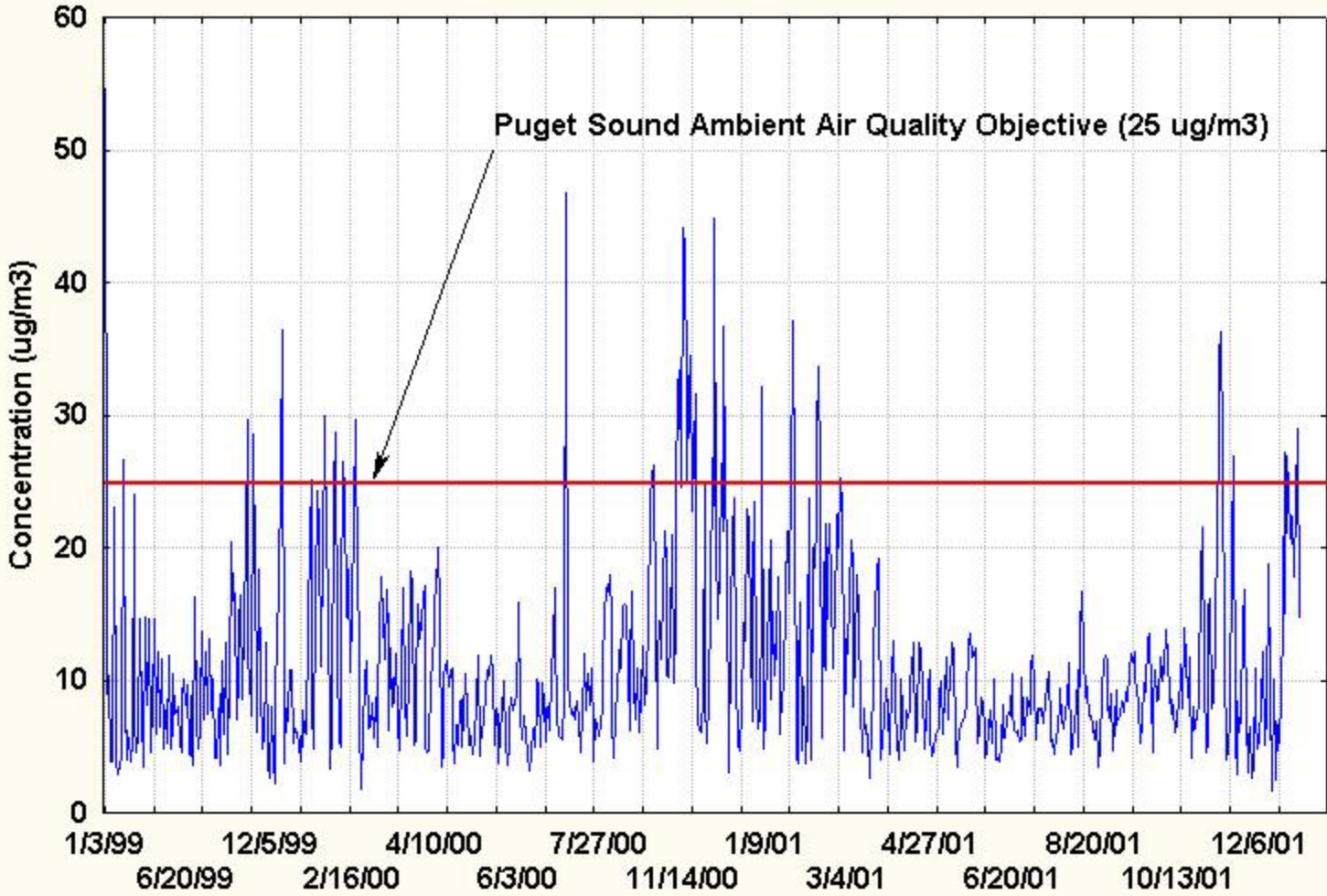
## PM2.5 - 3 Year Running Mean of the 98th Percentile of the Daily Average Chilliwack (101101)



### PM2.5 - 98th Percentile of the Daily Average Station 61-1007 Marysville



### PM2.5 - 24 Hour Average Station 61-1007 Marysville



# Things to Take Away

- ✱ Population growth
- ✱ Emission reductions could cause increases in ozone
- ✱ Agricultural Sector
- ✱ Marine Sector
- ✱ Canada Wide Standards – CI/KCAC
- ✱ Computer modelling