

SMOG:
the PM and Ozone Management
Framework for Alberta
(Pro-action and Prevention)

**George Murphy,
Alberta Environment**

April 04

Summary

A. Background

- **SMOG, CCME, CASA.**

B. Alberta's PM & O3 Management Framework

- **Tiered Approach, four levels, three triggers.**

C. Implementation

- **Ambient Data.**

A1, Background:

SMOG

**Fine Particulate Matter (PM_{2.5}): < 2.5 micrometres.
(Primary and secondary).**

**Ground Level Ozone: formed in the atmosphere
through chemical reactions involving NO_x,
VOCs and sunlight.**

Share many emission sources :

- **Wood combustion (forest fires)**
- **Fossil fuel combustion**
- **Industrial processes**
- **Vehicles...**

A2, Background:

Why SMOG?

1. Associated health effects:

- Increases in premature death, aggravation of asthma, cardio-vascular / circulatory diseases**

2. Environmental effects:

- a) Damage to vegetation (ozone)**
- b) Adverse animal health effects,**
- c) Dust fall, Haze, Odour,**
- d) Oxidation and soiling of materials.**

3. Scientific Uncertainty

- a) Source - Ambient - Effects**

A3, Background:

Canadian Council of Ministers of the Environment (CCME)

Canada-Wide Standards (CWSs)

Signed by Ministers June 2000

1. Numeric Levels:

- PM2.5: 30 micrograms/cubic meter,
- Ground Level Ozone: 65 ppb.

2. Keeping Clean Areas Clean (CWS Annex A)

- the CWS is not a “Pollute Up To” Level.

3. Requirement for Jurisdictional Plans

- Planning now for achievement by 2010.

4. Natural and Trans-boundary Effects.

- Provisions for Forest fires, Stratospheric intrusion, Long range transport...

A4, Background: Photochemical SMOG



New York
City,
During and
After
a SMOG Event



SMOG Alert Day Toronto



A5,Background: EDMONTON,
December, 2002

SE

-22° C

NNW



Clean Air Strategic Alliance

(CASA at: www.casahome.org)

1. Multi-Stakeholder Forum

- a) Government, Industry, NGO (health, environmental, consumer, other)**
- b) Consensus Decisions**

2. Objective: develop and apply a comprehensive air quality management system for Alberta.

3. PM and Ozone Project Team

- a) Recommend Alberta's approach for meeting the PM and Ozone CWS.**
- b) Accepted by CASA Board Sept 2003**
- c) Implementation 2004.**

B2, Alberta's PM & Ozone Management Framework:
Alberta

Challenges

Opportunities

Diverse Economy

Modern Cities and Industry

Diverse Landscapes

Regional Air-shed
Management

Growing economy,
population, industry,
infrastructure

History of stakeholder
engagement in air issues

Public skepticism and the
perception that air quality is
poor and declining

Proactive management and
public involvement and
reporting

B3, Alberta's PM & Ozone Management Framework:

Key Elements of the Alberta PM and Ozone Framework

1. AENV is the lead agency.

2. Four Action Levels:
Mandatory Planning
Management Planning,
Surveillance And
Baseline Monitoring.

3. Three “Triggers”:
Exceedance,
Planning,
Surveillance.

4. Annual analysis and review.

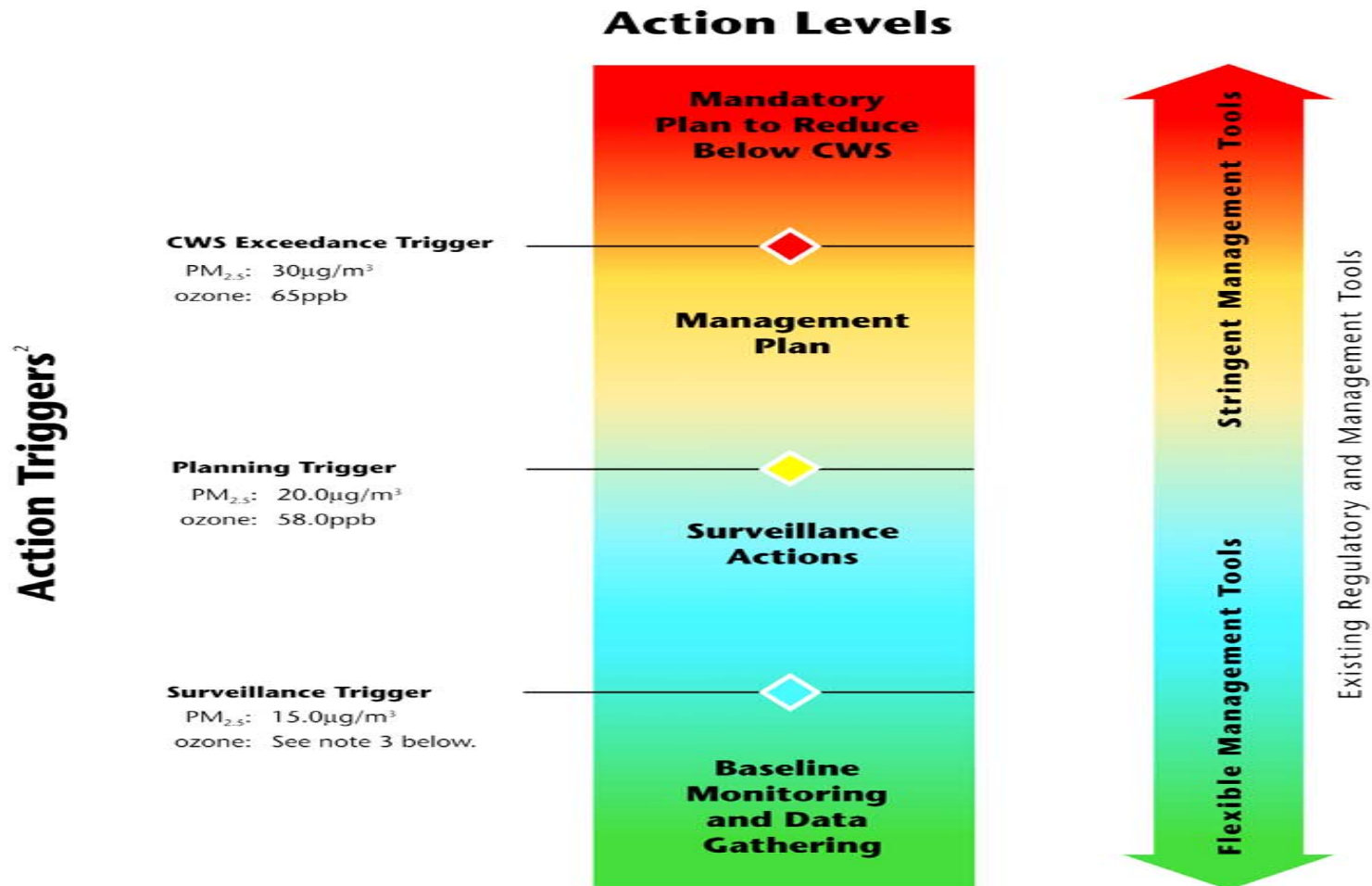
5. Annual reporting to the public.

6. Guidance Document.

B4, Alberta's PM & Ozone Management Framework:

Figure 1:

Fine Particulate Matter and Ozone Management Framework¹



¹ The framework must be applied in the context of its key elements, including guiding principles, existing initiatives and mechanisms that support management of PM & ozone, and the goals and objectives for each action level.

² Action triggers for PM_{2.5} are based on a 24 hour average, and achievement is based on the 98th percentile ambient measurement annually, averaged over 3 consecutive years. Action trigger levels for ozone are based on an 8 hour average, and achievement is based on the 4th highest measurement annually, averaged over 3 consecutive years.

³ For ozone, Alberta Environment will determine on an annual basis which areas of the province are in baseline and which are in surveillance.

B5, Alberta's PM & Ozone Management Framework:

CWS Exceedence Trigger,

PM_{2.5} >30µg/m³ or Ozone >65ppb.

Mandatory Planning: Air Quality is not acceptable (the Minister is committed to attain the CWS levels by 2010).

- 1. AENV to work with stakeholders (to the greatest degree possible).**
- 2. Objective: to develop a management plan to achieve CWS levels or better.**
- 3. Two years for plan development (VS unilateral action by AENV).**

Planning Trigger

PM_{2.5} > 20 μ g/m³ or Ozone > 58ppb

Management Planning Level: *Some concern about air quality, action is desirable.*

- 1. AENV and stakeholders develop a management plan, Zones may take the lead.**
- 2. Objective: to ensure levels remain below the CWS levels & if possible, improve air quality.**
- 3. Two years for plan development (VS unilateral action by AENV).**

B7, Alberta's PM & Ozone Management Framework,

Surveillance Trigger

PM_{2.5} > 15 μ g/m³ or Ozone > TBD Level

Surveillance Level: *Air quality is good, - there is room for improvement.*

1. AENV, with the support of the affected airshed zone(s), will:
 - Determine source(s), Analyse trends, & Improve monitoring network & air quality information.
2. Objective: to maintain or improve air quality
3. Take pro-active steps i.e.: "Pollution Prevention and Continuous Improvement" strategies

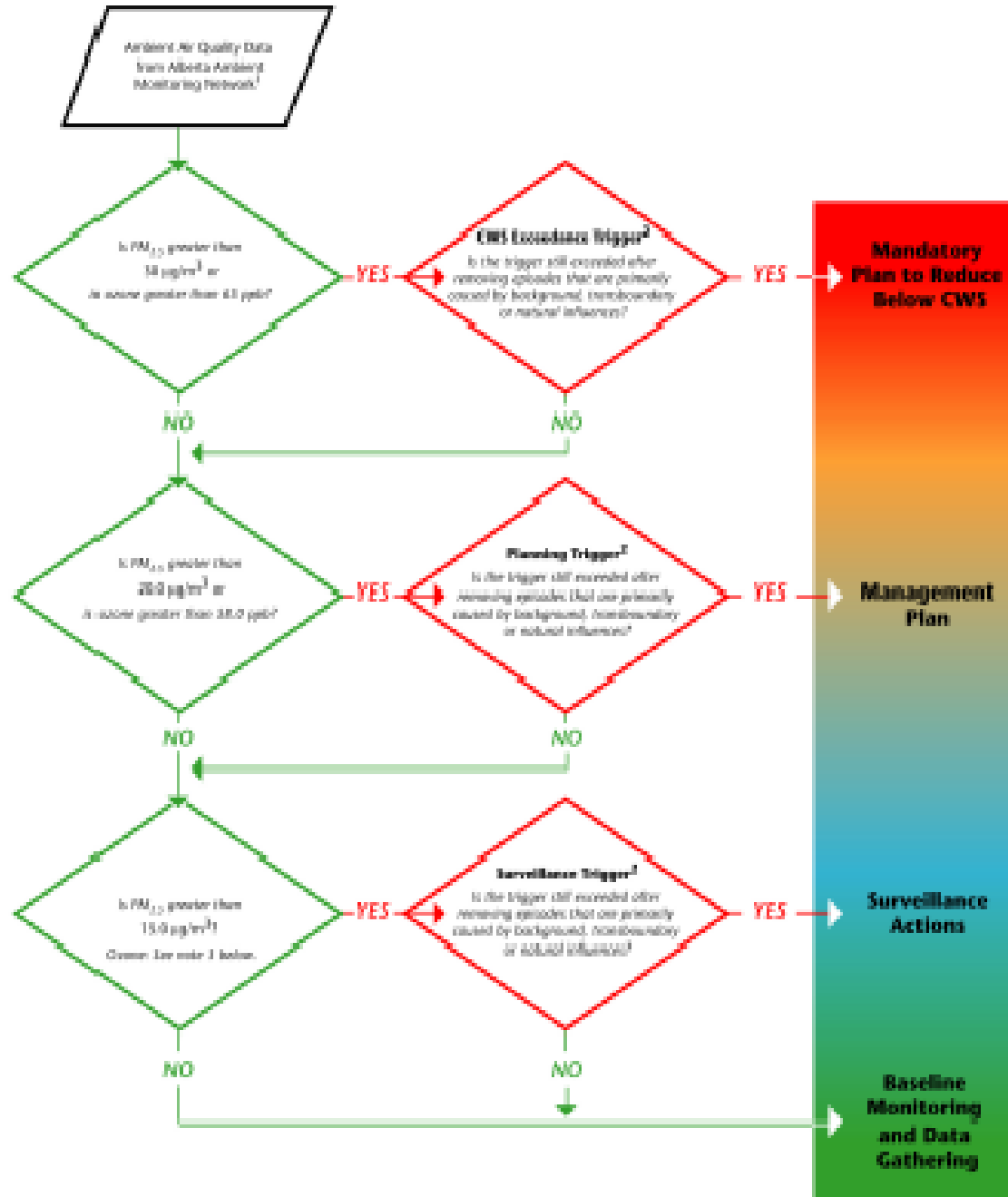
B8, Alberta's PM & Ozone Management Framework,

PM_{2.5} < 15 µg/m³ or Ozone < TBD Level

Baseline Level: air quality is very good - near background levels.

- 1. Analytical or management activities are discretionary.**
- 2. Objective is ongoing monitoring of ambient air quality levels.**
- 3. Could involve siting new monitors**

B9, Alberta's PM & Ozone Management Framework: Annual Analysis of PM and Ozone Monitoring Data - to determine Action Levels under the Alberta Framework.



Annual Ambient AQ Data Analysis

Is PM_{2.5} > 30 µg / m³ or is O₃ > 65 ppb?

Yes

Is the CWS Trigger still exceeded after removing episodes caused by background, trans-boundary or natural events?

Yes

Mandatory Plan'g

NO

NO

Is PM...

Management Tools

- 1. Tools are not prescribed other than direction to create exceedance and management plans.**
- 2. More stringent tools apply as ambient levels increase.**
- 3. Less stringent tools – more flexible tools apply at lower ambient levels.**
- 4. A regulatory backstop applies at all levels and in all areas (allows AENV to address hot spots and bad actors).**
- 5. Menu of management tools and approaches**

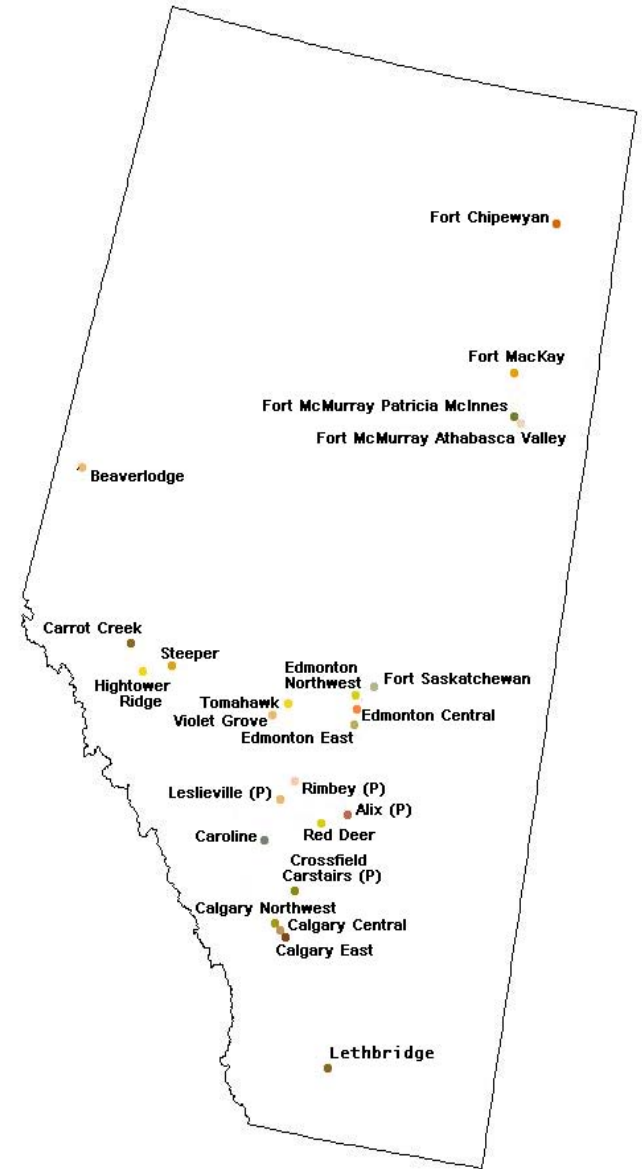
B12, Alberta's PM & Ozone Management Framework,
Menu of Management Tools & Approaches

- **Regulatory Tools**
- **Standards & Guidelines**
- **Codes**
- **Programs**
- **Agreements**
- **Emission and Sectoral Targets & Objectives**
- **Incentives/ Disincentives**
- **Municipal/ Regional Planning Approaches**
- **Voluntary Industry Initiatives**
- **Existing Initiatives: AENV, CASA, EUB...**

Guidance Document for the Management of Fine Particulate Matter and Ozone in Alberta

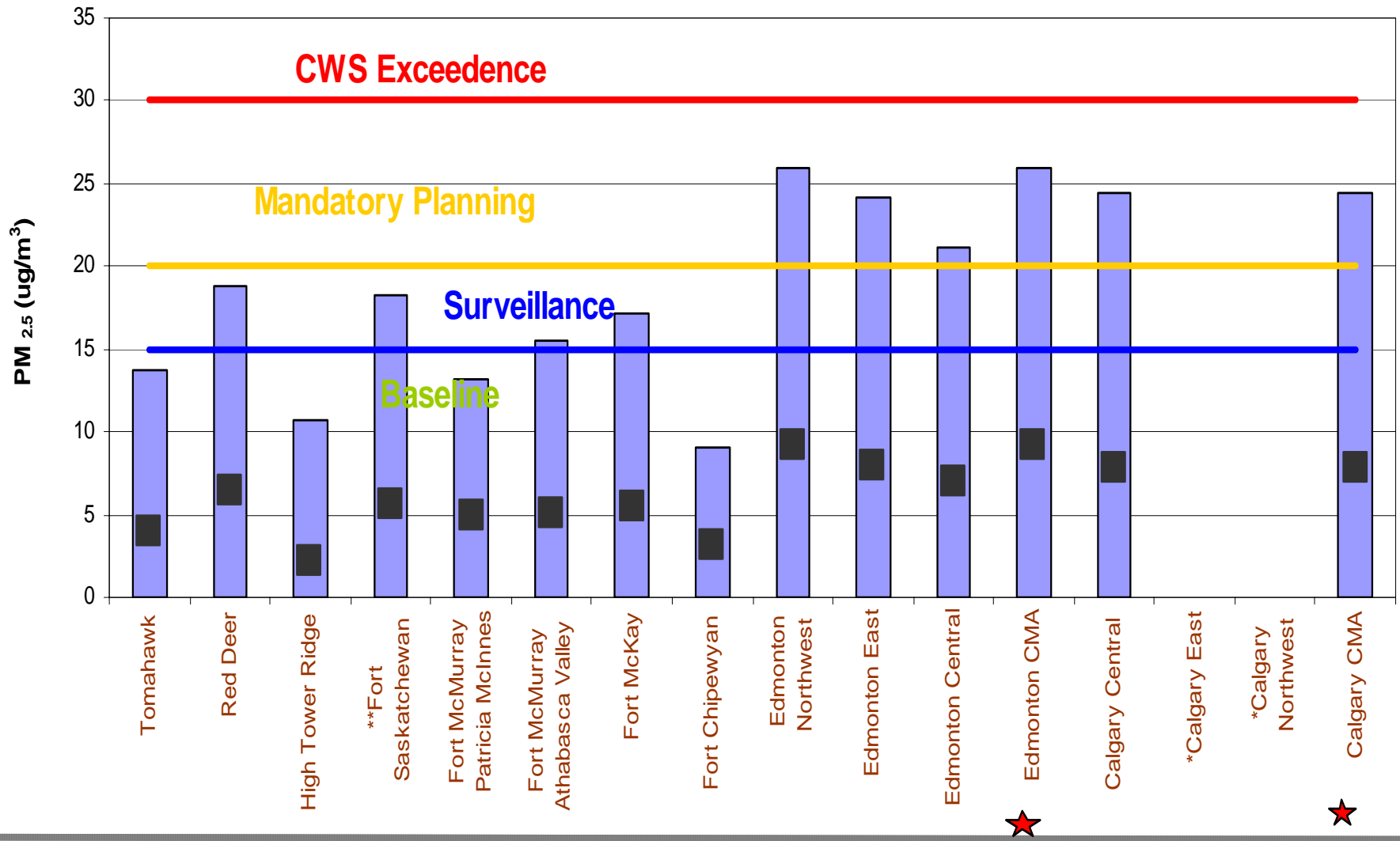
- 1. Comprehensive resource for all stakeholders.**
- 2. Outlines framework,**
 - a) principles,
 - b) processes,
 - c) monitoring and reporting
- 3. Trans-boundary Influence Considerations**
- 4. Background and Natural Influence**
- 5. Simplified Mechanisms**
- 6. Reporting Requirements**
- 7. www.casahome.org click on: 'CASA Library' then 'PM and Ozone Project Team'**

**C1, Implementation:
Continuous
Particulate
Matter and Ground
Level Ozone
Monitoring
Stations in Alberta**



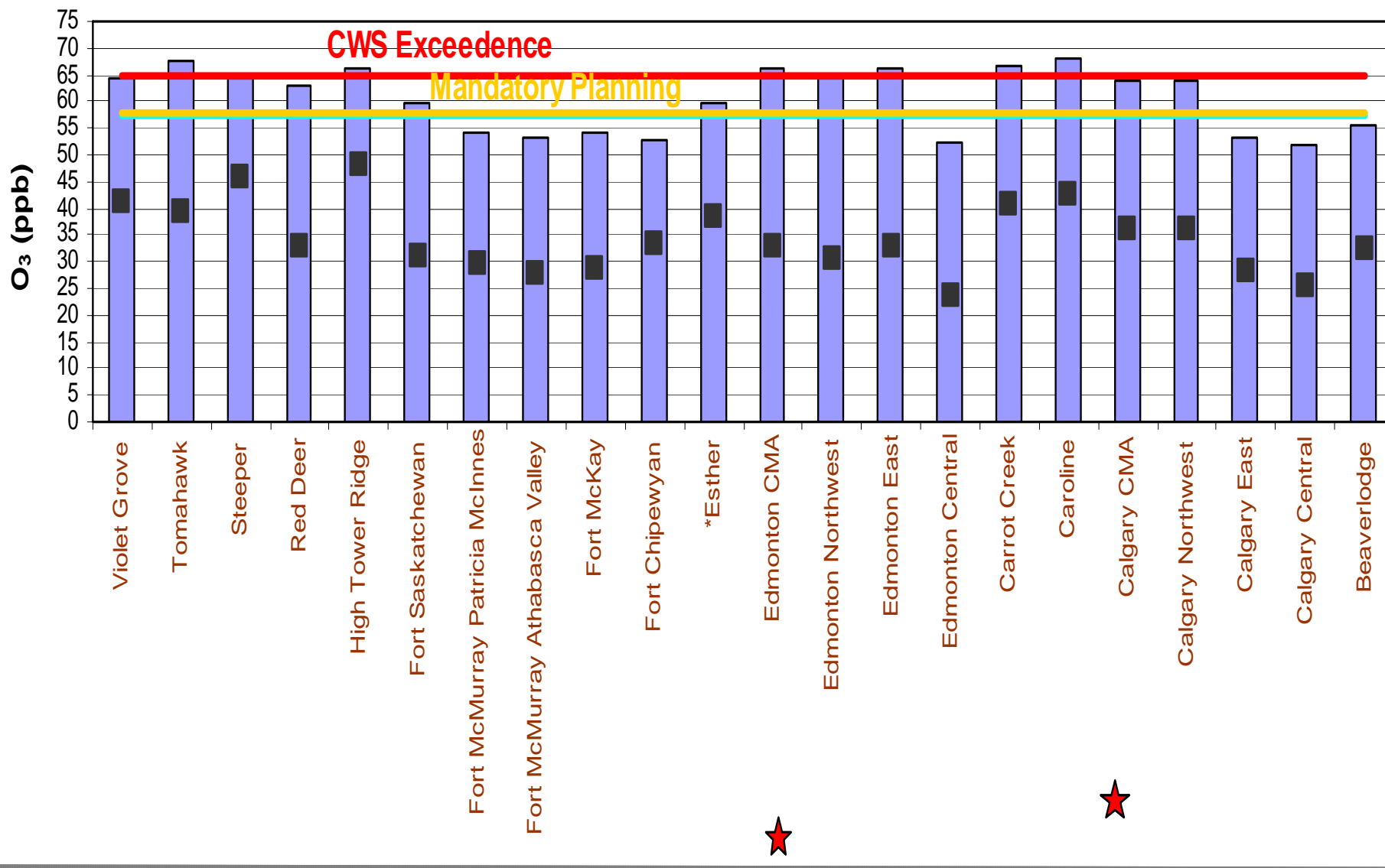
C2, Implementation:

CWS Achievement for Selected Alberta Monitoring Stations PM_{2.5} 2001 - 2003



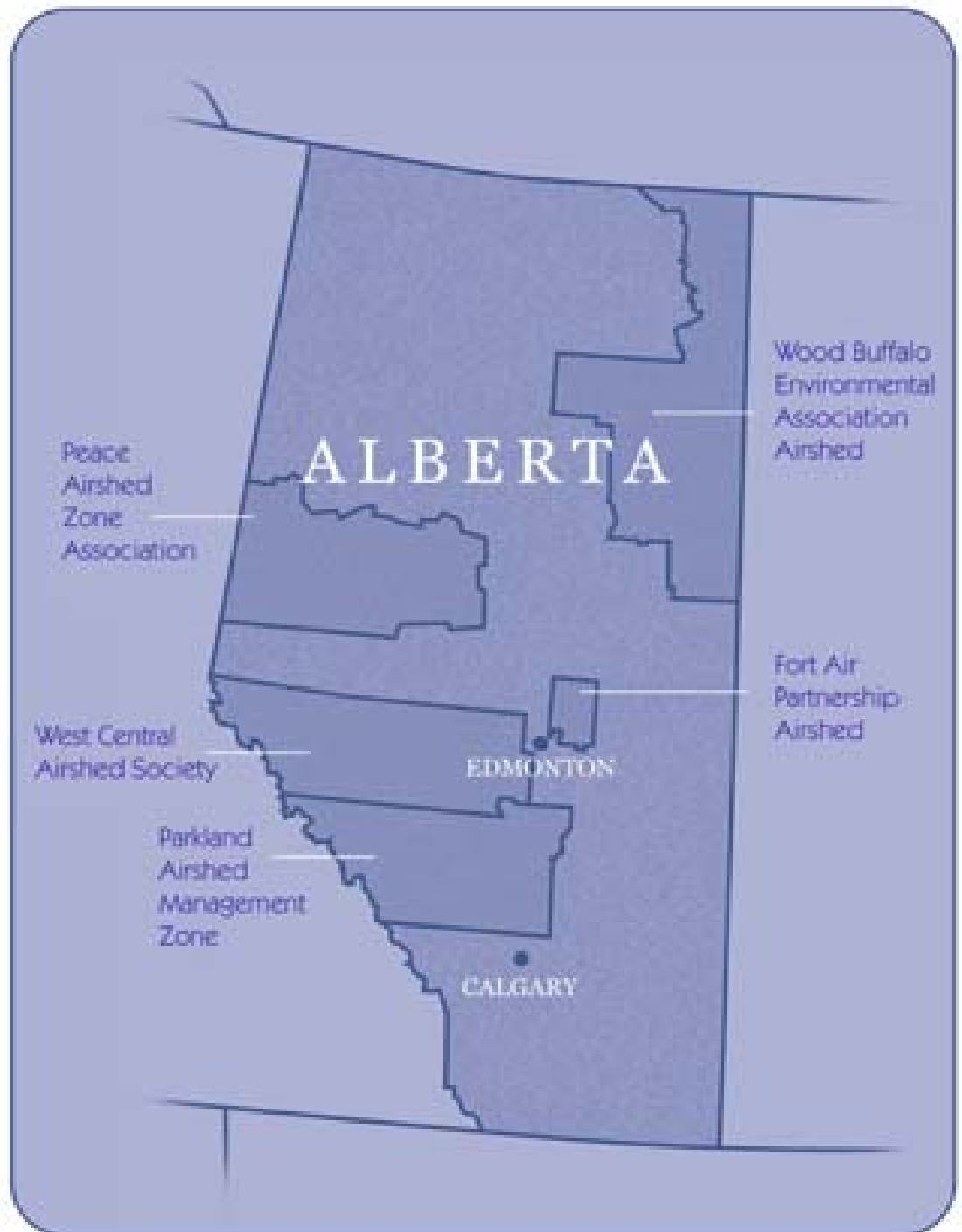
C3, Implementation:

CWS Achievement for Selected Alberta Monitoring Stations O₃ 2001 - 2003



C4, Implementation:

Airsheds in Alberta



Conclusions

Framework Implementation Will Succeed:

- 1. Developed through an open and transparent Multi-stakeholder, Consensus approach.**
- 2. Proactive, overall, the objective is to avoid allowing air quality to get poorer.**
- 3. Flexible allows for actions tailored to meet local conditions.**
- 4. Clear roles, AENV retains responsibility for implementation and reporting.**
- 5. Requires ongoing, annual, public reporting on ambient levels and on management actions.**