



Cowichan's Regional Airshed Protection Strategy



A partnership of: Cowichan Valley Regional District, Cowichan Tribes, Ministry of Environment, Island Health, Our Cowichan - Communities Health Network, School District 79, Catalyst Paper, University of Victoria, City of Duncan, Town of Ladysmith, Town of Lake Cowichan, Municipality of North Cowichan and Cowichan Fresh Air Team - as of November 2015.



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This strategy has been referred for comment to the following organizations and will be included in future programming for action as per the identified roles and responsibilities laid out. Each of these organizations will be invited to participate in meetings of the Cowichan Airshed Protection Round Table.

Ministry of Environment	Caycuse Volunteer Fire Department Society
Ministry of Forests, Lands & Natural Resource Operations	Cowichan Bay Fire Protection
Ministry of Transportation and Infrastructure (Victoria)	Mill Bay Fire Protection
Ministry of Agriculture	Shawnigan Lake Fire Protection
BC Transit	Thetis Island Fire Protection
Island Health	Pacific Pilotage Authority
Managed Forest Council	School District 68
Cowichan Tribes	School District 79
Ditidaht First Nation	Municipality of North Cowichan
Halalt First Nation	Town of Lake Cowichan
Lake Cowichan First Nation	Town of Ladysmith
Lyackson First Nation	City of Duncan
Malahat First Nation	Catalyst
Pauquachin First Nation	TimberWest
Pacheedaht First Nation	Island Timberlands
Penelakut First Nation	Hancock Forest Management
Stz'uminus First Nation	CVRD Engineering Services Department
First Nations Health Authority	CVRD Planning & Development Department
Our Cowichan Communities Health Network	CVRD Inspections and Enforcement Division
Cowichan Fresh Air Team	CVRD Waste and Recycling Management Division
South Island Fire Management Organization (SIFMO)	CVRD Public Safety Division

Additional organizations that are interested in participating in the proposed Regional Airshed Protection Round Table will be added to this list and invited to the meetings.



This report outlines a Regional Airshed Strategy for the Cowichan Valley Regional District (CVRD). It identifies the necessary steps to be undertaken in order to develop an effective response to growing air quality concerns in the region. This work is consistent with and taken based on direction in the CVRD Corporate Strategic Plan which specifically directs that an airshed protection strategy be developed. Given this is an area in which many players are involved the CVRD has taken the lead role in the development of the strategy in coordination with MOE, however the implementation will require a broad and coordinated response from many.

Jon Lefebure – Chair Cowichan Valley Regional District

What is the air quality problem in our Region?

In the Cowichan, the air contaminant of greatest concern is PM_{2.5}, which refers to particulate matter that is less than 2.5 microns in diameter. This is the particulate matter of greatest concern because it can travel deep into the lungs and become lodged there, causing heart and lung disease, and premature death. Fine particles that comprise PM_{2.5} are also efficient at scattering light, resulting in degradation of visibility.

A 2014 Air Quality Study for the Cowichan region indicated that there are occasional exceedances of the provincial PM_{2.5} objectives from 2009 to 2013. The Study also indicated that the exceedances were primarily due to local open burning and wood burning appliances (winter), and forest fires located in other regions (summer). An emission inventory completed in 2014 estimated that 77% of the total PM_{2.5} in the Region is coming from area sources. Open burning accounted for 53% of the total PM_{2.5} and wood burning appliances accounted for 23% of the total PM_{2.5}.

Our History

Air quality concerns in our Region are rooted in local history. The primary sources for PM_{2.5} include open burning and wood burning appliances. However, the burning of wood debris for clearing land and the use of wood stoves for residential heating has been happening for generations.



There is something about the smell of wood smoke and the warmth of heat from a fire that is comforting for people. In our region, it is part of our history of living off the land. People will say: “My parents burned wood and my grandparents burned wood, why wouldn’t I?” Today, we know about the health effects of wood smoke. And today, the technology and practices exist to do it better.

TW Paterson – local historian and author of over 26 books on BC History

Wild fires have also been contributing to air quality concerns throughout our history. In 1938, a cloud of smoke one mile high covered two-thirds of Vancouver Island and was reported as far south – 640 km – as Portland Oregon. Its fly-ash was so thick that two ships collided off Port Angeles. This was the product of Vancouver Island’s worst forest fire ever, the Great Fire (so-called) of 77 years ago which burned an area of approximately 350 square kilometers.



Image mcr020399-7 courtesy of the Museum at Campbell River



Image mcr020399-16 courtesy of the Museum at Campbell River

Why are we concerned about air quality?

There is solid scientific evidence at a national level of a strong link between air pollution levels and impacts on human health. Locally, data from Island Health indicates that **in the Cowichan Local Health Area, admissions rates for children with respiratory diseases averaged 70% higher than provincial rates** for the period 1998 to 2012. In 2012 the **proportion of persons aged 5-54 diagnosed with asthma was 14% higher** and the **prevalence of chronic respiratory illness for all persons aged 45 and over was 50% higher in Cowichan Valley Regional District than the province.**



In our region, air emissions originate from a wide range of sources including mobile vehicle emissions, stationary industrial point sources, residential or commercial area sources and natural sources. There is also a wide range of types of contaminants being emitted. For common air contaminants such as particulate matter (PM) and ground-level ozone, health impacts have been found even at low concentrations, indicating that there may be no safe level. The elderly, the young, those with lowered immunity, and/or existing heart and lung ailments are especially vulnerable.

Air pollution also affects the integrity of natural ecosystems and agricultural crops, increases greenhouse gas emissions and degrades the visibility of scenic vistas. Together with the health costs, these impacts and their consequences for tourism and other industries have implications for economic activity throughout the region.

What is an airshed?

The term “airshed” is used to describe an area where the movement of air tends to be hindered by the local geography and by weather conditions. The most obvious examples of an airshed would be the Cowichan, the Shawnigan, Chemainus Basins or even the larger Georgia Basin. Airsheds are not confined to political boundaries and they can be at multiple scales depending on a variety of variables such as geography, dominant wind patterns or weather.

During temperature inversions, a common event in our region, the cooler air near the ground is trapped by warmer air aloft. The effects and duration can be much different depending on the season. The types of emissions that accumulate in the surface layer will vary according to seasonally related activities such as summer traffic, winter home heating with woodstoves or open burning in the fall.

In contrast, when the air is well mixed and winds are moderate, pollutants are quickly dispersed. In some cases, the pollutants and their by-products may be transported long distances beyond the airshed. This is a reminder that everyone and their activities are globally interconnected and that our local conditions are to some extent affected by issues elsewhere. The region experiences impacts to air quality from a wide variety of events including fires in Europe, central BC and other areas, dust storms in Asia and the combustion of fossil fuels by mobile sources and large facilities in neighboring regions.

For the above reasons, many of our communities are prone to periods of poor air quality. As global and regional emissions increase and local ground temperatures increase as a result of global climate change, air quality is expected to continue to worsen over time.



Lizard Lake Fire - August 2015

This can have numerous impacts on the community, including adversely affecting human health, the environment and visibility. It can also limit a community's ability to attract or accommodate desirable and potential growth. Fortunately, action at the local level can be taken to reduce local consequences.

Addressing Air Quality Concerns by Airshed Planning

Local, regional and provincial governments have developed and applied various approaches to combat and control air pollution. Among these, airshed planning has emerged as an important tool for dealing with multiple pollution sources that involve numerous stakeholders and, in some cases, cross political boundaries. Airshed planning is a stakeholder-driven process to coordinate the abatement of activities affecting air quality in a defined area or airshed. It recognizes that local air quality is influenced by a myriad of activities and sources, including industry, transportation, commercial and residential development, wood smoke, road dust, and natural circumstances. Since no one jurisdiction controls all these sources, a collective approach to air quality protection is needed that engages a variety of organizations

and individuals and, where necessary, encourages partnerships with neighbouring communities in developing and implementing local solutions.

To date, all such efforts in BC have been voluntary in nature, in keeping with a shared stewardship approach. Currently, there are 14 airshed plans that have been completed for various airsheds in the province, with some variation in key areas, objectives, and mechanisms. The issues and ability of key players in the region will affect the level and speed of implementation of a regional strategy. As such it is important that the development of such a strategy include the participation of a broad range of participants working in a coordinated fashion.

Why pursue a Community Based Approach?

Because the impacts of poor air quality affect such a broad spectrum of the community and originate from a variety of sources a multi stakeholder process is necessary in order to address sources effectively. This will require that all affected organizations and entities are aligned and coordinated so that policies, actions and ongoing monitoring is effective and strategic in nature. No one entity is charged with the issue nor can any individual action address its effects in a meaningful way.

Existing programs and policies in the region are already contributing towards air quality management objectives (e.g., energy and climate action planning, transportation planning, open burning bylaws, wood burning appliance programs). As such, the emphasis of the proposed strategic process will be on supporting and expanding these existing initiatives.

The value of partnerships for airshed protection is illustrated by successes already achieved in the Region including:

- backyard burning regulations in 5 electoral areas and 4 municipalities,
- a woodstove exchange program that has supported the upgrades of 635 woodstoves
- the *clear the air cowichan* communications materials
- a series of 5 articles on wood smoke in the local newspaper
- partnership with UVIC researchers to undertake initial nephelometer study
- partnership with MOE that allowed for the technical background required to backstop this (emissions inventory, air quality study for the CVRD)
- current partnership for installation of additional regional monitoring stations across region (total now 4)

These programs were all delivered through a collaboration of several provincial government, local government, academic and stewardship organizations. If it is possible to achieve a coordinated alignment it will be possible to ensure that future planning and programming builds effectively on the overall goals and identified actions. And enforcing the philosophy of collective impact, shared interests and shared responsibility which will be a keystone for long term and stable policy development and community health objectives.

Participants

Contributions from the various organizations involved in local air quality management are key to the successful design and implementation of an Airshed protection strategy. To date a number of ongoing discussions have occurred in the region and most recently planning discussions were hosted by the MOE and the CVRD in 2014 and 2015 to bring together a focused Round Table group to develop a collaborative Airshed Protection Strategy for the region and its affected populations. Each organization has interest in moving forward on the development of a Regional Airshed Strategy as a sub component of the Regional Sustainability and Health Strategies. This strong message provided the impetus to MOE and the CVRD to partner on the development of the necessary background studies (attached as appendices A and B).

The Round Table gathered over a number of meetings in 2014 and 2015 and discussed the overall issues affecting air quality in the region. Based on the insights gathered through these discussions, the CVRD and the MOE partnered to develop additional background material and identification of specific contaminants, appropriate indicators and draft targets for the groups discussion (see appendices C and D).

Based on a structured process the group then identified specific goals, actions and the identification of key leaders and supporting organizations. The following Action Plan is the result of that work and will form the combined efforts of the collaborative in achieving *our vision*.

Our Vision

*Working together for **clean air** to support our health, our environment and our communities*



Our goals, targets and objectives

Airshed planning and implementation will be an ongoing effort of many. While a number of high priority goals have been identified, it is recognized that this will be an ongoing process of refinement over time. Short term and long term actions are summarized below then in more detailed tabular format. Key targets have also been included. The complete set of indicators and targets is provided in Appendix C.

1. **GOAL – Protecting Human Health**

We will protect and improve regional air quality so our communities are as healthy as possible.

Key Targets

- Zero exceedance of 24 hour BC AAQO for PM_{2.5} (25 ug/m³)
- Zero exceedance of annual BC AAQO for PM_{2.5} (8 ug/m³)

Objectives

- Reduce PM_{2.5} emissions from local open burning including land clearing burning and backyard burning
- Reduce PM_{2.5} emissions from wood burning appliances
- Support programs that reduce emissions from mobile and point sources¹ of all targeted pollutants (PM₁₀, PM_{2.5}, SO₂, Nox, CO and VOC)

Key Actions – High Priority

- Raise public awareness on the health impacts of wood smoke, the alternatives, the best practices and the rules.
- Develop consistent airshed wide regulatory approach for open burning
- Contribute to provincial efforts to control wood smoke through participation in wood smoke strategy discussions
- Explore options for a curbside pickup of yard and garden materials to overcome barriers to open burning alternatives.
- Develop airshed wide regulatory approach for wood burning appliances
- Develop incentives for wood burning appliance upgrades to overcome financial barriers for upgrading and replacing appliances
- Promote use of alternative energy sources and systems



Supporting Actions – Medium Priority

- Reduce vehicle idling through policies and education
- Support alternative modes of transportation
- Reduce stop and go traffic on the Trans-Canada Highway
- Reduce dust emissions in communities adjacent to dirt roads
- Compliance with federal and provincial regulatory requirements by point source emitters¹.

Participants

- Lead roles for the Ministry of Environment, Island Health, First Nations, Our Cowichan - Communities Health Network, Municipalities, the CVRD and other local governments.
- Support from all Airshed Protection Round Table participants

¹A point source emitter is a single, stationary source of pollution, such as an industrial facility, that typically operates under some kind of government authorization.

2. GOAL – *Building Strong and Collaborative Partnerships:*

We recognize that many players are critical to true partnerships and we will work towards coordinating our efforts to achieve the objectives and benefits clean air provides our community.

Key Targets

- Formation of an Airshed Protection Round Table with Terms of Reference and Annual Reporting

Objectives

- Develop Terms of Reference for the Airshed Protection Round Table
- Implement the actions in this strategy
- Annual monitoring and reporting of progress towards the goals, targets and objectives of the strategy

Key Actions – High Priority

- Develop Terms of Reference for the Airshed Protection Round Table
- Collaborative development of work plans for the actions identified in this strategy.

- Periodic reporting by the Round Table on progress towards meeting the objectives in the Strategy
- Determine compliance with provincial and federal objectives and standards by working with partners to implement additional short-term monitoring projects in communities throughout the CVRD.
- Periodic assessment of whether the strategy should focus on other pollutants of interest
- Develop existing and new linkages to climate change, wildfire (bc *FireSmart*), transportation and solid waste planning processes.

Participants

- All Round Table participants and other organizations that can improve air quality in the Region.

Key Actions

Goal #1: *Protecting human health*

We will protect and improve regional air quality so our communities are as healthy as possible.

The following actions related to goal #1 are considered **high priority** as they could lead to a relatively large reduction in PM_{2.5}. The tables provide details of the initiatives and tasks that will help us achieve our goals.

Emission Sources: <u>Open Burning</u> and <u>Wood Burning Appliances</u>, the 1st and 2nd largest sources of PM_{2.5}.					
Objectives:					
<ul style="list-style-type: none"> • Reduce emissions from local open burning including land clearing burning and backyard burning • Reduce emissions from wood burning appliances 					
#	Action	Initiative	Who?	Status	Proposed Future Tasks
1	Raise public awareness on the health impacts of wood smoke, the best practices, the alternatives and the rules.	Deliver a regionally coordinated public awareness campaign to educate the public on the health impacts of wood smoke, the best practices, the alternatives and the rules. Tools to include: <ul style="list-style-type: none"> • Website • Printed media (newspaper and newsletters) • Social Media • Community Outreach • Agriculture focused media and content • Community Air Quality Forums 	Our Cowichan - Communities Health Network, Island Health, MoE, UVic, the CVRD, municipalities, School District.	Initiative is in progress. <i>Tasks Completed:</i> <ul style="list-style-type: none"> • Clear the Air Cowichan website includes information on the rules and best practices (burn it smart). • Released 5 newspaper articles in the Fall of 2014 on the impacts of wood smoke. • Air quality advisories for the region are released by the MoE. 	<ul style="list-style-type: none"> • 2016 late summer/fall - Run article series again. Lead: <u>CVRD, MoE and Our Cowichan Communities Health Network.</u> • 2016 - Turn articles into series of digital info documents. Lead: <u>CVRD, MoE and Our Cowichan</u> • 2016 – Explore community air quality forums. Lead: <u>Our Cowichan, CVRD, MoE</u> • 2016 - Develop a public interface for air quality issues and alerts that can be delivered effectively using a variety of media routes. Lead: <u>MoE and CVRD and Our Cowichan.</u>

Emission Sources: Open Burning

Open Burning is the largest source of PM_{2.5}

Objective: Reduce emissions from local open burning including land clearing burning and backyard burning

#	Action	Initiative	Who?	Status	Proposed Future Tasks
2	Develop consistent airshed wide regulatory approach for open burning	2a. Develop, implement and review backyard burning bylaws across the region.	CVRD, Municipalities, Fire Improvement Districts,	<p>Initiative is in progress.</p> <p><i>Tasks Complete:</i></p> <ul style="list-style-type: none"> Open burning bylaws Implemented in the Municipality of North Cowichan, City of Duncan, Town of Ladysmith, Town of Lake Cowichan and some CVRD electoral areas 	<ul style="list-style-type: none"> Spring 2016 - Review bylaws on a rolling 3 year basis. Lead: <u>CVRD, Municipalities and Fire Improvement Districts.</u> Spring 2016 - Identify issues and barriers for adoption and enforcement of bylaws across whole of region, including improvement districts areas and additional electoral areas. Lead: <u>CVRD, Municipalities and Fire Improvement Districts.</u> Spring 2016 - Explore expansion of burning timelines to take advantage of better venting in some areas and reduce the number of days with people burning. Lead: <u>CVRD, Municipalities and Fire Improvement Districts.</u> Spring 2016 - Develop metrics to track: the # of burns that follow best practices and those that don't & the # of agricultural, forest and backyard burns. Lead: <u>CVRD and MoE.</u>
		2b. Explore an update to open	Ministry of	Initiative is pending	<ul style="list-style-type: none"> Spring 2016 - Preliminary discussion

		burning bylaw(s) in the Region to include prohibition of any open burning on zoned agricultural land and ALR land as long as it is not 'a normal farm practice'.	Agriculture, CVRD, Agricultural Community, Municipalities		with CVRD and MNC agriculture commissions. Lead: <u>MAL, CVRD, Municipalities and MoE.</u> <ul style="list-style-type: none"> • Spring 2016 - Focused stakeholder meeting with local agricultural producers. Lead: <u>MAL, CVRD, Municipalities.</u> • Spring 2016 - Develop and clarify the role of burning on agricultural properties in an educational way. Lead: <u>MAL CVRD and Agricultural Commissions.</u>
		2c. Explore complete ban on backyard burning for additional high density (urbanized) areas in the Region while maintaining alternate disposal options of yard and garden debris.	All Airshed Round Table participants	Initiative is Pending. <i>Background:</i> Backyard burning is banned in the City of Duncan, Town of Ladysmith and the Town of Lake Cowichan.	<ul style="list-style-type: none"> • Fall 2015 - Review of Official Community Plan (OCP) issues, explore area E as a starting point given the current OCP cycle and public consultation. Lead: <u>CVRD, MoE and Municipalities.</u>
3	Contribute to provincial efforts to control wood smoke	Monitor or participate in Open Burning Smoke Control Regulation (OBSCR) planning discussions and other wood smoke strategy discussions	Forest Industry, MFC, Min of Ag, Agricultural Community, Island Health, CVRD, MoE, Municipalities, Private Forest Sector	Initiative is in Progress Provincial OBSCR discussions are ongoing.	<ul style="list-style-type: none"> • Ongoing for 3 to 5 years – Participation by MoE and Island Health in OBSCR discussions. Lead: <u>MoE</u> • Spring 2016 - Report progress to Airshed Round Table on periodic basis. Lead: <u>MoE,</u>
4	Explore options for a curbside pickup of	Study the potential benefits and costs for curbside pickup of	CVRD, Municipalities,	Initiative is in Progress. CVRD has already gathered	<ul style="list-style-type: none"> • 2016 - Explore costs and benefits for a yard and garden pickup including:

	yard and garden materials to overcome financial barriers to the alternative.	yard and garden materials and options for the receiving facility (District Energy System or compost facility)	Agricultural Community,	information on costs and benefits.	<ul style="list-style-type: none"> ○ options for commercial or multi-family residential organics ○ Consider breaking up the two waste streams for more specific management objectives. <p>Lead: <u>CVRD</u></p> <p>Seek direction from the Board and Report back to task force by 2016.</p> <p>Lead: <u>CVRD</u></p> <ul style="list-style-type: none"> ● 2017 - explore the pilot use of a fee for service air curtain burner and wood chipper. <p>Lead: <u>CVRD</u></p>
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Emission Sources: Wood Burning Appliances

Wood burning appliances is the 2nd largest source of PM_{2.5}

Objective: Reduce emissions from local open burning including land clearing burning and backyard burning

#	Action	Initiative	Who?	Status	Proposed Future Tasks
5	Develop airshed wide regulatory approach for wood burning appliances	Develop and implement a model wood burning appliance bylaw to be available for the region. Explore expansion of options that have already adopted by a part of the Region to other high density (urbanized) parts of the Region that want them. These options include: <ul style="list-style-type: none"> ● During air quality advisory, 	CVRD, Municipalities, Ministry of Environment	<p>Initiative is in Progress.</p> <p><i>Tasks Complete:</i></p> <ul style="list-style-type: none"> ● Wood burning appliance bylaw already implemented in the City of Duncan 	<ul style="list-style-type: none"> ● Develop and implement a model wood burning appliance bylaw <ul style="list-style-type: none"> ○ 2016 - Estimate the number of woodstoves there are in the region by spatial locations and age. ○ 2016- Further develop an understanding of the use of woodstoves in economically challenged households. ○ 2016 – Study the neighborhood <i>PM_{2.5} levels</i> in more densely

		<p>no woodstoves may be used, except to heat homes with no other form of heating</p> <ul style="list-style-type: none"> • Upon sale of house, non-certified woodstoves must be upgraded or removed. Additional financial incentives to support these upgrades/removals would be explored. • Only certified woodstoves may be installed in new homes being constructed. 			<p>populated areas (e.g. mobile home parks)</p> <ul style="list-style-type: none"> ○ 2016 - Request an update from the province regarding the changes to legislation required for real estate transactions ○ 2017 - Expand and support the burn it right program ○ 2017 - Explore and make recommendations on the expansion of wood burning bylaws in other high density areas ○ 2017 - Legal review of woodstove ban in new homes. <p>Lead: <u>CVRD and municipalities</u></p>
6	Develop incentive programs for wood burning appliance upgrades.	Develop and implement a wood burning appliance rebate program for the region	Ministry of Environment, CVRD, Municipalities,	<p>Initiative is in Progress.</p> <p><i>Tasks Complete:</i></p> <ul style="list-style-type: none"> • Regional woodstove rebate program implemented. Rebates are for upgrades for woodstoves to certified appliances. 718 stoves exchanged between 2009 and 2015 (reduction of 44.5 tonnes of PM_{2.5}). 	<ul style="list-style-type: none"> • Ongoing - Continue wood burning appliance upgrades at a pace established in action 5 above. Lead: <u>CVRD</u> • 2016 – Explore additional incentives to overcome financial barrier of upgrades. • 2017 - Expand woodstove switch out program to include incentives for transition to alternative modes of heating. Lead: <u>CVRD</u>
7	Promote use of alternative energy	Promote alternative energy pilot programs and grant programs.	School District, Local Solar Energy	<p>Initiative is in Progress.</p> <p><i>Tasks Complete:</i></p>	2016 – Include information on alternative energy source and

	sources and systems		Stewardship Community, CVRD, Municipalities,	<ul style="list-style-type: none"> • Solar panel demonstration project being explored for the Region • Events in the community to promote clean energy forms have been coordinated by local stewards and co-ops. • Potential for exploring District Energy Systems 	<p>systems in public awareness campaign.</p> <p>Lead: <u>CVRD and Our Cowichan Communities Health Network.</u></p> <ul style="list-style-type: none"> • 2016 – Contribute air quality information to solar energy stewardship community as they engage the community. • Lead: <u>CVRD and Our Cowichan Communities Health Network</u>
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Goal #2: Building strong and collaborative partnerships

We recognize that many players are critical to true partnerships and we will work towards coordinating our efforts to achieve the objectives and benefits clean air provides our community.

The following actions are considered to be **high priority** as they support the reduction of PM_{2.5} and other targeted contaminants.

Emission Sources: <u>All</u>					
Objectives:					
<ul style="list-style-type: none"> • Develop Terms of Reference for the Airshed Protection Round Table • Implement the actions in this strategy • Annual monitoring and reporting of progress towards the goals, targets and objectives of the strategy 					
#	Action	Initiative	Who?	Status	Proposed Future Tasks
1	Formation of an Airshed Protection	Develop Terms of Reference Formation for an Airshed	All Round Table participants and	Initiative is in progress. <i>Tasks complete:</i>	<ul style="list-style-type: none"> • Strategy to be reviewed and approved in principle by partnering

	Round Table	Protection Round Table that will implement the actions in this Strategy.	other organizations that can improve air quality in the Region.	The Airshed Round Table has begun the process of building partnerships through 3 workshops from 2013 to 2015 to develop this strategy.	organizations in the Fall of 2015. Lead: <u>CVRD</u> <ul style="list-style-type: none"> TOR to be drafted by Dec 2015. Lead: <u>CVRD</u>
2	Develop Work Plans	Develop work plans for the <u>high priority actions</u> identified in this strategy. Identify supporting processes for the <u>medium priority actions</u> identified in this strategy	All Round Table participants	Initiative is in progress	<ul style="list-style-type: none"> January 2016 and ongoing - Task force to meet annually to report out and develop 2 year work plans Lead: <u>Our Cowichan Communities Health Network</u> January 2016 - Invitation to participate to be extended to additional participants (e.g. fire departments): Lead: <u>Our Cowichan</u>
3	Periodic Reporting and Monitoring	Annual reporting by the Round Table on progress towards meeting the objectives in the Strategy.	All Round Table participants	Initiative is pending	<ul style="list-style-type: none"> December 2015 - Decision and recommendations on monitoring and reporting framework to be developed Lead: <u>CVRD and Our Cowichan</u> December 2015 - Annual reporting and task force meeting and communications schedule to be discussed for recommendations Lead: <u>Our Cowichan</u>
		Periodic assessment of whether the strategy should focus on other pollutants of	All Round Table participants	Initiative is pending	<ul style="list-style-type: none"> Fall 2016 – Review whether strategy should focus on other pollutants of interest.

		interest.			<p>Lead: <u>MoE</u></p> <ul style="list-style-type: none"> Establish review cycle and process. <p>Lead: <u>MoE</u></p>
		Regional Air Quality Monitoring and Information Gathering	MoE and CVRD	Initiative is in progress	<ul style="list-style-type: none"> Spring 2016 - MOE will provide air monitoring stations and technical support via a MOU with the CVRD Lead: <u>MoE and CVRD</u> Spring 2016 – Work with partners to implement additional short term PM_{2.5} monitoring projects throughout the region. Lead: <u>MoE</u>
4	Develop existing and new linkages to climate change, transportation, wildfire and solid waste planning processes.	Participate in climate change strategy, transportation planning, wildfire (bc firesmart) and solid waste planning discussions.	All Round Table participants	Initiative is pending	<ul style="list-style-type: none"> Spring 2016 - Preliminary presentations to task force with proposed issues and linkages by invited representatives Lead: <u>Various participants</u> 2016 and 2017 - Become a FireSmart community. Lead: <u>CVRD</u>

Supporting Actions

The following actions are considered to be **medium priority** for the following reasons:

- they could lead to a relatively large reduction in targeted contaminants including Nitrogen Oxides (NOx), Carbon Monoxide (CO) and Volatile Organic Compounds (VOCs); and/or
- they could lead to a relatively small reduction in PM_{2.5}; and/or
- the actions are beyond the direct control of representatives of the Airshed Protection Round Table

Emission Sources: <u>On-Road Vehicles</u>					
<i>On-road vehicles are the second largest source of Nitrogen Oxides (NOx) and Carbon Monoxide (CO) emissions in our region.</i>					
Objective: Support programs that reduce emissions from mobile and point sources of all targeted pollutants (PM ₁₀ , PM _{2.5} , SO ₂ , NOx, CO and VOC)					
#	Action	Initiative	Who?	Timing	Proposed Future Tasks
1	Reduce vehicle Idling through policies and education	<ul style="list-style-type: none"> • Identify organizations and companies with/without policies. Extend invitations to support anti-idling policies for companies that do not have one • Provide anti-idling resources to organizations (e.g. free anti-idling signs for store parking lots) 	Stewardship Community, CVRD, Municipalities, Island Health	<p>Initiative is in progress.</p> <p><i>Tasks complete</i></p> <ul style="list-style-type: none"> • Anti-idling policy under exploration for the CVRD vehicle fleet • Municipal anti-idling bylaws have been implemented 	<ul style="list-style-type: none"> • Report to task force spring 2016 <p>Lead: <u>To be determined</u></p>
2	Support alternative modes of transportation	Support programs that overcome barriers to bicycling as a commuting option	CVRD, Municipalities, Ministry of Transportation and Highways,	Initiative is in progress.	<ul style="list-style-type: none"> • Local governments to report out issues and recommendations regarding active transportation in Summer 2016. <p>Lead: <u>CVRD and Municipalities</u></p>

			Stewardship Community, Island Health		
	Support programs that overcome barriers to electric vehicle use as a commuting option	Electric vehicle community, CVRD, Municipalities		<p>Initiative is in progress.</p> <p><i>Tasks Complete</i></p> <p>10 publicly accessible Electric Vehicle charge stations installed across 4 municipalities (Ladysmith, North Cowichan, Lake Cowichan and Duncan) and 2 electoral area (Mill Bay, and Shawnigan Lake)</p>	<ul style="list-style-type: none"> By 2017 - Round Table participants to provide support letters to electric vehicle associations. Lead: <u>To be determined</u> By 2017 - local partners (where possible) to explore installing EVI stations in their facilities Lead: <u>To be determined</u>
	Raise awareness for public transit and promote ridership	BC Transit Municipalities All Round Table participants		<p>Initiative is in progress.</p> <p><i>Tasks Complete</i></p> <p>The Cowichan Valley Future Transit Plan is complete and ridership targets are included in the plan. The plan envisions what the network should look like 25 years from now. Implementation is underway.</p>	<ul style="list-style-type: none"> By 2017 - Task force partners to review how their organizations can support internally and externally the use of public transportation in their programs and public messaging Lead: <u>To be determined</u> By 2017 - Report to be brought back to the task force Lead: <u>To be determined</u>
	Road Improvements to improve walkability	Municipalities, Ministry of Transportation and Highways, CVRD		<p>Initiative is in progress.</p> <p><i>Tasks Complete</i></p> <p>CVRD Parks and Trails Master Plans include active transportation and have</p>	<ul style="list-style-type: none"> By 2017 - Task force members to consider how to support the collection of this information from their user groups Lead: <u>Municipalities and CVRD</u>

				<p>been developed for some electoral areas of the region. Transportation planning as part of the CVRD's Regional Integrated Strategy is underway.</p> <p>City of Duncan's active transportation plan is being developed.</p>	<ul style="list-style-type: none"> By 2017 - Local governments to review OCP's and provide recommendations on improvements. Lead: <u>CVRD and Municipalities</u>
3	Reduce Stop and go traffic on the Trans Canada Highway and other major road systems in the region	Implement the TransCanada Highway (TCH) Corridor Management Plan	Ministry of Transportation and Highways, CVRD, Municipalities and Cowichan Tribes.	<p>Initiative is in progress.</p> <p><i>Tasks Complete</i></p> <p>The Boys Rd to Beverley Rd section of the TCH corridor management plan is being implemented.</p>	<ul style="list-style-type: none"> By Dec 2016 - MOTI be invited to become a partner on the task force or strategy by December 2015. Lead: <u>Our Cowichan</u>
4	Reduce dust emissions in communities adjacent to dirt roads	Reduce Mud track out onto main roads through truck wash stations	TimberWest, CVRD, Town of Lake Cowichan, Island Health,	<p>Initiative is in progress.</p> <p><i>Tasks Complete</i></p> <p>The Youbou truck wash station has been built and is expected to be in use in the Fall of 2015.</p>	<ul style="list-style-type: none"> By Dec 2016 - MOTI be invited to become a partner on the task force or strategy by December 2015. Lead: <u>Our Cowichan</u> A representative of the Managed Forest Council to be invited to sit on as an industrial representative by December 2015. Lead: <u>Our Cowichan</u>

Emission Sources: Point Sources

Point Sources are the largest contributor of Sulphur Dioxide and Total Reduced Sulfur. And the second largest contributor of VOCs.

Objective: Support programs that reduce emissions from mobile and point sources of all targeted pollutants (PM₁₀, PM_{2.5} SO₂, NO_x, CO and VOC)

#	Action	Initiative	Who?	Timing	Proposed Future Tasks
1	Compliance with provincial and federal regulatory requirements for reporting of PM ₁₀ , PM _{2.5} , SO ₂ , CO, NO _x , VOCs and TRS.	Annual air quality monitoring and reporting	Large point source facilities. Ministry of Environment	Initiative is in progress. <i>Ongoing tasks underway</i> Many of the large facilities in our region are reporting for compliance with provincial and federal permitting requirements for facilities.	<ul style="list-style-type: none">Spring 2016 - Catalyst to provide annual data and issues identification Lead: <u>Catalyst</u>

Appendix A - Emissions Inventory for the Cowichan Region

Background

Levelton Consultants Ltd. (Levelton) was retained by BC Ministry of Environment (MoE) and for the Cowichan Valley Regional District (CVRD) to compile an emissions inventory for the region. The main purpose of the 2014 analysis was to provide background information regarding which pollutants/emission sources may be of greatest concerns and identify and individual sectors/subsectors will be key to future management actions. The regional inventory was compiled for 2011 as the base year and forecasted at five-year intervals for 2016, 2021, 2026 and 2031.

Scope

The emissions inventory was compiled for the following key pollutants of interest:

- Particulate Matter (PM), including the following size fractions:
 - Particulate matter less than 2.5 microns in equivalent diameter (PM_{2.5});
 - Particulate matter less than 10 microns in equivalent diameter (PM₁₀);
 - Total particulate matter (TPM);
- Carbon Monoxide (CO);
- Sulphur Dioxide (SO₂);
- Nitrogen Oxides (NO_x);
- Ammonia (NH₃); and
- Volatile Organic Compounds (VOCs)

No specific analysis of carbon dioxide or other Greenhouse Gasses (GHG's) was undertaken as it was outside to the parameters of this study and have been calculated as a component of the Community Energy and Emmissions Inventory (CEEI) by the Province.

The emissions inventory identified a number of source categories including: point sources (large industrial facilities), area sources (light industrial, residential, commercial and institutional sources, agricultural activities, miscellaneous sources), mobile sources (on-road motor vehicles and non-road sources including aircraft, marine vessels, and others such as construction and lawn and garden equipment), and road dust. A summary of the emission inventory is provided below.

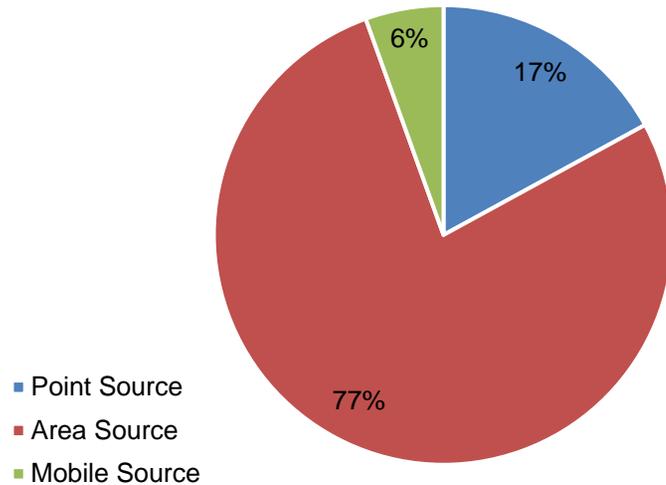
Results – where are the emissions coming from?

The majority of TPM, PM₁₀, PM_{2.5}, VOC and NH₃ emissions were from area sources. Mobile sources, excluding road dust, were the largest contributor of CO and NO_x. The largest emitters for SO₂ were point sources.

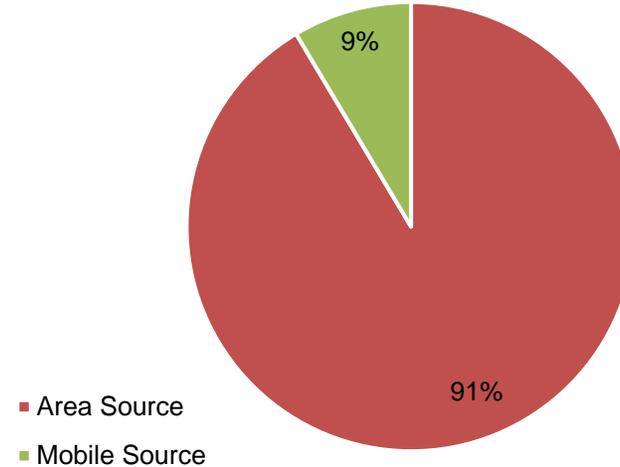
Area Sources

Overall, the majority of TPM, PM₁₀, PM_{2.5}, VOC and NH₃ emissions were from area sources. Open burning was the largest contributor of CO, NO_x, TPM, PM₁₀ and PM_{2.5}. VOC emissions from gasoline marketing including the distribution and sales of petroleum products at service stations and solvent evaporation accounted for approximately half of the total VOC emissions from area sources. Agricultural activities were the largest source for the regional NH₃ emissions. Space heating was the largest contributor of SO₂ emissions and second largest contributor of CO, NO_x, TPM, PM₁₀ and PM_{2.5} emissions.

Distribution of PM_{2.5} Emissions



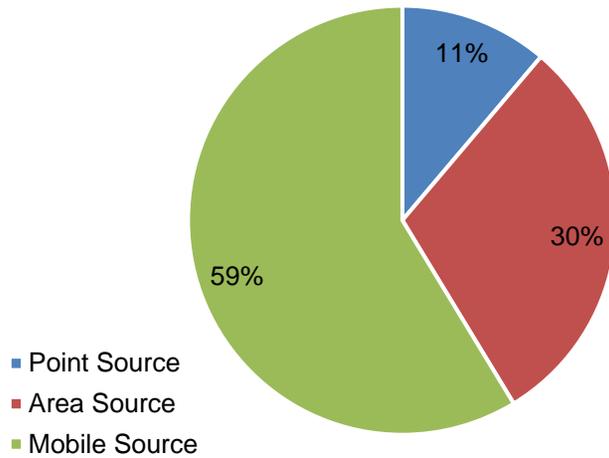
Distribution of NH₃ Emissions



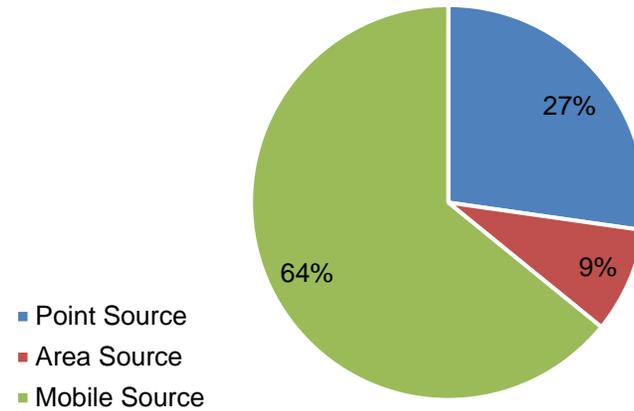
Mobile Sources

Overall, mobile sources, excluding road dust, were the largest contributor of CO and NOx. Data analyses indicated that emissions from on-road vehicles were the largest contributor of all CACs from mobile sources with the exception of NOx. Marine vessels were the largest contributor of NOx emissions from mobile sources. The second largest emission contributor to CO, TPM, PM₁₀, PM_{2.5} and VOC emissions from mobile sources was non-road equipment/vehicles. CAC emissions due to aircraft activity were insignificant.

Distribution of CO Emissions

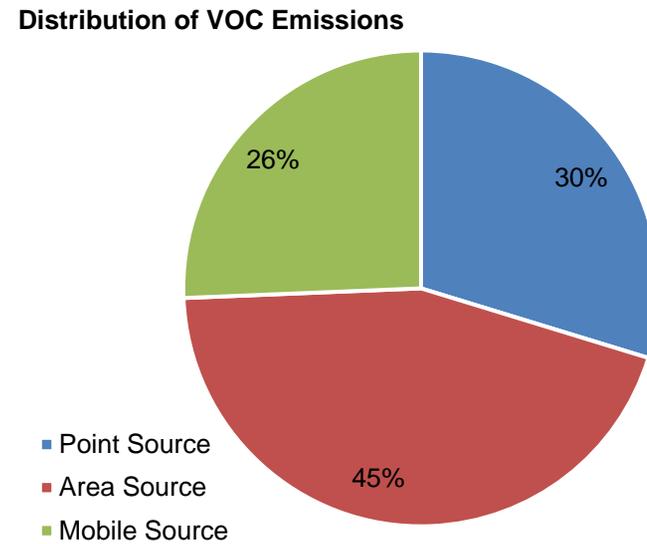
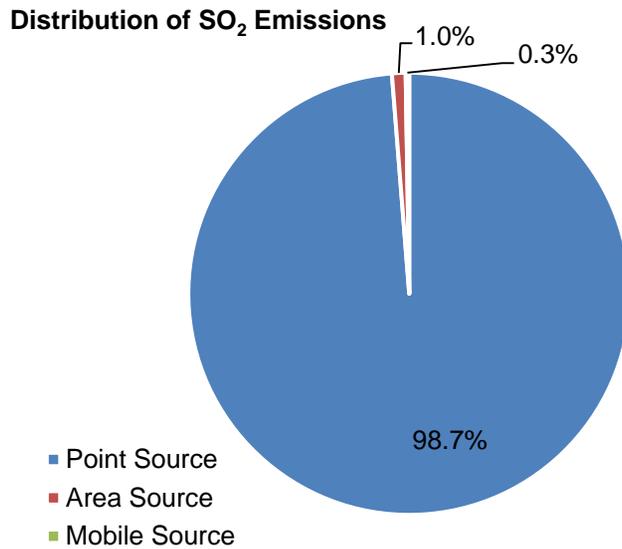


Distribution of NOx Emissions



Point Sources

Overall, the largest emitters for SO₂ were point sources. The majority of point source industry emissions were from the pulp and paper sector, which accounted for 87% of CO, 95% of NO_x, 62% of TPM, 77% of PM₁₀, 86% of PM_{2.5}, 67% of VOC, and 99.7% of SO₂ emissions from point sources. The petroleum product storage sector was the second largest contributor at 29% in terms of total VOC emissions.



For additional details on the Emissions Inventory please visit: <http://www.cvrld.bc.ca/DocumentCenter/View/65427>

Appendix B - Air Quality Study for the Cowichan Region

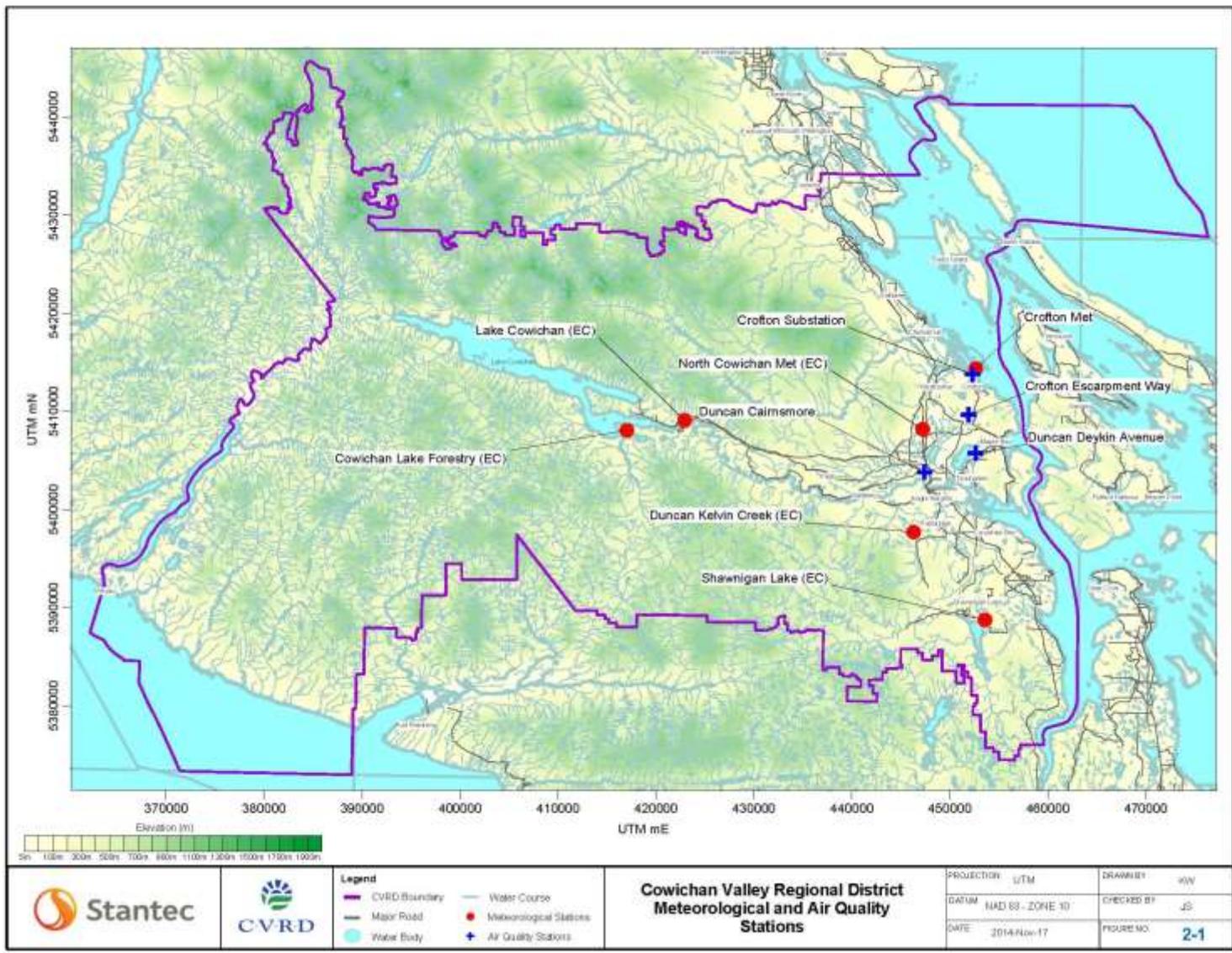
Background

The BC Ministry of Environment and the Cowichan Valley Regional District engaged Stantec Consulting Inc. in 2014 to analyze the meteorological and air quality datasets for the region to develop a more comprehensive analysis of the impact of emissions on air quality. The study considered the 11- year period 2003 through 2013 to consolidate the most recent air quality information in support of future airshed management efforts. Statistical summaries, graphics, and case studies were used to characterize patterns in the observed air quality conditions.

Scope

Air quality datasets from four monitoring stations in the CVRD were analyzed. These include Crofton Substation, Crofton Escarpment Way, Duncan Deykin Avenue, and Duncan Cairnsmore. The Crofton Substation and Duncan Deykin Avenue stations were operational prior to 2003. Observations at Crofton Escarpment Way and Duncan Cairnsmore stations began in October 2008 and July 2009, respectively.

The five substances that were measured and analyzed are: sulphur dioxide (SO₂), nitrogen dioxide (NO₂), particulate matter (PM), total reduced sulphur (TRS), and ozone (O₃). Particulate matter is further categorized by diameter into inhalable (PM₁₀) and respirable (PM_{2.5}) fractions. These substances are known collectively as criteria air contaminants (CACs). Air quality is determined by a comparison of the measured CAC concentrations with the national and provincial ambient air quality objectives (AAQO).



Results of baseline analysis

Respirable Particulate Matter - PM_{2.5} (particulate size is small enough to be absorbed and distributed into organs of body)

There were sporadic exceedances of the PM_{2.5} objectives (Figures 1 and 2). The study revealed that the exceedances were episodic and not systemic in nature. The Crofton Substation, Crofton Escarpment Way, and Duncan Deykin Avenue stations had very few exceedances of the 24-hour AAQO for PM_{2.5} while Duncan Cairnsmore had a greater frequency of exceedances. The diurnal (hourly) analysis showed increased PM_{2.5} concentrations in the late afternoons and evenings (Figure 3). **PM_{2.5} and meteorological data analysis revealed that most of the sporadic exceedances may be due to local burning and space heating (winter)**, The analysis also revealed that there were a few exceedances due to long range transport from forest fires located in other regions (summer).

Impact of pollutant

PM_{2.5} refers to particulate matter that is less than 2.5 microns in diameter. This is the particulate size of greatest concern because it can travel deep into the lungs, causing heart and lung disease, and even premature death. Fine particles that comprise PM_{2.5} are also efficient at scattering light, resulting in degradation in visibility.

The following figures illustrate the exceedance of PM_{2.5} objectives and the daily pattern observed at the Duncan Cairnsmore location.

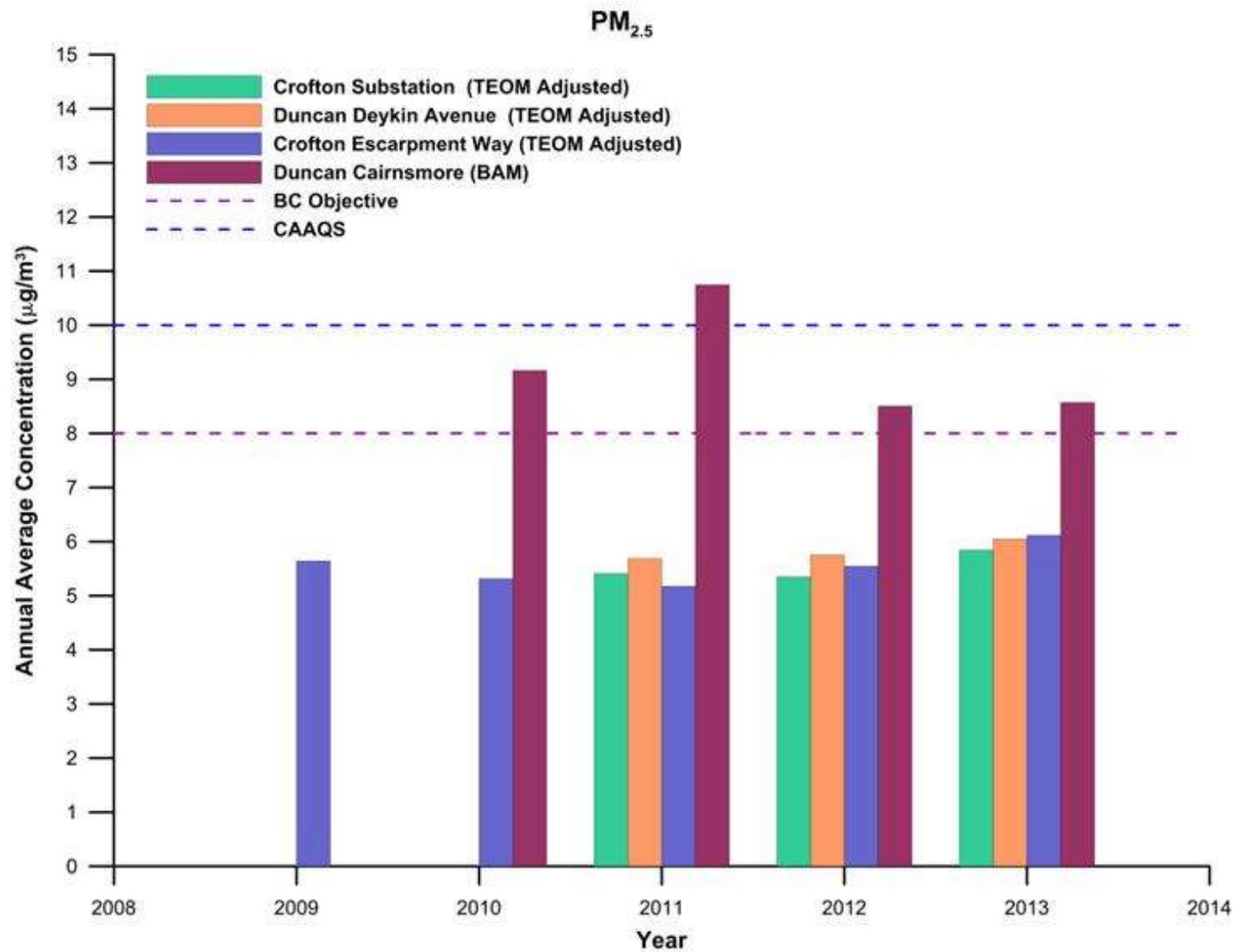


Figure 1. Annual Average PM_{2.5} Concentrations in the CVRD

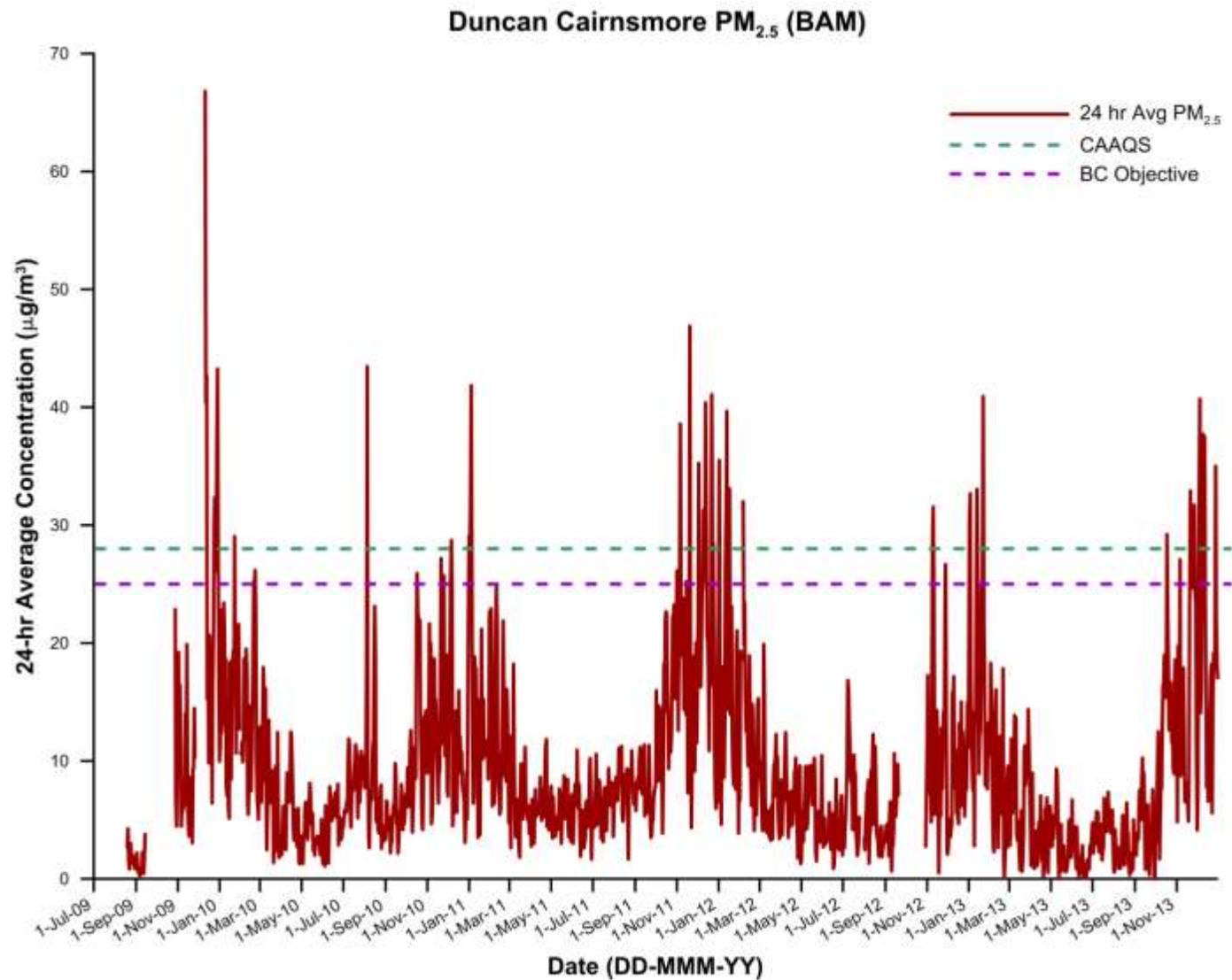


Figure 2. 24 Hour Average PM_{2.5} at Duncan Cairnsmore

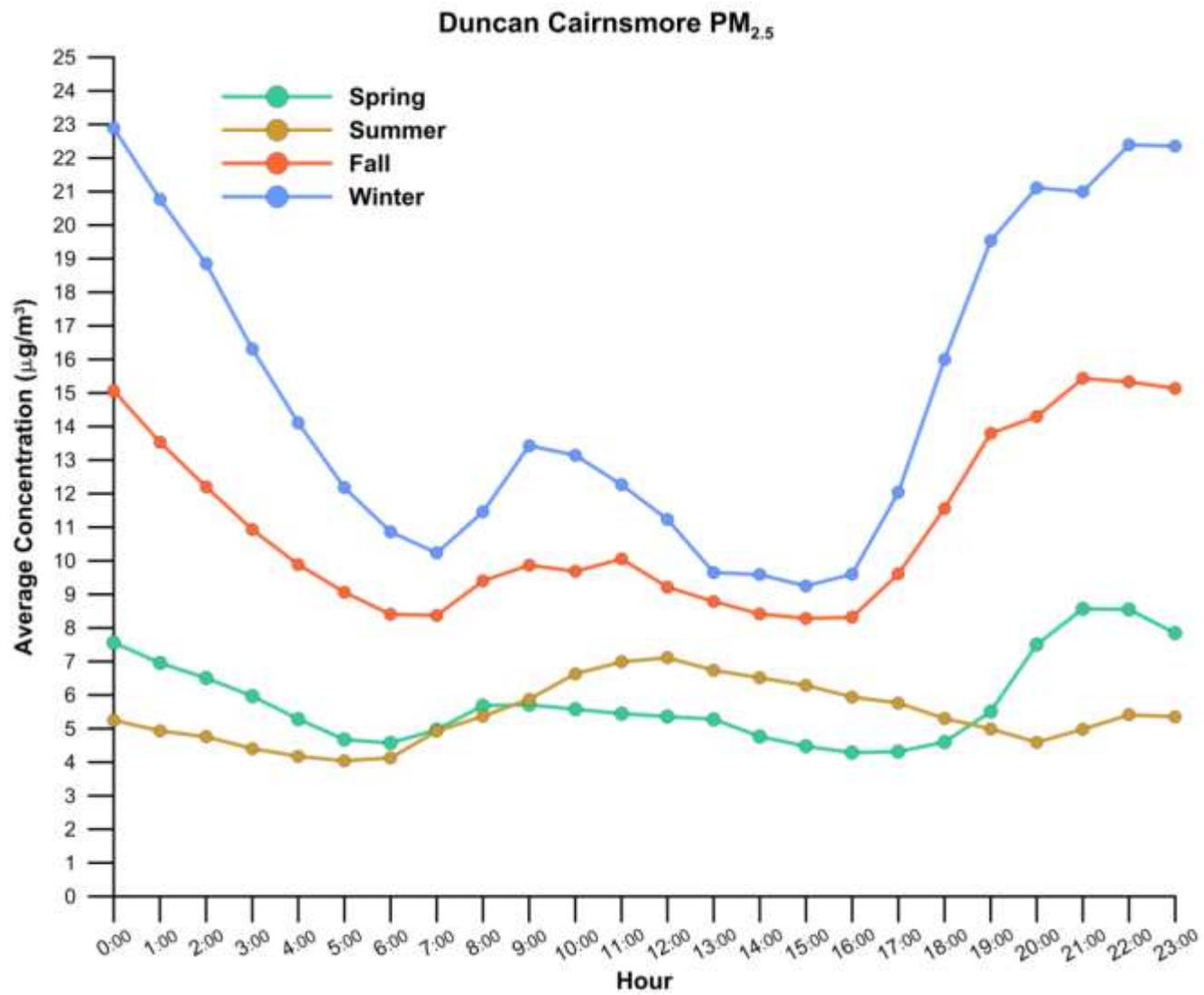


Figure 3. Diurnal Trends in PM_{2.5} Concentration at Duncan Cairnsmore by Season.

Inhalable Particulate Matter – PM₁₀ (particulate size will irritate and cause coughing, become lodged in respiration system)

At Crofton Substation, there was just one day when the 24 hour average PM₁₀ concentration exceeded the BC AAQO (Figure 4). There were no exceedances of the provincial objective at Duncan Deykin Avenue from 2003 to 2010 (Figure 5). At Crofton substation, there is minimal seasonal trend with slightly higher concentrations in the spring and summer compared to the fall and winter. At Duncan Deykin Avenue, there were higher concentrations in the late fall and early winter due to activities such as space heating and open burning.

Impact of pollutant

PM₁₀ refers to particulate matter that is less than 10 microns in length. These particles can irritate the nose and throat, but do not normally penetrate deep into the lungs. Particulate matter is the main source of haze that reduces visibility. These particles can also make lakes and other sensitive areas more acidic, causing changes to the nutrient balance and harming aquatic life.

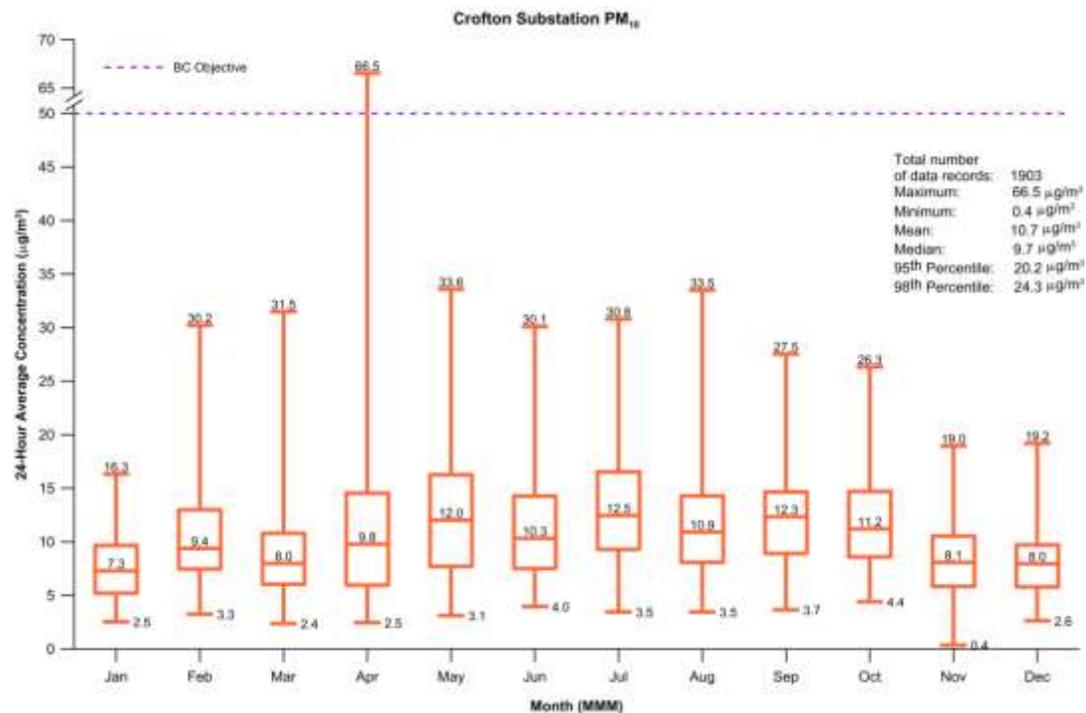


Figure 4. Monthly Variation of 24-Hour Average PM₁₀ Concentration at Crofton Substation Based on 2005–2010 Data

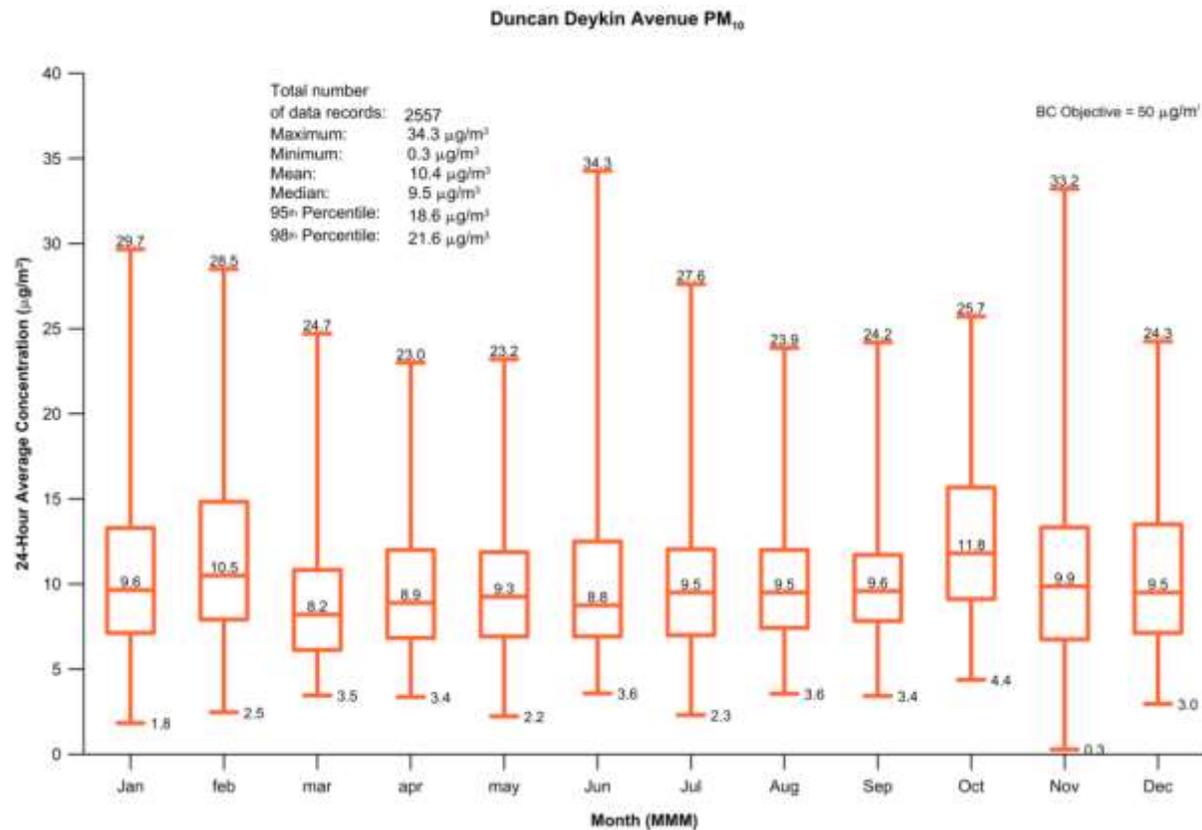


Figure 5. Monthly Variation of 24-Hour Average PM₁₀ Concentration at Duncan Deykin Avenue Based on 2003–2010 Data

Ozone

Ozone was measured at the Duncan Cairnsmore station starting in mid-2009. Ozone (O₃) is more prevalent during summertime high pressure systems, as its formation is dependent on sunlight and warm temperatures. Average monthly concentrations exhibited a springtime peak, but the highest 1-hour average concentrations occurred in August (figure 6). A well-defined daily cycle in O₃ concentration with a late afternoon maximum was observed for all seasons, indicating some local photochemical production – entirely consistent with the small urban setting (figure 7). Further analysis of two high-concentration episodes found these patterns were

associated with periods of hot, sunny weather. Analysis of O₃ into regimes suggests that transport of O₃ from the Lower Fraser Valley (or most distant sources) is not an important factor. This analysis is illustrated in the Air Quality Study Report. There were no exceedances of the national AAQO for O₃.

Impact of Pollutant

Low concentrations of ground-level ozone can irritate the eyes, nose and throat. O₃ can also irritate the lung airways, and make them red and swollen (inflammation). People with lung problems are most at risk, but even healthy people who are active outdoors can be affected when ozone levels are high. O₃ can also damage plants and trees when levels are high.

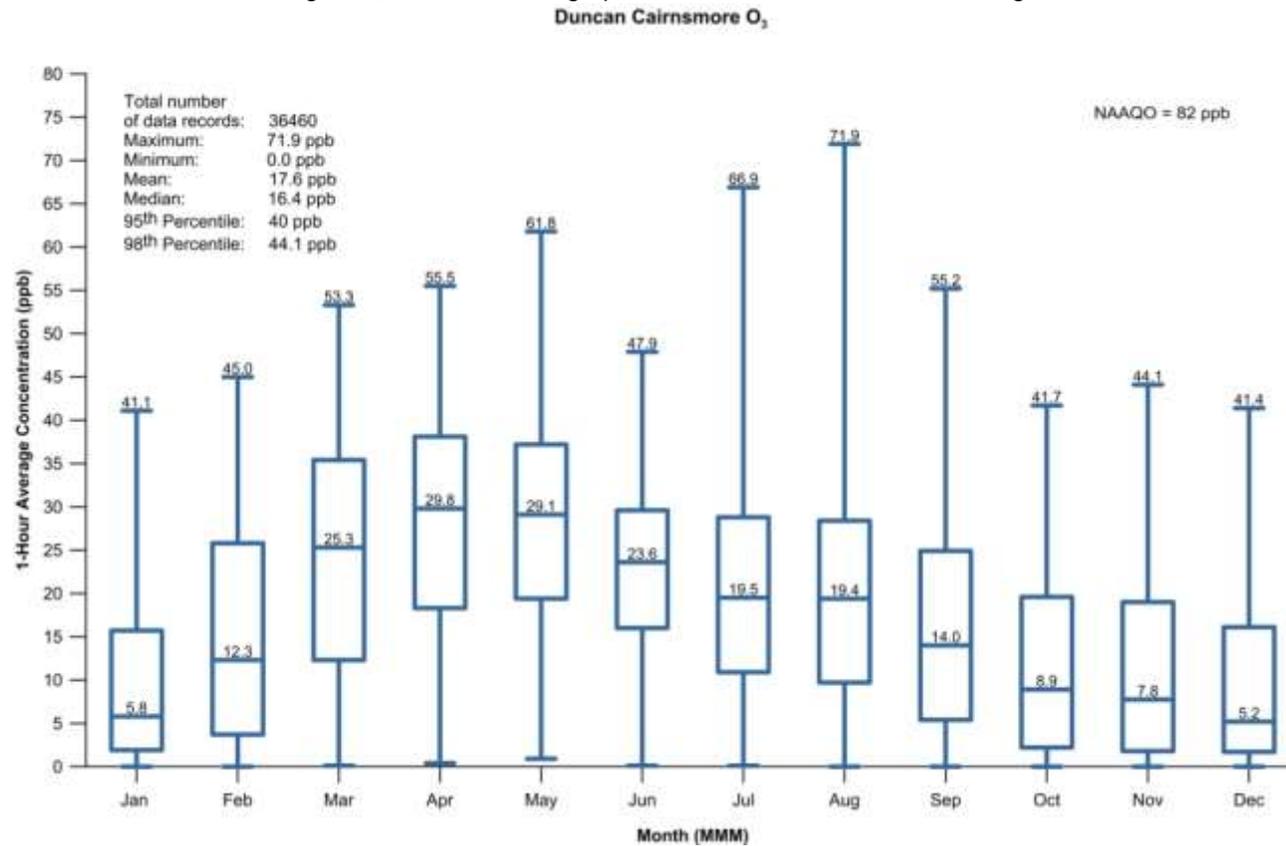


Figure 6. Monthly Variation of 1-Hour Average O₃ Concentration at Duncan Cairnsmore based on 2009–2013 Data

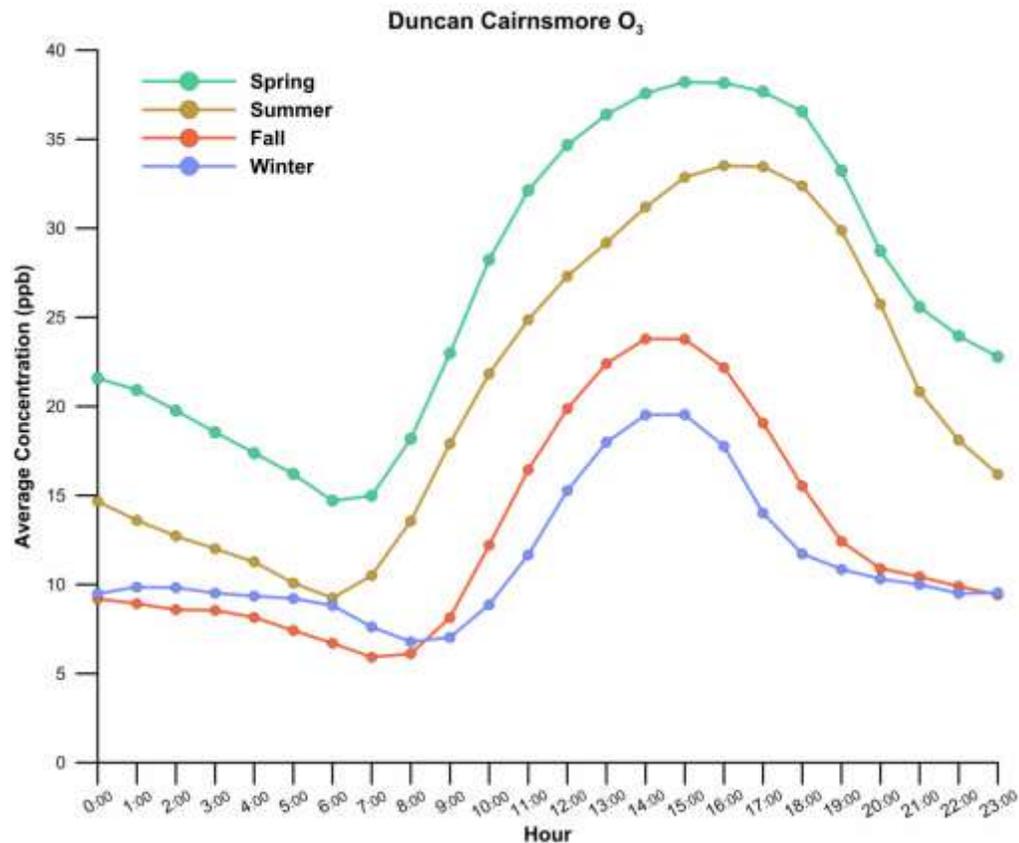


Figure 7. Diurnal trends in O3 concentration at Duncan Cairnsmore by Season

Sulphur Dioxide

A daily pattern was found for SO₂ concentrations in which average values peaked in late morning and decreased through the night. This pattern was likely due to shoreline fumigation (clearing of air) after the onset of onshore (easterly) wind flow. No day of week pattern was apparent for SO₂. There were no exceedances of national or provincial AAQO for SO₂ (Figure 8).

Impact of Pollutant

Sulphur dioxide can transform in the atmosphere to sulphuric acid, a major component of acid rain. Inhalation of high levels of sulfur dioxide is associated with increased respiratory symptoms and disease, difficulty in breathing and premature death.

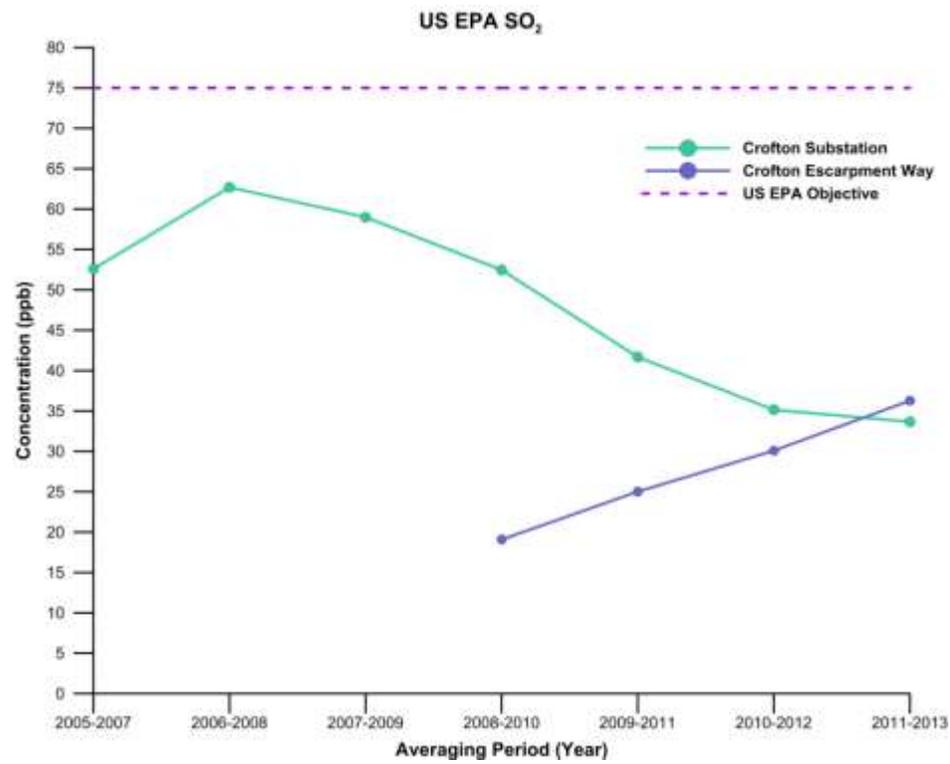


Figure 8. 1-Hour Average SO₂ Results for the US EPA Supplemental Objective at the Crofton Substation and Crofton Escarpment Way Monitoring Stations

Nitrogen Dioxide

A daily pattern was found for NO₂ concentrations as well. The pattern for NO₂ showed two peaks, one in the morning and one in the evening, corresponding to times of peak motor vehicle traffic (Figure 9). There appears to be a downward trend in the annual average NO₂ concentrations likely linked to improving combustion efficiencies in motor vehicles (Figure 10). There were no exceedances of national or provincial AAQO for NO₂.

Impact of Pollutant

High levels of Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Nitrogen oxides in the air can significantly contribute to acid rain and eutrophication in coastal waters.

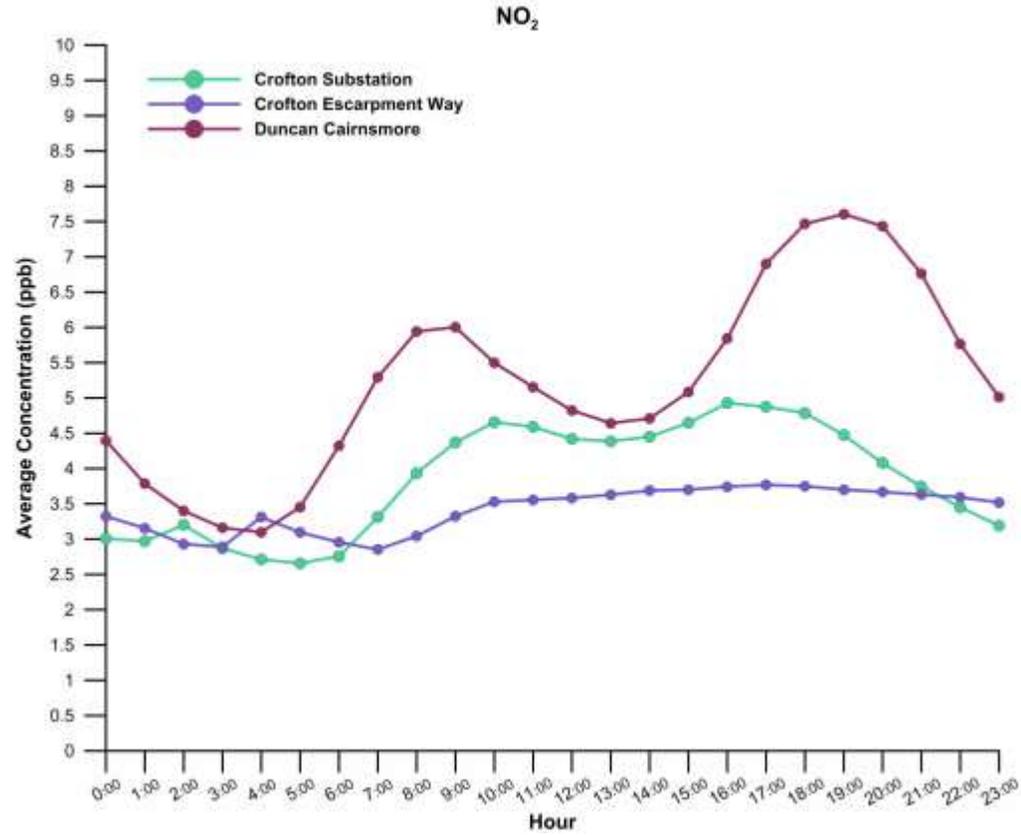


Figure 9. Diurnal Trends in NO₂ Concentration Based on all Available Hourly Data

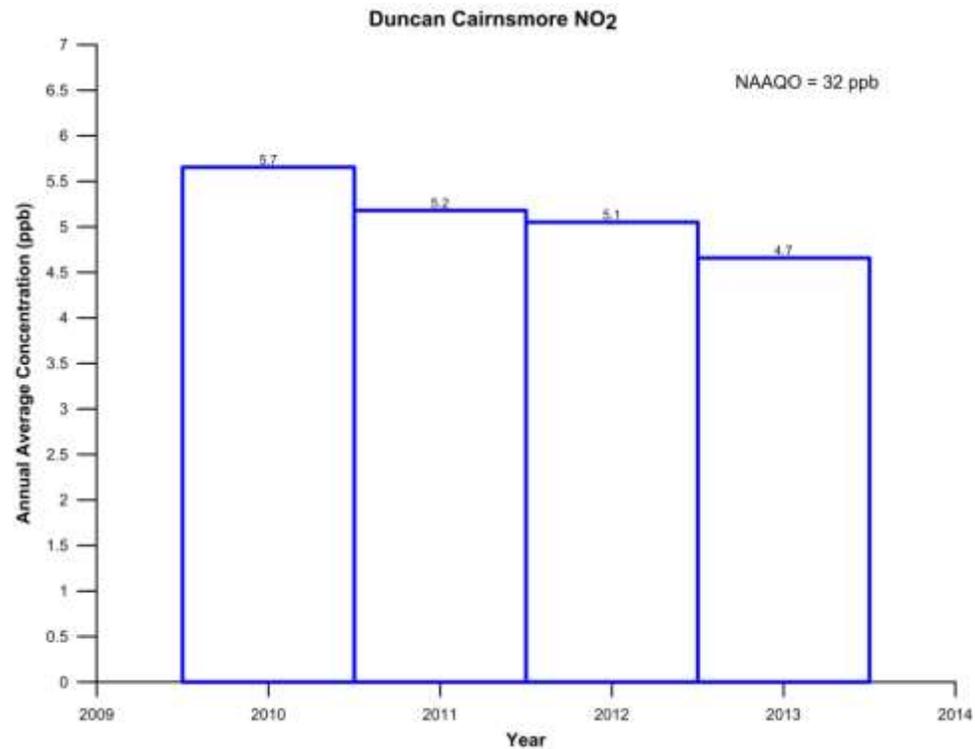


Figure 10. Annual Average NO₂ Concentrations at Duncan Cairnsmore for 2010–2013

Total Reduced Sulphur

Total reduced sulphur (TRS) exhibited low average concentrations with short-term peaks that exceeded the most stringent BC AAQO for the 1-hour and 24-hour averaging periods (Figure 11). These episodes of higher TRS concentration are most likely associated with emissions from the Pulp Mill in Crofton. Exceedance of the TRS AAQO for the 24-hour averaging period occurred up to 30% of the time on an annual basis at Crofton Substation which is 250 m south of the Pulp Mill, but only up to 1.5% of the time at Duncan Deykin Avenue which is more than 8 km away from the Pulp Mill (illustrated in the Air Quality Study Report). The meteorological data analysis revealed that these sporadic exceedances may be due to the Crofton Mill emissions.

Impact of Pollutant

TRS is a mixture of compounds including hydrogen sulphide, mercaptan, dimethyl sulphide and dimethyl disulphide. TRS compounds are not considered a health hazard at typical environmental levels. They are however, a primary cause of odours. Exposure to high concentrations of hydrogen sulfide can lead to respiratory distress or arrest.

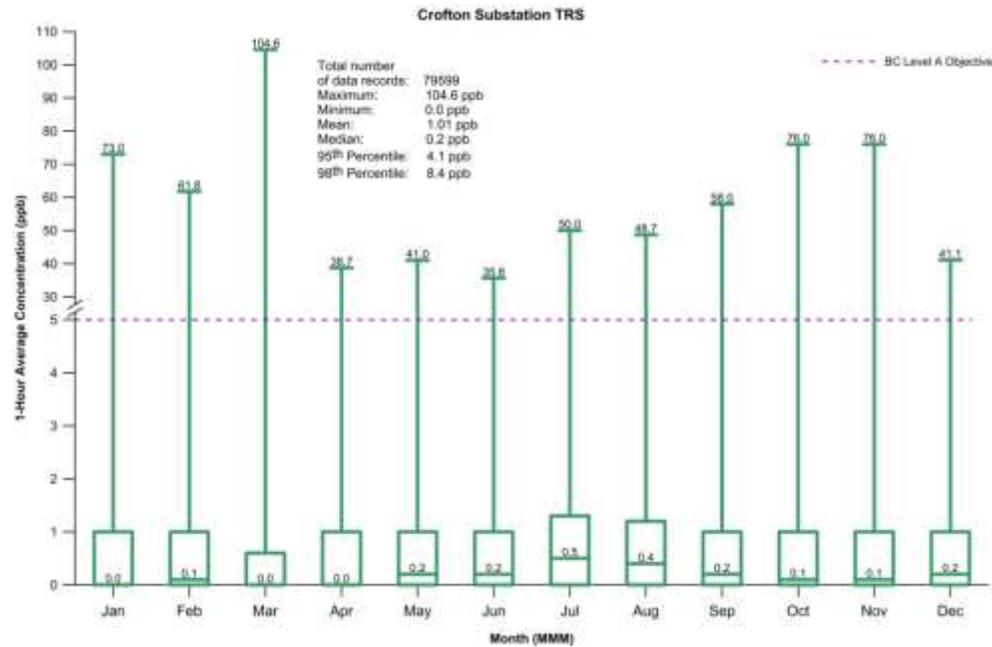


Figure 11. Monthly Variation of 1-Hour Average TRS Concentration at Crofton Substation Based on 2003–2013 Data.

For additional details on the Air Quality Study please visit: <ftp://ftp.cvrld.bc.ca/Environment/Airshed%20Protection/AirQualityStudyFinal.pdf>

Appendix C – Our Indicators and Targets

The following indicators and targets were developed to help us understand whether we are achieving our goals

Parameter	Indicator	Sources	Rationale	Targets ⇒ Denotes key target	Units	Monitoring
Health	a) Childhood respiratory illness		a) Health effects	Zero	# of people	Island Health
Population	b) Resident population c) Visitors by demographic categories		b) Measure of population growth c) Measure of tourism health	N/A	# of people	Census data
Particulate matter	a) Annual average PM _{2.5}	Open burning and wood burning appliances	Health effects (respiratory, cardiovascular), vegetation damage, visibility degradation.	⇒ a) Zero exceedance of BC AAQO (8 µg/m ³) & zero exceedance of National AAQO	µg/m ³	Yes
	b) Daily PM _{2.5}		Reduce the frequency and duration of episodes that lead to <i>air quality advisories</i> .	⇒ b) Zero exceedance of BC AAQO (25 µg/m ³) & zero exceedance of National AAQO		
NOx	a) Provincial and National objectives	industry, mobile sources, wood burning, etc.	Health effects (respiratory), vegetation damage, acidification, secondary particles, O ₃ precursor	Decreasing trend		
SO ₂	a) Provincial and National objectives guideline of 7.5 ppb	Crofton Pulp Mill; combustion of fossil fuels containing sulphur. Marine Vessels.	At high concentrations - health effects (respiratory), vegetation damage, acidification, fine particulate formation, visibility	a) WHO 24 h 7.5 ppb		
Ozone	a) Provincial and National Objectives for 1 hr and 8 hr	A secondary pollutant formed from reactions between oxides of	Health effects (respiratory and eyes), vegetation damage, visibility (photochemical smog)			

			nitrogen (NOx) and volatile organic compounds (VOCs) in the presence of sunlight			
Odour	<ul style="list-style-type: none"> a) # of odour complaints b) TRS – Provincial Level A odour objective 	Point sources Crofton pulp mill; sewage treatment; swamps, bogs and marshes.	Offensive odours	<ul style="list-style-type: none"> a) Reduction in odour complaints b) Continuous improvement in TRS 		
Visibility	<ul style="list-style-type: none"> a) Visibility b) Complaints 	Mobile sources Ozone, NOx, VOC and PM	can effect tourism, outdoor recreation and public perception	<ul style="list-style-type: none"> a) Reduction in visibility complaints b) Visibility index of good 		
Partnerships & Leadership	<ul style="list-style-type: none"> a) Annual reports b) Partnerships c) Stewardship programs d) Public Awareness Campaign 			<ul style="list-style-type: none"> ⇒ Form an Airshed Protection Round Table ⇒ Implement Actions in this Strategy 		<ul style="list-style-type: none"> - Website hits. - #of AQ pres. given to others. # of requests for info AQ planning. - # of visitors with a positive perception of air quality and environmental health.

Appendix D - Contaminant Prioritization

To focus the planning of actions on those that will have the greatest impact on our air quality, high priority pollutants have been determined based on the following criteria:

- Does the pollutant have exceedance(s) of national or provincial air quality objectives?
- Is the pollutant normally considered to be a significant hazard to human health, the environment or the economy?

Pollutant	Exceedance of AQ objective	Hazard		
		Human Health	Environmental	Economic
SO ₂		√	√	√
TRS	√			√
NO _x		√	√	√
Ozone		√	√	√
PM ₁₀		√	√	√
PM _{2.5}	√	√	√	√

Appendix E – References

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(http://www.bcairquality.ca/reports/pdfs/airshedplan_provframework.pdf)
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9. Carlton, A.G., R.W. Pinder, P.V. Bhave and G.A. Pouliot. "To What Extent Can Biogenic SOA be Controlled?", Environmental Science & Technology 44:3376-3380 (2010).
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