Introduction

This is the sixth annual air quality report for the Central Interior Air Zone. Annual air zone reporting is a commitment under the national Air Quality Management System (AQMS). This report describes achievement of the Canadian Ambient Air Quality Standards (CAAQS) for ground-level ozone (O_3) and fine particulates ($PM_{2.5}$), the associated management levels and recent actions to improve air quality. A province-wide summary can be found at: http://www.env.gov.bc.ca/soe/indicators/air/.

Background

The AQMS is the national approach to managing air quality in Canada. Under the AQMS, the CAAQS are developed to drive action to protect human health and the environment. Air zones are areas that exhibit similar air quality characteristics, issues and trends, and that form the basis for monitoring, reporting and taking action on air quality. The Central Interior Air Zone (see Figure 1) is one of seven broad air zones across the province. Under the AQMS, progressively more rigorous actions are expected as air quality approaches or exceeds the CAAQS. The level of action is guided by the Air Zone Management Framework outlined in Table 1.

Figure 1. Central Interior Air Zone.

Table 1. Air zone management framework for ground-level ozone and $PM_{2.5}$ defined based on 2015 CAAQS criteria.

Management Level	Objectives	Ozone	$PM_{2.5}$	
		8-hour (ppb)	Annual ($\mu g/m^3$)	24-hour ($\mu g/m^3$)
Red	Achieve CAAQS	>63	>10.0	>28
Orange	Prevent CAAQS Exceedance	>56 and ≤63	>6.4 and ≤10.0	>19 and ≤28
Yellow	Prevent Air Quality Deterioration	>50 and ≤56	>4.0 and ≤6.4	>10 and ≤19
Green	Keep Clean Areas Clean	≤50	≤4.0	≤10

Ozone Levels

Ozone measurements in the Central Interior Air Zone are summarized in Figure 2. Concentrations ranged from 48-51 ppb.[1] All sites achieved the national standard of 63 ppb.

Trends in ozone levels are shown in Figure 3.[2] Ozone concentrations have remained below the level of the national standard throughout this period.

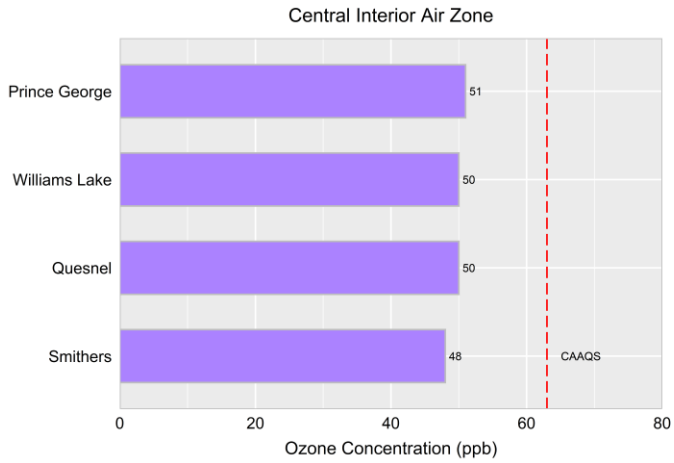


Figure 2. Ozone concentrations in the Central Interior Air Zone, based on annual 4th highest daily 8-hour maxima, averaged over 2016-2018. Red dashed line identifies the CAAQS of 63 ppb.

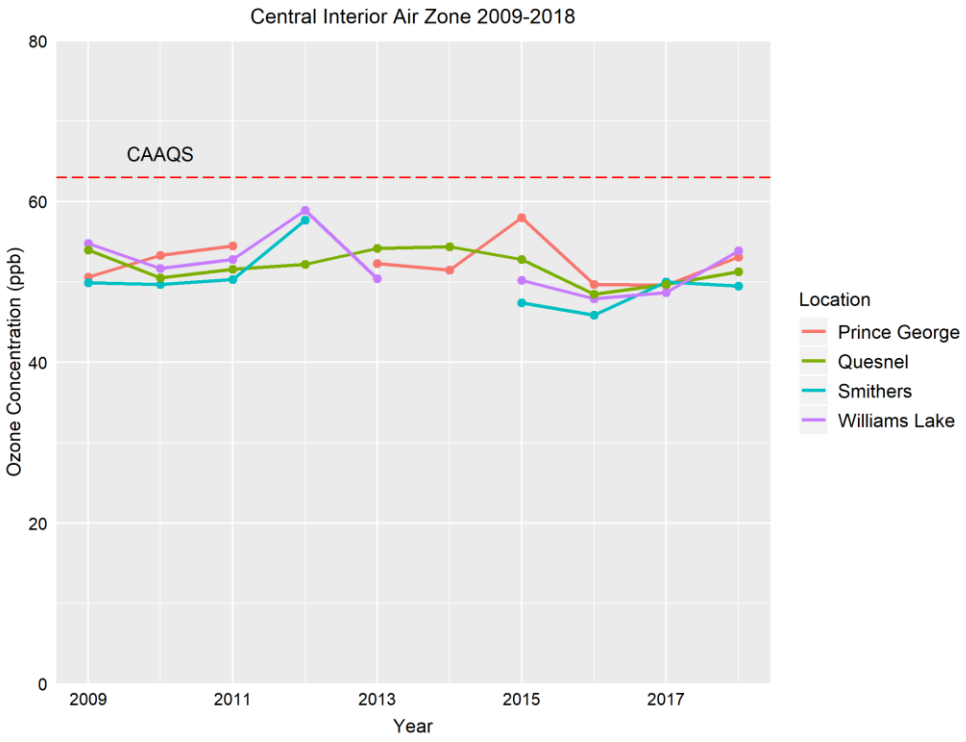


Figure 3. Trends in ozone concentrations (2009-2018), based on annual 4th highest daily 8-hour maxima over a single year. The red dashed line identifies the CAAQS level of 63 ppb.

[1] Concentrations based on 4th highest daily 8-hour maximum, averaged over three years (2016-2018).
[2] Concentrations based on 4th highest daily 8-hour maximum, over a single year.

$PM_{2.5}$ Levels

$PM_{2.5}$ refers to inhalable particles up to 2.5 micrometres in diameter. $PM_{2.5}$ measurements are summarized in Figure 4. All measurements for this reporting period were based on the Federal Equivalent Method (FEM), which provides a more complete measure of $PM_{2.5}$ than the older TEOM instruments.

Daily concentrations (upper plot) ranged from 29 to 111 μg/m^3.[3] All eight sites shown exceeded the national standard of 28 μg/m^3. Annual concentrations (lower plot) ranged from 7.0 to 15.3 μg/m^3. Five of eight sites exceeded the annual standard of 10 μg/m^3: Valemount, Williams Lake, Quesnel, Vanderhoof and Prince George.[4] As described further in the Appendices, wildfire smoke had a major impact on air quality in the Central Interior Air Zone in 2017 and 2018.

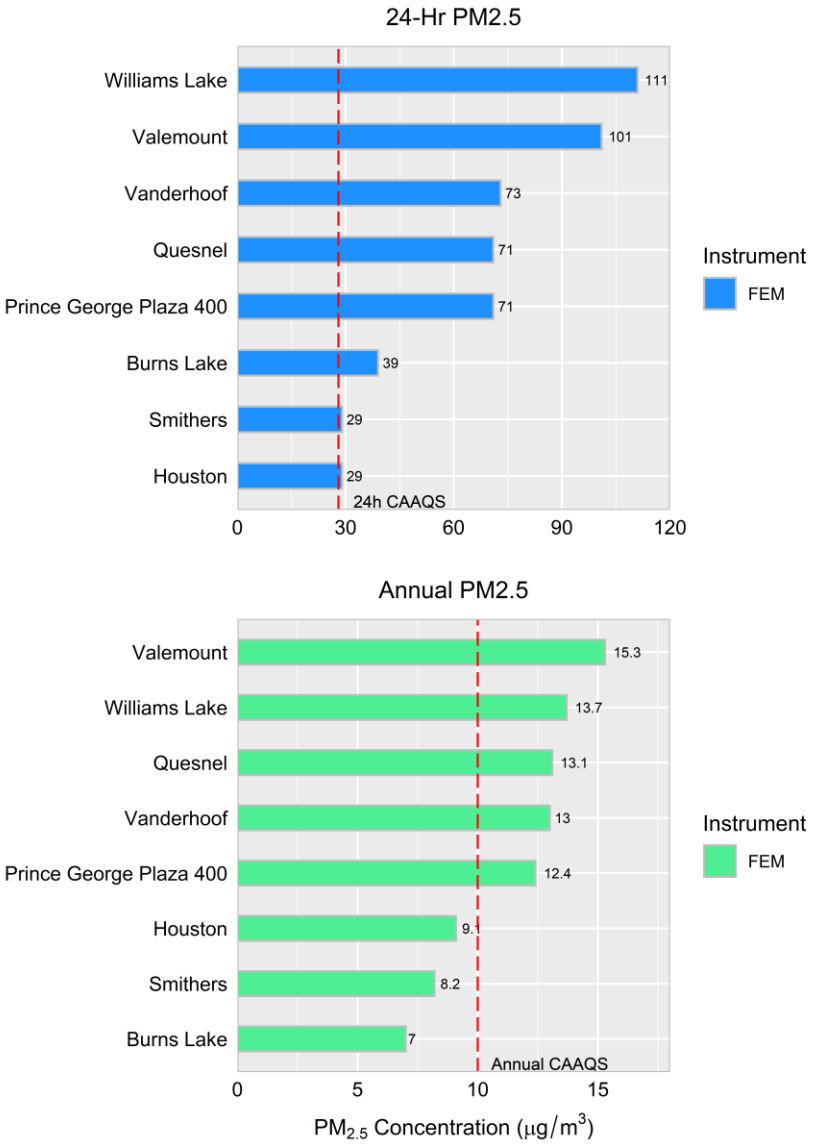


Figure 4. $PM_{2.5}$ concentrations in Central Interior Air Zone. Upper plot based on 24-hour concentration (annual 98th percentile, averaged over 2016-2018). Lower plot based on annual mean concentration (averaged over 2016-2018). The red dashed lines identify CAAQS of 28 μg/m^3 (upper plot) and 10 μg/m^3 (lower plot).

Trends in annual mean concentrations between 2009 and 2018 are shown for a subset of sites in Figure 5.[5] A shift to higher reported concentrations is seen with the change from TEOM to FEM instruments from about 2010 onward. Over the 10-year period, four of six sites recorded the highest annual average concentrations in 2017 or 2018, reflecting in part wildfire influences.

[3] Concentrations based on the annual 98th percentile of the 24-hour value, averaged over three years (2016-2018).
[4] Concentrations based on the annual average of 24-hour values, averaged over three years (2016-2018).
[5] Concentrations based on the annual average of 24-hour values over single year.

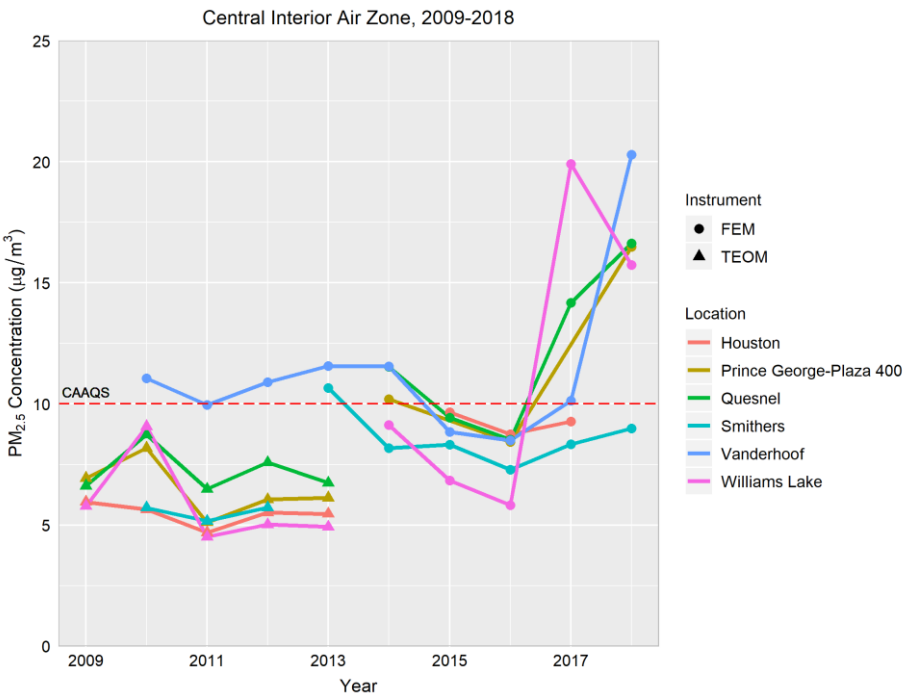


Figure 5. Trends in $PM_{2.5}$ concentrations (2009-2018), based on annual mean concentrations from a single year. The CAAQS value of 10 µg/m^3 is shown by the dashed line. $PM_{2.5}$ measurements prior to 2011 are reported at 25°C and 1 atm. From 2011 onward, measurements are reported at local conditions.

Air Zone Management Levels

Air zone management levels are assigned on the basis of the highest concentrations within an air zone, excluding contributions from transboundary flows (TF) and exceptional events (EE) such as wildfires, and preferentially based on stations with three complete years of data. TF/EE influences are removed so that long-term management strategies are not developed on the basis of events that are beyond local or provincial control.

In the Central Interior Air Zone, wildfires are the primary contributor to TF/EE. The methodology for identifying wildfire-influenced data is provided in Appendix I and excluded data are summarized in Appendix II. The wildfire season of 2017 was one of the most severe on record, with over 1.2 million hectares of land burned and roughly 65,000 persons evacuated, including the City of Williams Lake. This was surpassed by the 2018 wildfire season, in which over 1.35 million hectares of land burned.

Table 2 summarizes ozone concentrations as measured and after consideration of any TF/EE influences. No TF/EE influences were identified. Consequently, the Central Interior Air Zone is assigned a “yellow” management level based on concentrations in Prince George. This indicates that any ozone-related actions should focus on preventing further air quality deterioration.

Table 2. Summary of ozone concentrations as measured and air zone management levels for the Central Interior Air Zone (based on 2016-2018 data).

Location	No. Valid Years	4th Highest Daily 8-hour Maxima (ppb)		Air Zone Management Level
		As Measured	TF/EE Influences Removed	
Prince George	3	51	51	Goal: Preventing Air Quality Deterioration
Quesnel	3	50	50	
Smithers	3	48	48	
Williams Lake	3	50	50	

Table 3 summarizes $PM_{2.5}$ concentrations as measured and with TF/EE influences removed for each monitoring site. Overall, the Central Air Zone is assigned a "red" management level based on elevated $PM_{2.5}$ levels in Valemount and Vanderhoof. This indicates that $PM_{2.5}$-related actions should be an important priority in these communities, with activities focused on achieving the CAAQS. Although as-measured $PM_{2.5}$ concentrations in other communities also exceeded the CAAQS level, this was determined to be a result of wildfire influence. For more information on these analyses, see Appendix II.

Table 3. Summary of $PM_{2.5}$ concentrations as measured and air zone management levels for the Central Interior Air Zone (based on 2016-2018 data).

Location	Monitor Type	No. Valid Years	Daily Mean (98th Percentile, µg/m³)		Annual Mean (µg/m³)		Air Zone Management Level
			As Measured	TF/EE Removed	As Measured	TF/EE Removed	
Burns Lake	FEM	3	39	19	7.0	6.9	Goal: Achieving the CAAQS
Houston	FEM	2	29	28	9.1	8.8	
Prince George-Plaza 400	FEM	2	71	25	12.4	9.1	
Quesnel-Sr. Sec.	FEM	3	71	24	13.1	9.6	
Smithers	FEM	3	29	27	8.2	8	
Valemount	FEM	3	101	82	15.3	14.4	
Vanderhoof	FEM	3	73	34	13.0	9.6	
Williams Lake	FEM	3	111	21	13.7	7.5	

Actions to Protect Air Quality

The reduction of $PM_{2.5}$ emissions continues to be a major air quality priority in many areas of B.C., including the Central Interior Air Zone.

In 2016, the Province adopted a new Solid Fuel Burning Domestic Appliance Regulation that requires nearly all wood burning appliances sold in B.C. to be certified to meet particulate emissions standards set by the US Environmental Protection Agency (EPA) in 2015, or equivalent standards set by the Canadian Standards Association (CSA) in 2010. The regulation also specifies the types of fuels that can be burnt and has provisions around the sale and installation of outdoor wood boilers. For more information on the regulation, see: https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/regulations/solid-fuel-burning-domestic-appliance-regulation.

The Provincial Wood Stove Exchange Program encourages residents to change out their older, smoky wood stoves for low-emission appliances including new CSA-/EPA-certified clean-burning wood stoves. Between 2016 and 2018, wood stove change-out programs were carried out in the Bulkley Valley-Lakes District, Prince George and Vanderhoof.

The Province has supported several community-led initiatives within the Central Interior Air Zone between 2016 and 2018. A few highlights include:

- the 2017 door-to-door residential wood burning survey conducted in Vanderhoof to inform future air quality initiatives (https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/vanderhoof_wood-burning_appliance_survey_results-2017.pdf);
- the North Central Clean Air Forum 2018 hosted by the Prince George Airshed Roundtable (https://www.pgairquality.com/uploads/North_Central_Clean_Air_Forum_Summary_Report_2018%20(1).pdf); and
- within the Village of Valemount, early planning to form an air quality working group as a step towards implementing air quality initiatives in the community.

For additional information on community-led action within the Central Interior Air Zone, please see the following webpages:

- Bulkley Valley-Lakes District Airshed Management Society: https://cleanairplan.ca/the-airshed-management-society/
- Prince George Air Improvement Roundtable (PGAIR): https://www.pgairquality.com/
- Quesnel: https://quesnelairshed.wordpress.com/contact-us/
- Williams Lake Air Quality Roundtable: https://breatheasywilliamslake.org/roundtable/

A description of other activities underway in B.C. air zones can be found in the “Air Zone Management Response for British Columbia” (see: www.gov.bc.ca/bcairquality).

Appendix I – Approach to Identify Wildfire-influenced Data

Summertime air quality in British Columbia is periodically influenced by wildfire smoke – from local fires as well as long-range transport from outside of the province. The wildfire season in B.C. typically occurs between May and September, when warm and dry conditions prevail.

A myriad of different pollutants is emitted from wildfires. These include $PM_{2.5}$ and gases such as nitrogen oxides and volatile organic compounds that can react in the atmosphere to form ground-level ozone and additional $PM_{2.5}$.

Given that smoke-affected areas may be extensive, and that smoke may linger for days before being fully dispersed from an airshed, the current analysis has focussed on those periods when wildfire smoke may have contributed to an exceedance of the CAAQS levels for ground-level ozone or $PM_{2.5}$. Criteria used to flag and evaluate wildfire-influenced data included the following:

- 24-hour $PM_{2.5}$ concentrations in excess of the CAAQS level of 28 $\mu g/m^3$ and/or 8-hour daily maximum ozone concentrations in excess of the CAAQS level of 63 ppb between May and September;
- Wildfires of interest identified based on data from the B.C. Wildfire Management Branch;
- Smoky Skies bulletins issued by the Ministry to notify the public of rapidly changing smoke conditions;
- NASA satellite images showing smoke impacts over the region; and
- Multiple monitoring sites in the area of concern showing elevated pollutant levels, suggesting a common source or contributing source.

Wildfire-influenced data were excluded from the calculation of air zone management levels. Excluded data are as summarized in Appendix II.

Appendix II – Wildfire-influenced Data in the Central Interior Air Zone (2016-2018)

Ozone and $PM_{2.5}$ data from 2016-2018 for the Central Interior Air Zone were evaluated based on the criteria set out in Appendix I for TF/EE influences. Various pieces of evidence were used to support identification of wildfire-influenced periods. These included the following:

- Wildfires of note – either due to size or proximity to populated areas – are tracked by the BC Wildfire Service (see: https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary).
    - 2016 was below-average in terms of the amount of land burned (0.10 million hectares.
    - In contrast, 2017 (1.22 million hectares) and 2018 (1.35 million hectares ha) were record-breaking years in terms of area of land burned.
    - Several large fires burned in the interior of B.C. in the summers of 2017 and 2018 (see Table II-1 for example). The smoke impacts due to these fires was at times widespread and affected air quality in B.C. and beyond.
- Days flagged as wildfire-influenced (Table II-2) coincided with Smoky Skies Bulletins issued by the Ministry of Environment and Climate Change Strategy.
- Satellite images during this period (see Figures II-1 to II-4) provide additional information on both the number of wildfires and the spatial extent of wildfire smoke in and adjacent to the Central Interior Air Zone.

Table II-1. Examples of notable wildfires in the central interior during 2018.[6]

Date Discovered	Size (ha)	Geographic Location	Description
2017-07-06	191,865	Elephant Hill	Large area spanning near Ashcroft to near B.C. Highway 24 at north end
2017-07-06	5,700	Gustafsen fire	Just west of 100 Mile House
~2017-07-07	545,151	Chilcotin Plateau	Complex of nearly 20 separate fires on Chilcotin Plateau
~2017-07-07	241,160	Hanceville Complex	Complex of fires around Hanceville, Riske Creek, Alexis Creek and surrounding areas
~2017-07-07	31,181	Central Cariboo Complex	Complex of fires around Williams Lake, Soda Creek and surrounding areas
~2017-07-07	33,018	West Chilcotin Complex	Complex of fires that included the 7,368 ha Precipice fire 52 km east of Bella Coola

[6] https://www2.gov.bc.ca/gov/content/safety/wildfire-status/about-bcws/wildfire-history/wildfire-season-summary

Table II-1 continued

Date Discovered	Size (ha)	Geographic Location	Description
2018-07-27	92,412	Fraser Complex - Shovel Lake	6.7 km northwest of Endako; caused by equipment use
2018-07-30	20,813	Fraser Complex-Chutanli Lake	11 km northeast of Tatelkuz Lake; caused by equipment use
2018-07-30	10,2602	Fraser Complex-Tezzeron Lake	106 km northwest of Vanderhoof; lightning-caused
2018-07-31	79,394	Tweedsmuir Complex – Ramsey Creek	Tweedsmuir Provincial Park; lightning-caused
2018-08-01	21,381	Fraser Complex - Island Lake	Adjacent to Island Lake; lightning-caused
2018-08-01	44,817	Tweedsmuir Complex - Dean River	Tweedsmuir Provincial Park; lightning-caused
2018-08-01	12,322	Baezaeko Complex-Shag Creek	Lightning-caused
2018-08-01	8,278	Baezako Complex-Blackwater River	Lightning-caused
2018-08-01	13,433	Baezako Complex-North Baezaeko	South of Kluskoil Lake Park, 85 km west of Quesnel; lightning-caused
2018-08-03	60,631	Tweedsmuir Complex – Pondosy Bay	Tweedsmuir Provincial Park; lightning-caused

Table II-2 – Wildfire-influenced $PM_{2.5}$ data from 2016-2018. All dates shown coincided with a Smoky Skies Bulletin for the area of interest, with exception of those highlighted in red.

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Burns Lake	2017-08-08	28.9
Burns Lake	2017-08-09	35.2
Burns Lake	2017-08-10	31.4
Burns Lake	2017-08-11	34.3
Burns Lake	2018-07-31	31.1
Burns Lake	2018-08-10	71.7
Burns Lake	2018-08-11	70.2
Burns Lake	2018-08-12	40.8
Burns Lake	2018-08-14	79
Burns Lake	2018-08-16	178.2

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Burns Lake	2018-08-19	33.9
Burns Lake	2018-08-20	83.6
Burns Lake	2018-08-21	883
Burns Lake	2018-08-22	251.2
Burns Lake	2018-08-27	71.7
Burns Lake	2018-09-02	51
Burns Lake	2018-09-04	51.7
Burns Lake	2018-09-05	51.2
Burns Lake	2018-09-06	57.1
Burns Lake	2018-09-07	60

Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Houston	2017-08-08	34.7
Houston	2017-08-09	59
Houston	2017-08-10	63.3
Houston	2017-08-11	48.8
Prince George Plaza 400	2017-07-11	29.6
Prince George Plaza 400	2017-07-18	70.6
Prince George Plaza 400	2017-07-19	48.4
Prince George Plaza 400	2017-07-20	28.7
Prince George Plaza 400	2017-07-29	31.7
Prince George Plaza 400	2017-08-11	53.8
Prince George Plaza 400	2017-08-12	282.5
Prince George Plaza 400	2017-08-13	135.9
Prince George Plaza 400	2017-08-15	34.5
Prince George Plaza 400	2017-08-16	48.1
Prince George Plaza 400	2017-08-17	68
Prince George Plaza 400	2017-08-21	41.6
Prince George Plaza 400	2018-07-25	28.1
Prince George Plaza 400	2018-07-26	30.8
Prince George Plaza 400	2018-07-27	31.4
Prince George Plaza 400	2018-07-28	32.1
Prince George Plaza 400	2018-07-29	28.3
Prince George Plaza 400	2018-08-02	30.5
Prince George Plaza 400	2018-08-07	56.7
Prince George Plaza 400	2018-08-08	102.9
Prince George Plaza 400	2018-08-09	130.5
Prince George Plaza 400	2018-08-10	112.6
Prince George Plaza 400	2018-08-11	45.8
Prince George Plaza 400	2018-08-13	92.2
Prince George Plaza 400	2018-08-15	59.8
Prince George Plaza 400	2018-08-16	151.6
Prince George Plaza 400	2018-08-17	366.2
Prince George Plaza 400	2018-08-18	206.9
Prince George Plaza 400	2018-08-19	128.5
Prince George Plaza 400	2018-08-21	60
Prince George Plaza 400	2018-08-22	276.2
Prince George Plaza 400	2018-08-23	120.1
Prince George Plaza 400	2018-08-24	102.4

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Prince George Plaza 400	2018-08-25	88.7
Prince George Plaza 400	2018-08-28	66.7
Prince George Plaza 400	2018-08-29	36.8
Prince George Plaza 400	2018-08-30	33.3
Prince George Plaza 400	2018-08-31	41.1
Prince George Plaza 400	2018-09-01	49.3
Prince George Plaza 400	2018-09-02	39.6
Prince George Plaza 400	2018-09-06	30
Quesnel	2017-07-09	49.9
Quesnel	2017-07-10	31.4
Quesnel	2017-07-11	64.3
Quesnel	2017-07-12	42.9
Quesnel	2017-07-15	62.9
Quesnel	2017-07-18	81.1
Quesnel	2017-07-19	67.5
Quesnel	2017-07-20	64.2
Quesnel	2017-07-26	28.9
Quesnel	2017-07-29	46.9
Quesnel	2017-07-30	35
Quesnel	2017-08-03	34.6
Quesnel	2017-08-11	99.9
Quesnel	2017-08-12	173.4
Quesnel	2017-08-13	115.3
Quesnel	2017-08-14	127.1
Quesnel	2017-08-15	66.5
Quesnel	2017-08-16	73.9
Quesnel	2017-08-17	129.1
Quesnel	2017-08-18	48.2
Quesnel	2017-08-19	33.7
Quesnel	2017-08-20	53.5
Quesnel	2017-08-21	42.4
Quesnel	2017-08-30	63
Quesnel	2017-08-31	53.8
Quesnel	2017-09-01	80.9

Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Quesnel	2017-09-02	38.5
Quesnel	2017-09-06	40.8
Quesnel	2017-09-07	70
Quesnel	2018-07-30	35.6
Quesnel	2018-08-07	96.1
Quesnel	2018-08-08	88.2
Quesnel	2018-08-09	89.9
Quesnel	2018-08-10	136.3
Quesnel	2018-08-11	45.5
Quesnel	2018-08-13	81.8
Quesnel	2018-08-14	118.5
Quesnel	2018-08-15	112.7
Quesnel	2018-08-16	161
Quesnel	2018-08-17	296.3
Quesnel	2018-08-18	185.9
Quesnel	2018-08-19	77.4
Quesnel	2018-08-20	32.3
Quesnel	2018-08-21	43.6
Quesnel	2018-08-22	215.5
Quesnel	2018-08-23	179.4
Quesnel	2018-08-24	157.1
Quesnel	2018-08-25	88.3
Quesnel	2018-08-28	53.3
Quesnel	2018-08-31	45.1
Quesnel	2018-09-01	62.4
Quesnel	2018-09-03	36.8
Smithers	2017-08-09	42.2
Smithers	2017-08-10	62.6
Smithers	2017-08-11	37.1
Smithers	2018-08-20	34.8
Smithers	2018-08-21	127.5
Smithers	2018-09-06	35.4
Valemount	2017-07-10	29.5
Valemount	2017-07-11	59.2
Valemount	2017-07-12	41.5
Valemount	2017-07-18	50.9
Valemount	2017-07-19	75.9

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Valemount	2017-07-20	32.3
Valemount	2017-08-12	36.6
Valemount	2017-08-13	75.9
Valemount	2017-08-14	42.3
Valemount	2017-08-15	45.9
Valemount	2017-08-16	52.4
Valemount	2017-08-17	65.7
Valemount	2017-08-18	35.1
Valemount	2017-09-06	34.6
Valemount	2017-09-07	75.8
Valemount	2017-09-08	47.7
Valemount	2018-08-07	62.1
Valemount	2018-08-08	56.4
Valemount	2018-08-09	43.4
Valemount	2018-08-10	111.8
Valemount	2018-08-11	116.1
Valemount	2018-08-14	80.6
Valemount	2018-08-15	103.3
Valemount	2018-08-16	92.2
Valemount	2018-08-17	148.3
Valemount	2018-08-18	126.4
Valemount	2018-08-19	33.4
Valemount	2018-08-21	59.6
Valemount	2018-08-22	83.7
Valemount	2018-08-23	180.8
Valemount	2018-08-24	133.6
Valemount	2018-08-25	113.5
Vanderhoof	2017-07-18	52.2
Vanderhoof	2017-07-19	33.9
Vanderhoof	2017-08-11	68.4
Vanderhoof	2017-08-12	91.9
Vanderhoof	2017-09-07	43.6
Vanderhoof	2018-08-02	32.2
Vanderhoof	2018-08-06	29.9
Vanderhoof	2018-08-07	67.5
Vanderhoof	2018-08-08	86
Vanderhoof	2018-08-09	99.1

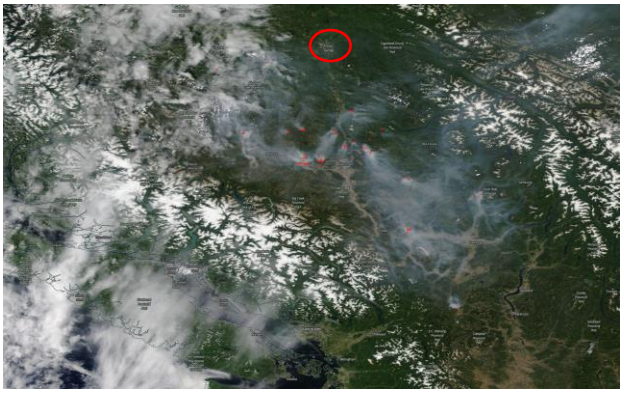
Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Vanderhoof	2018-08-10	78.2
Vanderhoof	2018-08-11	104.1
Vanderhoof	2018-08-12	124.4
Vanderhoof	2018-08-13	73
Vanderhoof	2018-08-14	145.4
Vanderhoof	2018-08-15	194.8
Vanderhoof	2018-08-16	291.3
Vanderhoof	2018-08-17	232.5
Vanderhoof	2018-08-18	124.8
Vanderhoof	2018-08-19	105.8
Vanderhoof	2018-08-20	101.7
Vanderhoof	2018-08-21	220.7
Vanderhoof	2018-08-22	631.5
Vanderhoof	2018-08-23	98.3
Vanderhoof	2018-08-24	151
Vanderhoof	2018-08-25	55.5
Vanderhoof	2018-08-27	39.5
Vanderhoof	2018-08-28	79.9
Vanderhoof	2018-08-29	47.1
Vanderhoof	2018-08-30	57.1
Vanderhoof	2018-08-31	60.6
Vanderhoof	2018-09-01	91.4
Vanderhoof	2018-09-02	39.7
Vanderhoof	2018-09-07	38.8
Williams Lake	2017-07-08	138.8
Williams Lake	2017-07-09	205.5
Williams Lake	2017-07-10	73.1
Williams Lake	2017-07-11	273.3
Williams Lake	2017-07-12	122.4
Williams Lake	2017-07-13	62.8
Williams Lake	2017-07-14	83
Williams Lake	2017-07-15	194.3
Williams Lake	2017-07-16	293.8
Williams Lake	2017-07-17	270.6
Williams Lake	2017-07-18	260.3
Williams Lake	2017-07-19	287.6

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Williams Lake	2017-07-20	128.4
Williams Lake	2017-07-25	31.8
Williams Lake	2017-07-26	50.4
Williams Lake	2017-07-27	29
Williams Lake	2017-07-28	37.1
Williams Lake	2017-07-29	57.9
Williams Lake	2017-07-30	59.7
Williams Lake	2017-08-02	43.2
Williams Lake	2017-08-03	124.5
Williams Lake	2017-08-06	95
Williams Lake	2017-08-07	38.2
Williams Lake	2017-08-09	74.9
Williams Lake	2017-08-10	72.5
Williams Lake	2017-08-11	104.3
Williams Lake	2017-08-12	92.5
Williams Lake	2017-08-13	77.4
Williams Lake	2017-08-14	200.1
Williams Lake	2017-08-15	93.4
Williams Lake	2017-08-16	96.1
Williams Lake	2017-08-17	87.4
Williams Lake	2017-08-18	31.5
Williams Lake	2017-08-19	34.7
Williams Lake	2017-08-20	43.7
Williams Lake	2017-08-31	64.8
Williams Lake	2017-09-01	80.7
Williams Lake	2017-09-02	30.3
Williams Lake	2017-09-05	36.8
Williams Lake	2017-09-06	88
Williams Lake	2017-09-07	119.4
Williams Lake	2018-08-06	37.9
Williams Lake	2018-08-09	35.8
Williams Lake	2018-08-10	103.5
Williams Lake	2018-08-11	112.4
Williams Lake	2018-08-12	117.2
Williams Lake	2018-08-13	101.3
Williams Lake	2018-08-14	97.1

Table II-2 (continued)

Location	Date	Daily $PM_{2.5}$ ($\mu g/m^3$)
Williams Lake	2018-08-15	115.4
Williams Lake	2018-08-16	140
Williams Lake	2018-08-17	527.5
Williams Lake	2018-08-18	292.3
Williams Lake	2018-08-19	124.4
Williams Lake	2018-08-21	29.6
Williams Lake	2018-08-22	110.5
Williams Lake	2018-08-23	218.6
Williams Lake	2018-08-24	138.9
Williams Lake	2018-08-25	66.8
Williams Lake	2018-09-01	28.6
Williams Lake	2018-09-03	32.6



a. July 8, 2017

b. July 15, 2017

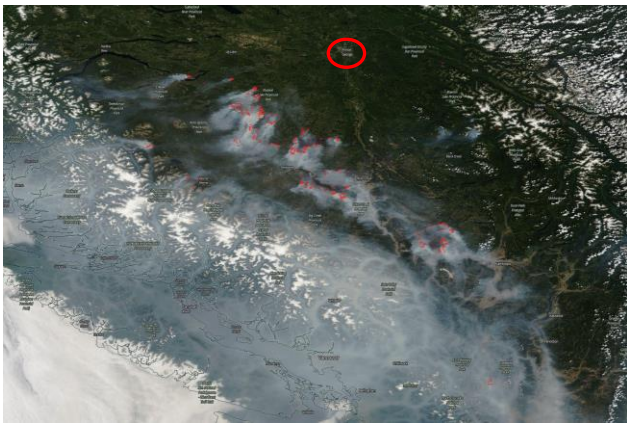
c. July 19, 2017

d. July 29, 2017

e. July 30, 2017

f. Aug. 3, 2017

Figure II-1. Satellite images from Jul. 8, 15, 19, 29-30 and Aug. 3, 2018, showing smoke (grey plumes) over the province, including the Central Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-1(a) identifies approximate location of Prince George on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.



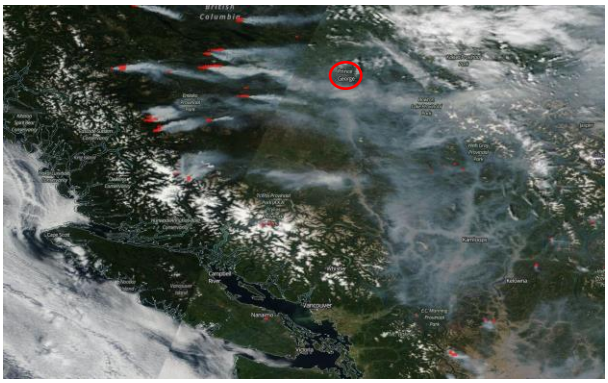
a. Aug. 5, 2017

b. Aug. 8, 2018

c. Aug. 17, 2017

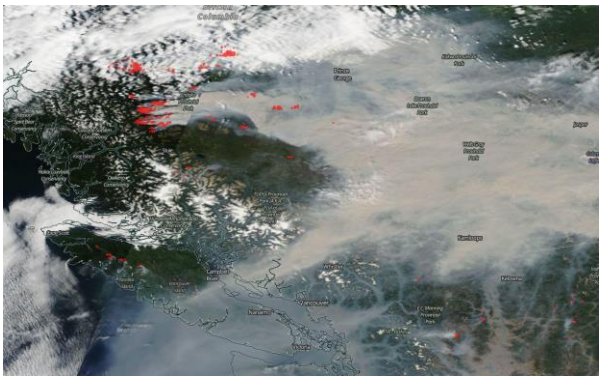
d. Aug. 29, 2017

Figure II-2. Satellite images from Aug. 5, 8, 17 and 29, 2017, showing smoke (grey plumes) over the province, including the Central Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-2(a) identifies approximate location of Prince George on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.

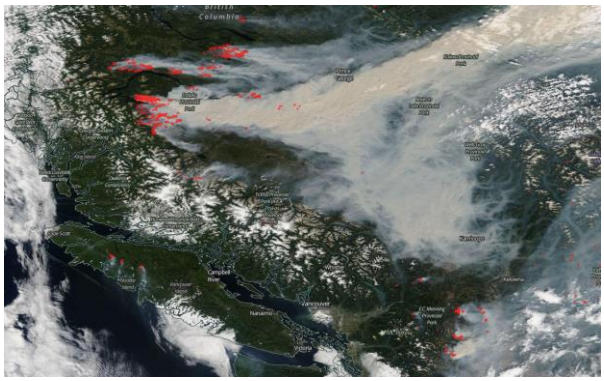


a. Aug. 7, 2018

b. Aug. 10, 2018

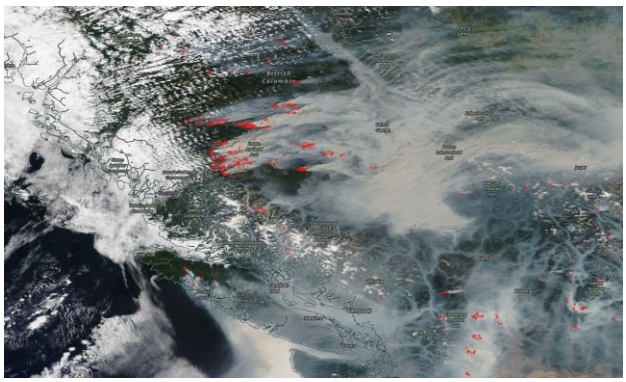


c. Aug. 14, 2018



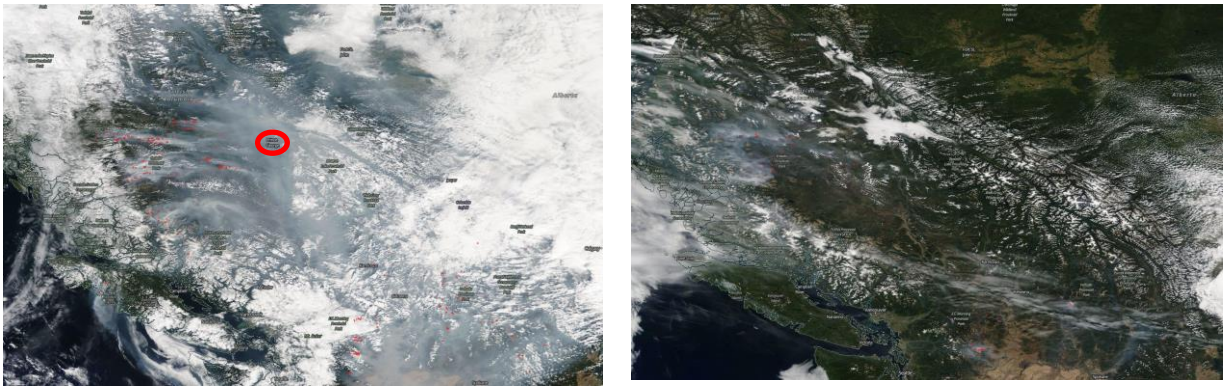
d. Aug. 17, 2018

e. Aug. 20, 2018



f. Aug. 22, 2018

Figure II-3. Satellite images from Aug. 7, 10, 14, 17, 20 and 22, 2018, showing smoke (grey plumes) over the province, including the Central Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-3(a) identifies approximate location of Prince George on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.



a. Aug. 24, 2018 b. Sept. 4, 2018

Figure II-4. Satellite images from Aug. 24 and Sept 4, 2018, showing smoke (grey plumes) over the province, including the Central Interior Air Zone. Red dots indicate fires and thermal anomalies. Large red circle in Figure II-4(a) identifies approximate location of Prince George on map. Source of images: NASA Worldview Snapshots at: https://worldview.earthdata.nasa.gov/.