Air

Status of Sulphur Dioxide in B.C. (2020-2022)

British Columbia operates a network of air monitoring stations that measure sulphur dioxide and other air pollutants. This indicator reports on the concentration of sulphur dioxide from 2020-2022 and compares it to the Canadian Ambient Air Quality Standards established by the Canadian Council of Ministers of the Environment.

Sulphur Dioxide (SO_2): Canadian Ambient Air Quality Standard

SO_2 levels are calculated using **two** statistical forms called the annual and the 1-hour metrics. The Canadian Ambient Air Quality Standard value for SO_2 annual is **5 parts per billion** and the standard value for SO_2 1-hour is **70** parts per billion

SO_2 standards are achieved when annual levels are $\leq$5 ppb and 1-hour levels are $\leq$70 ppb.

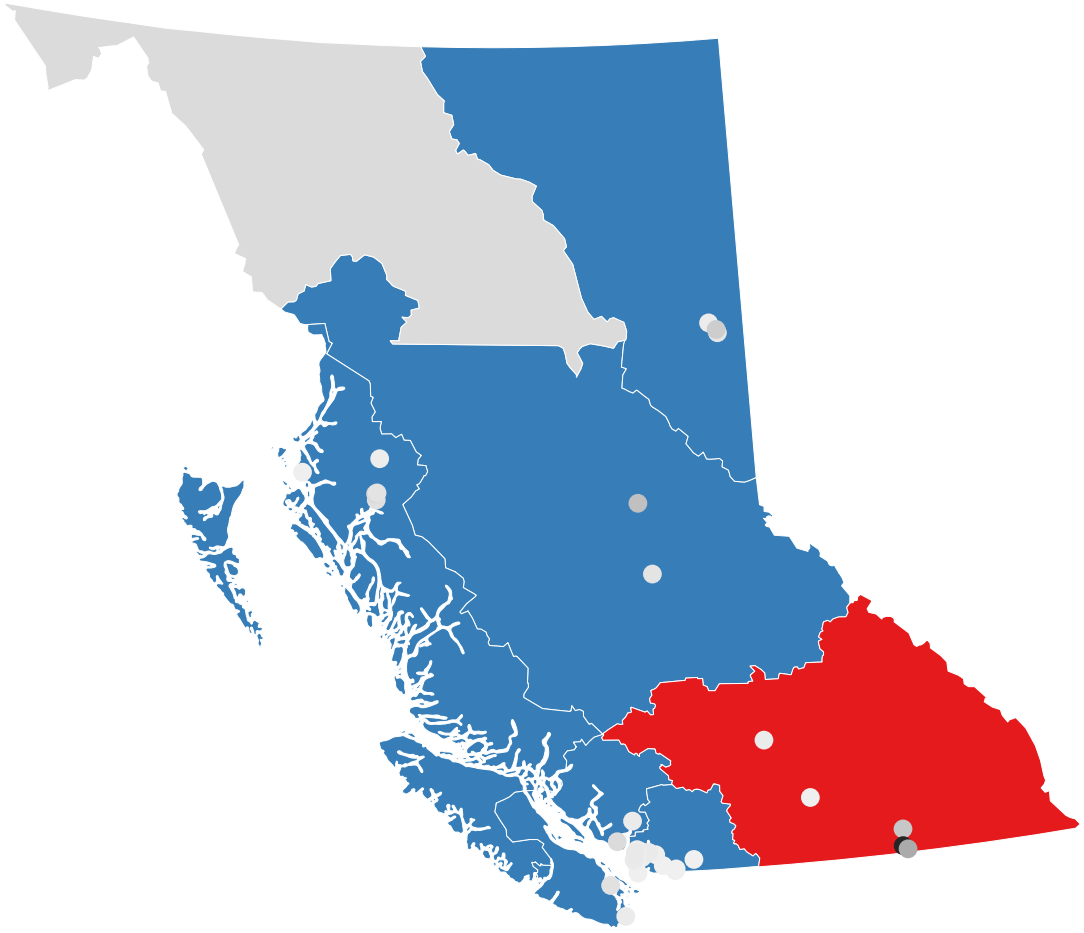
What is an Air Zone?

British Columbia is divided up into seven air zones, which are areas that typically exhibit similar air quality characteristics, issues, and trends.

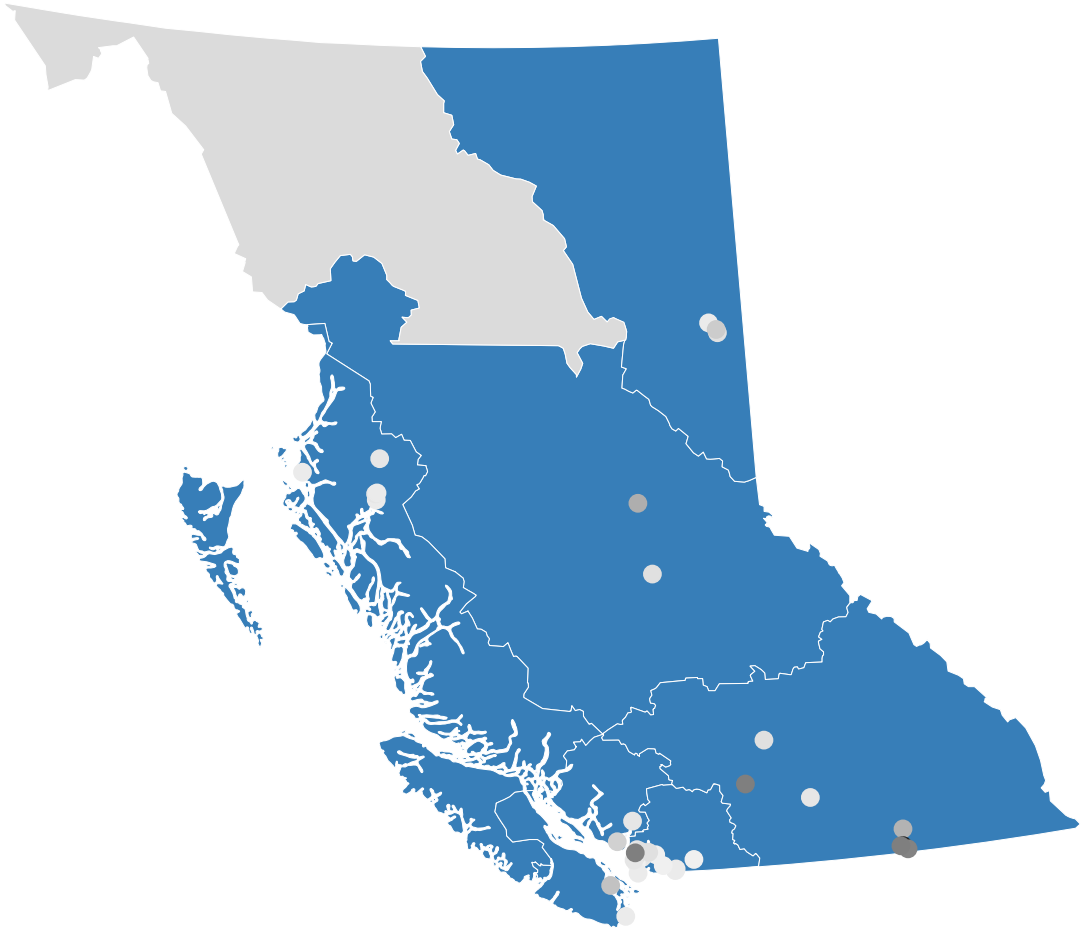
- **Sulphur dioxide is a colourless gas with a pungent odour at higher concentrations.** The largest sources of SO_2 in B.C. include the oil and gas sector, the pulp and paper sector, and metal smelters. Marine vessels and off-road diesel vehicles are additional sources of SO_2.[1]
- **Sulphur dioxide can be harmful to humans and the environment.** Short-term exposure to elevated sulphur dioxide can cause difficulties breathing for asthmatics. The long-term impacts of sulphur dioxide exposure are not well understood. Increased sulphur dioxide in the environment can affect vegetation and aquatic ecosystems through acid rain deposition [1].
- **Sulphur dioxide levels met the Canadian Ambient Air Quality Standards at 92 percent of assessed monitoring stations in B.C.** There are two standards for SO_2—an annual standard and a 1-hour standard (see sidebar). The annual standard was met at 35 of the 38 stations (92%) for which valid data was obtained, while the 1-hour standard was met at 35 of the 36 stations (97%) with sufficient data for analysis.
- **Sulphur dioxide levels met both of the Canadian Ambient Air Quality Standards in five of B.C.'s seven air zones.** The Coastal, Central Interior, Georgia Strait, Northeast, and Lower Fraser Valley air zones met both the annual and 1-hour standards. The Southern Interior exceeded the 1-hour standard. Currently, there are no air monitoring stations in the Northwest air zone.
- **Sulphur dioxide levels are used to set management levels for each air zone.** Four management levels (green, yellow, orange, and red) are each associated with a suite of actions that become more rigorous as sulphur dioxide levels approach the Canadian Ambient Air Quality Standards.

The maps and chart below summarise the Canadian Ambient Air Quality Standard achievement status for sulphur dioxide in B.C. air zones, as well as both the annual and 1-hour SO_2 levels at individual monitoring stations. Summaries are given for each monitoring station where sufficient data was available for the 2020-2022 reporting period.

Status of 1-hour SO_2 Levels in B.C. Air Zones (2020-2022)



Status of Annual SO_2 Levels in B.C. Air Zones (2020-2022)



SO_2 Metrics for Air Monitoring Stations within B.C. Air Zones (2020-2022)

More about the Canadian Ambient Air Quality Standard sulphur dioxide metrics:

- There are two Canadian Ambient Air Quality Standards for sulphur dioxide (SO_2). The statistical form of the SO_2 annual metric is the average over a single calendar year of all 1-hour average average concentration of SO_2. The statistical form of the SO_2 1-hour metric is the average of the annual 99th percentile of the daily maximum 1-hour average concentrations of SO_2.
- The SO_2 metric for an air zone is the highest SO_2 metric value reported from monitoring stations within the air zone.
- Air quality monitoring stations with at least two years of valid data from 2020-2022 were included in this indicator. Visit Current Air Quality Data for a complete list of air monitoring stations across B.C.
- Criteria for data completeness and sufficiency of the two SO_2 metrics are described in the Guidance Document on Achievement Determination for Canadian Ambient Air Quality Standards for Sulphur Dioxide (2020).

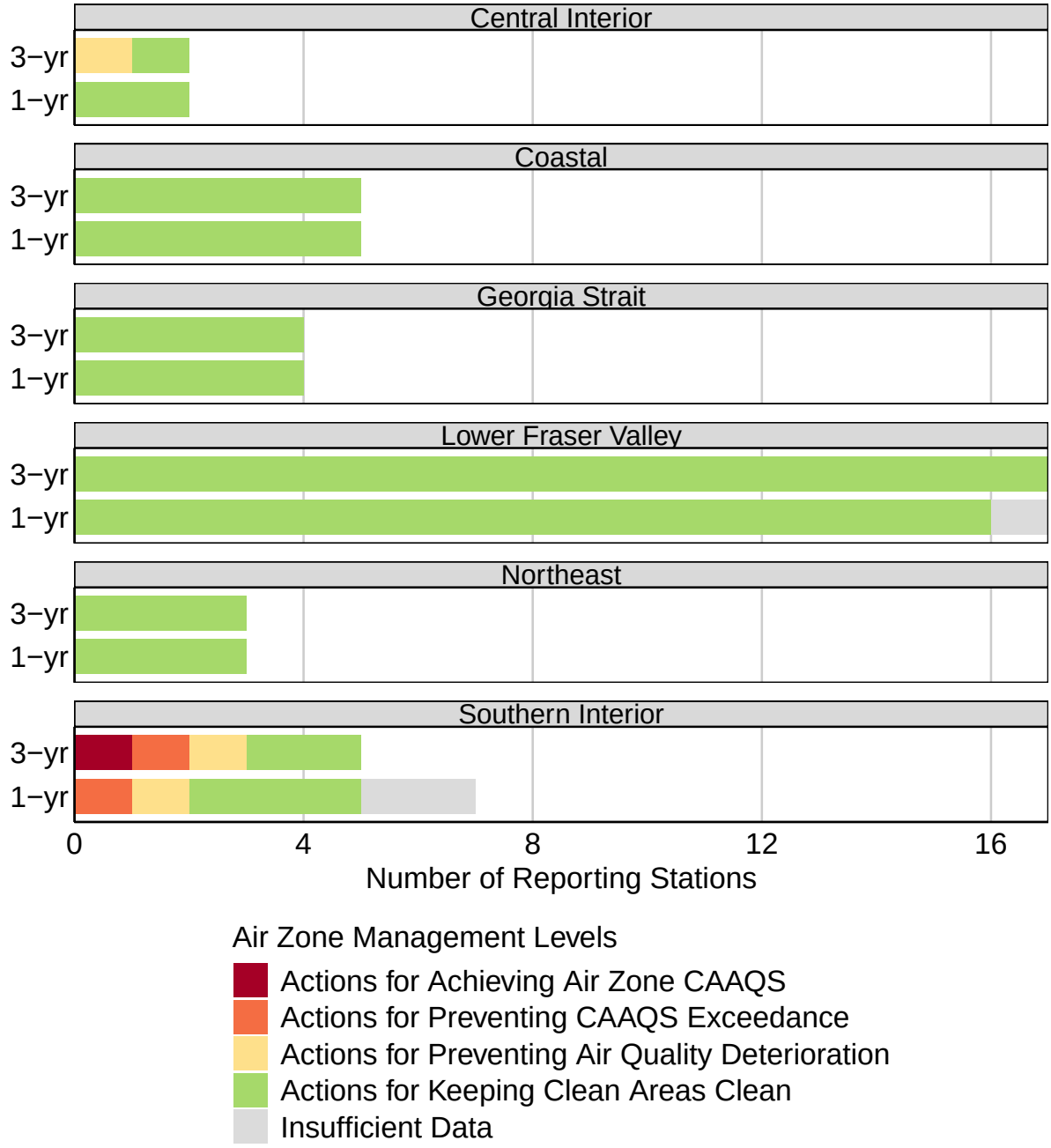
Canada-wide Air Quality Management System

The Air Quality Management System is Canada's approach for protecting air quality. Under the Air Quality Management System, provinces and territories monitor, report and manage local air quality within air zones, with the goal of continuously improving air quality and keeping pollutants below the Canadian Ambient Air Quality Standards.

- There are seven air zones in British Columbia: Coastal, Georgia Strait, Lower Fraser Valley, Southern Interior, Central Interior, Northeast and Northwest.
- The Air Zone Management Framework defines air zone management levels for sulphur dioxide based on the higher of the annual and 1-hour sulphur dioxide levels reported from monitoring stations within the air zone.
- The four management levels are (1) green (actions for keeping clean areas clean); (2) yellow (actions for preventing air quality deterioration); (3) orange (actions for preventing Canadian Ambient Air Quality Standard exceedance); and (4) red (actions for achieving air zone Canadian Ambient Air Quality Standard). Each management level is associated with a suite of actions that become more rigorous as sulphur dioxide levels approach the standard. Actions for each management level are detailed in the Guidance Document on Air Zone Management (2019) (PDF).
- The Southern Interior was the only air zone assigned to a red management level. Central Interior and Northeast air zones were assigned to a yellow management level, and the Coastal, Georgia Strait and Lower Fraser Valley air zones were assigned to a green management level. There are currently no air monitoring stations in the Northwest air zone.

Air Quality Management Levels in B.C. Air Zones

Station-Level Air Quality Management Levels Within Air Zones



Methods

The methods used to develop this indicator—including procedures, data requirements, and calculation of the Canadian Ambient Air Quality Standard sulphur dioxide metrics—are detailed in the Guidance Document on Achievement Determination for Canadian Ambient Air Quality Standards for Sulphur Dioxide (2020) published by the Canadian Council of Ministers of the Environment.

R package and code: We have developed an **R** package to facilitate the calculation of air quality metrics according

to the Canadian Ambient Air Quality Standards. Download the 'rcaaqs' package from GitHub. The source code for repeating the analysis presented on this page is also available on GitHub.

References and Other Useful Links

- Read individual Air Zone reports on the achievement of the Canadian Ambient Air Quality Standards for various parameters in B.C.
- Learn more about the implementation of the Air Quality Management System in British Columbia
- Access B.C.'s real-time data on air pollutants and find locations of all provincial air monitoring stations in B.C.
- BC Lung Association's BC State of the Air Reports
- Canadian Environmental Sustainability Indicators: Air Indicators
- [1]Canadian Smog Science Assessment: Highlights and Key Messages

Data

*By accessing these datasets, you agree to the licence associated with each file, as indicated in parentheses below.

- Indicator data: BC Sulphur Dioxide Canadian Ambient Air Quality Standards 2020-2022 (Open Government Licence - British Columbia)
- BC SO_2 Hourly Data & Air Monitoring Station locations (Open Government Licence - British Columbia)
- BC Air Zones (Open Government Licence - British Columbia)

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Email correspondence to: envreportbc@gov.bc.ca

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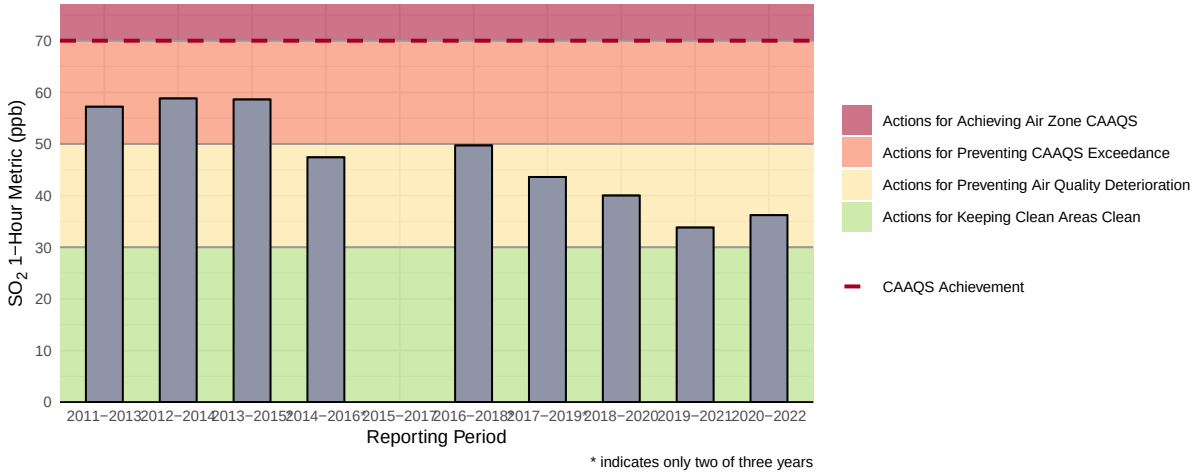
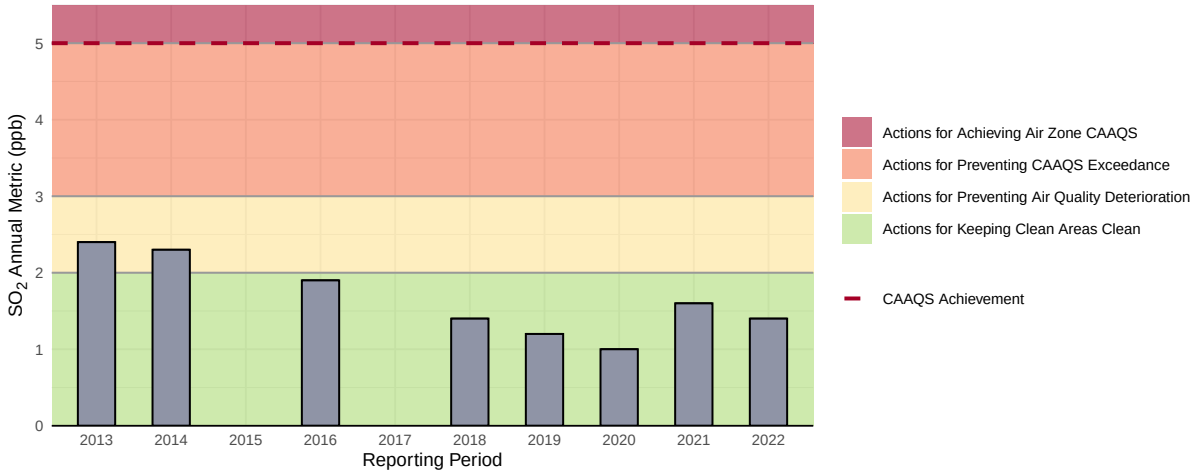
Appendix: Detailed sulphur dioxide Canadian Ambient Air Quality Standard results for each monitoring station within air zones in B.C.

Air Zone: Central Interior
Monitoring Station: Prince George Plaza 400

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 36.2ppb (3 year average)

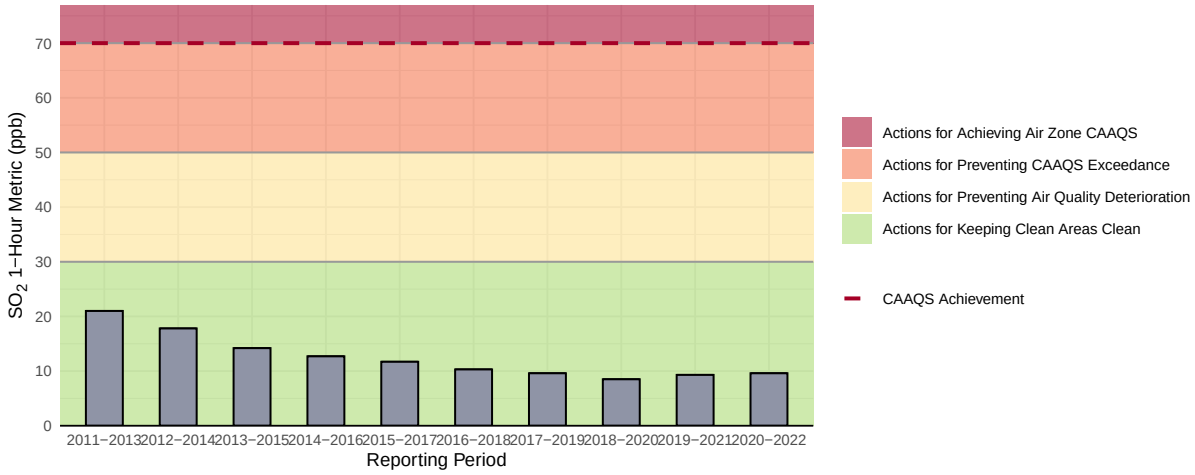


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 1.4ppb (1 year average)

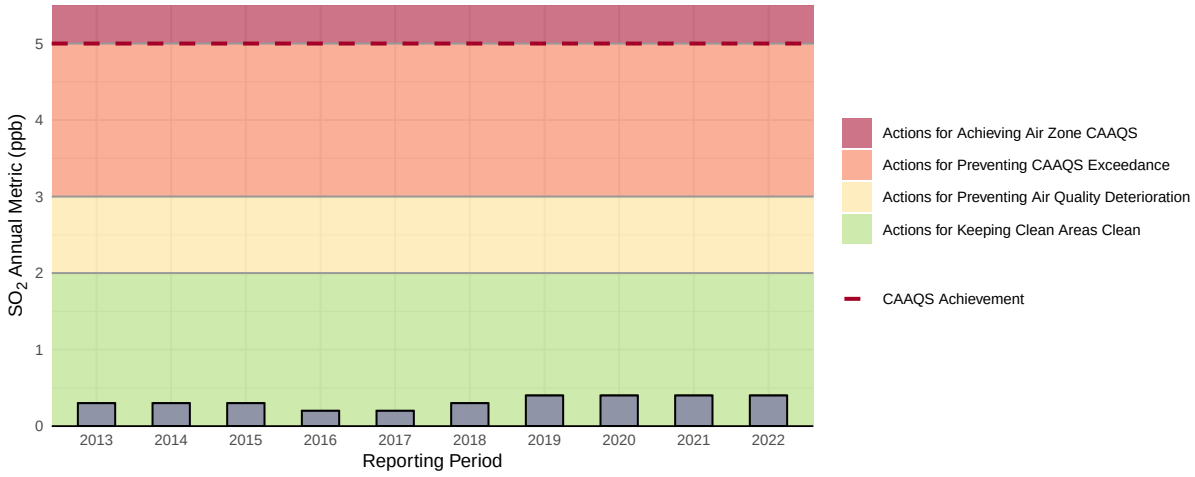


Air Zone: Central Interior
Monitoring Station: Quesnel

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 9.6ppb (3 year average)

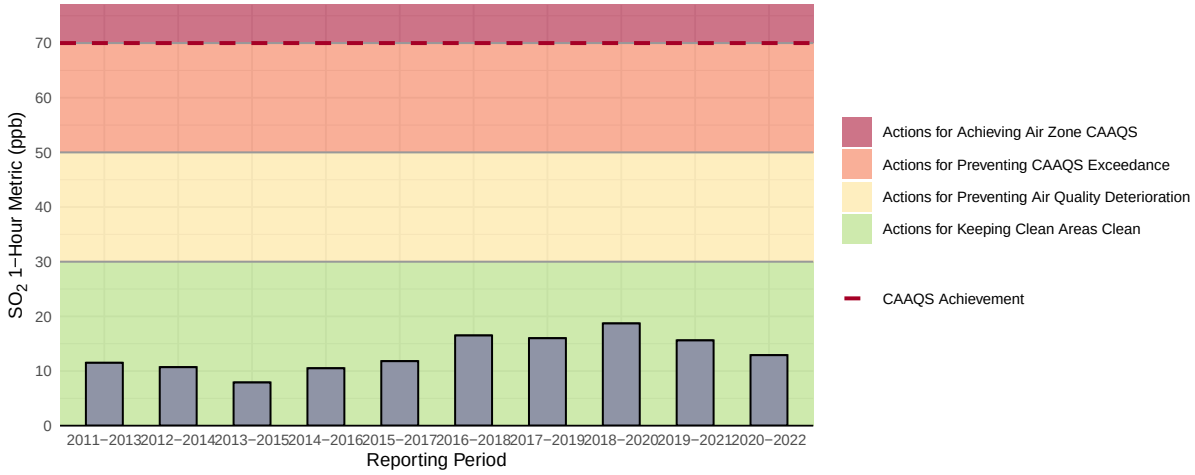


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.4ppb (1 year average)

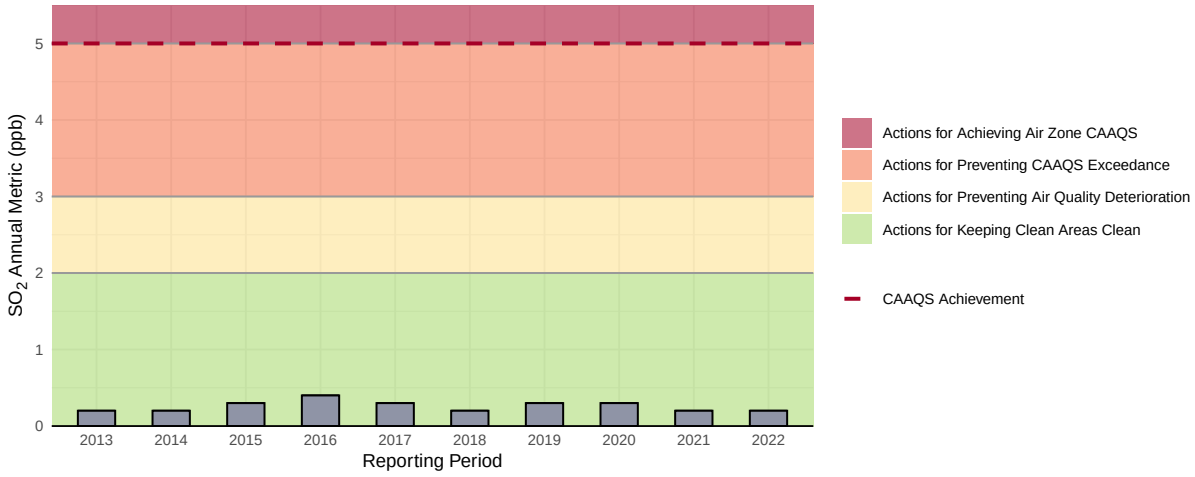


Air Zone: Coastal
Monitoring Station: Kitimat Haisla Village

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 12.9ppb (3 year average)

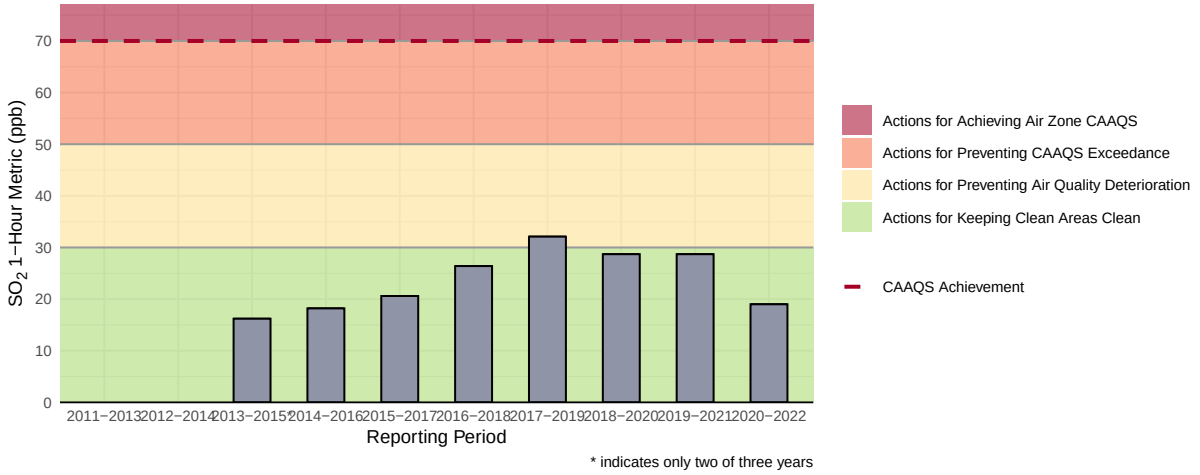


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

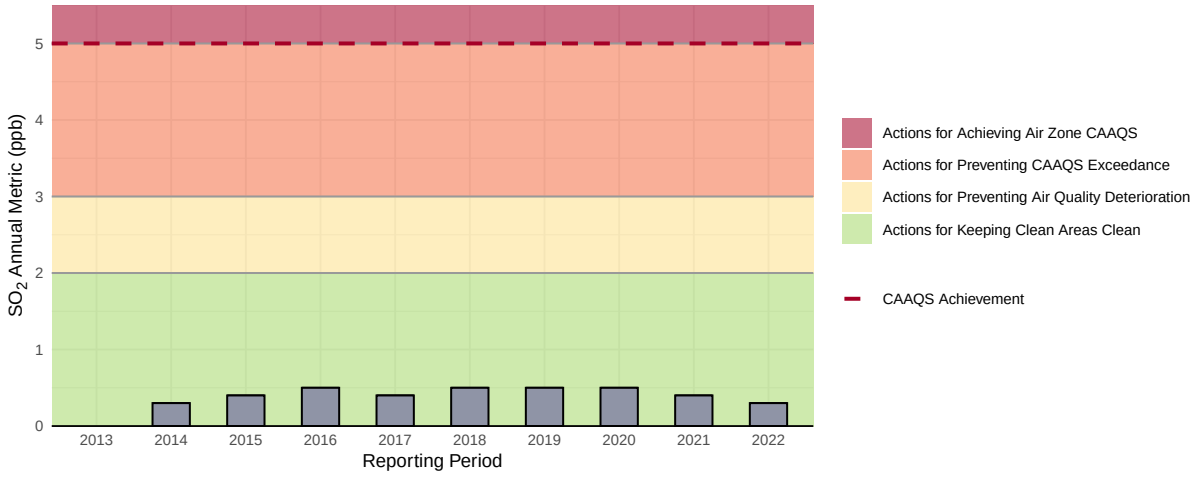


Air Zone: Coastal
Monitoring Station: Kitimat Riverlodge

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 19ppb (3 year average)

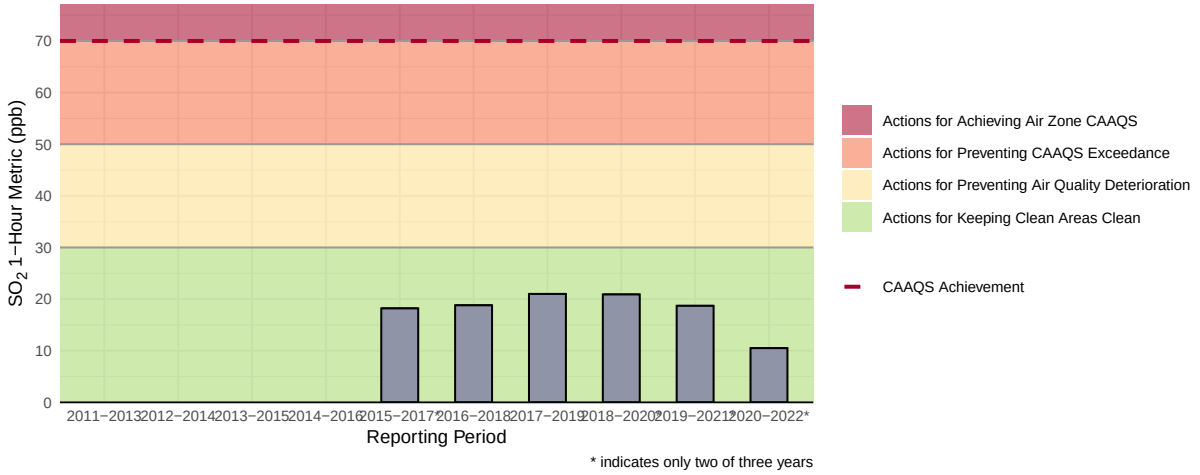


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

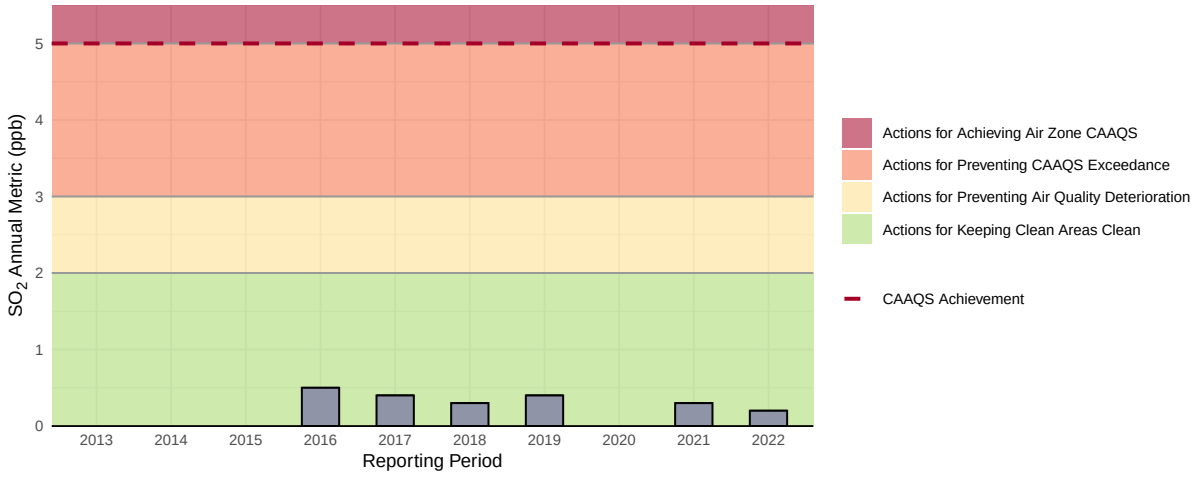


Air Zone: Coastal
Monitoring Station: Kitimat Whitesail

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 10.5ppb (2 year average)

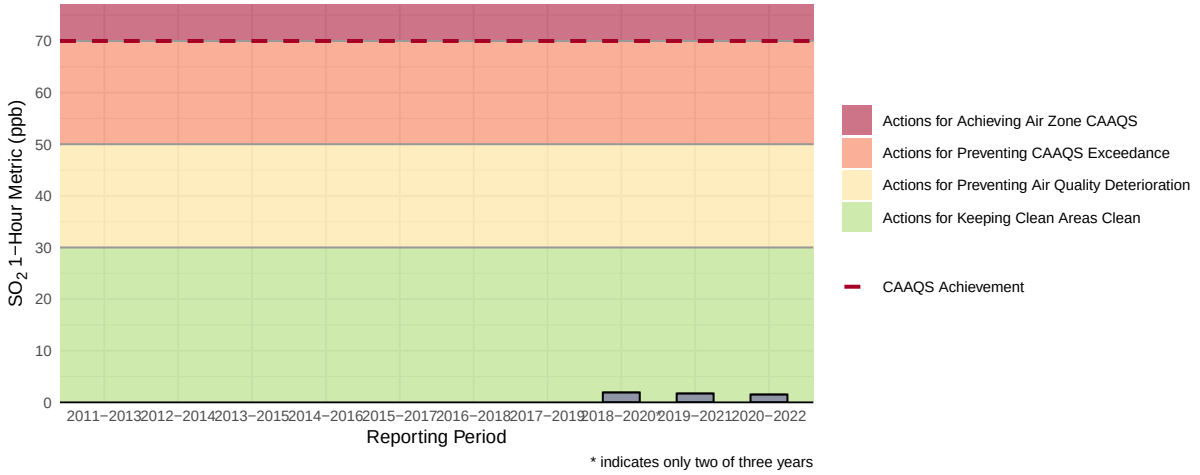


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

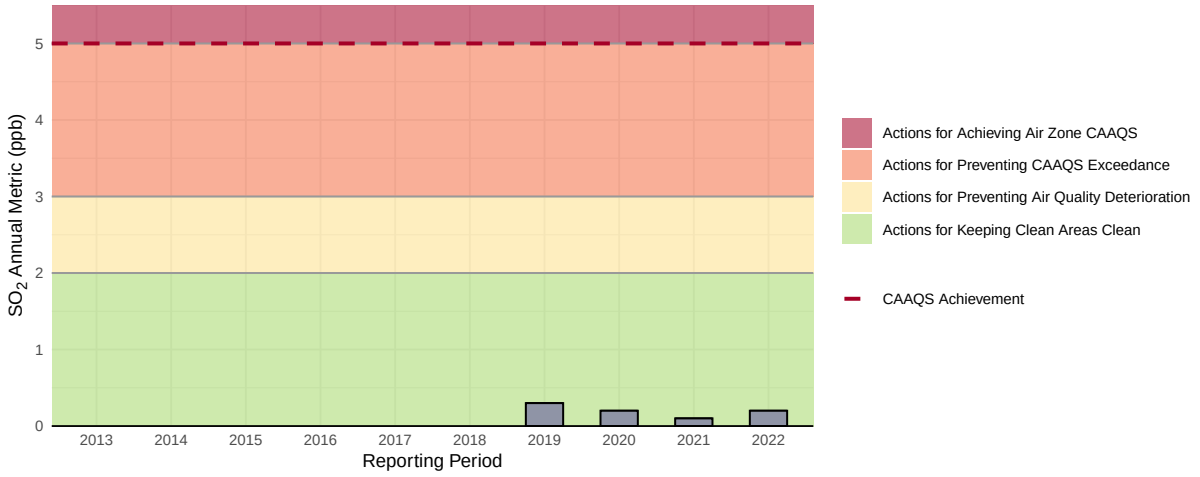


Air Zone: Coastal
Monitoring Station: Prince Rupert Fairview

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.5ppb (3 year average)

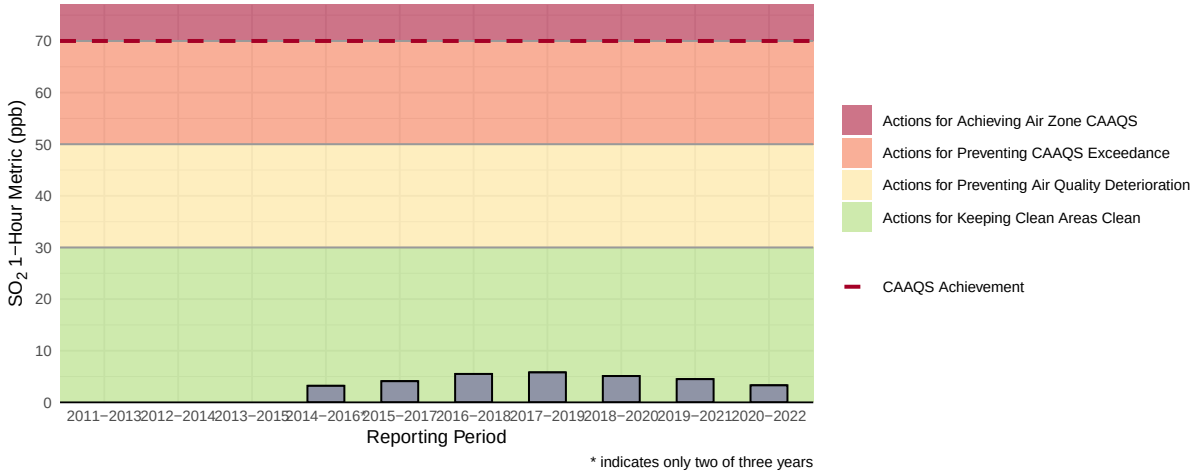


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

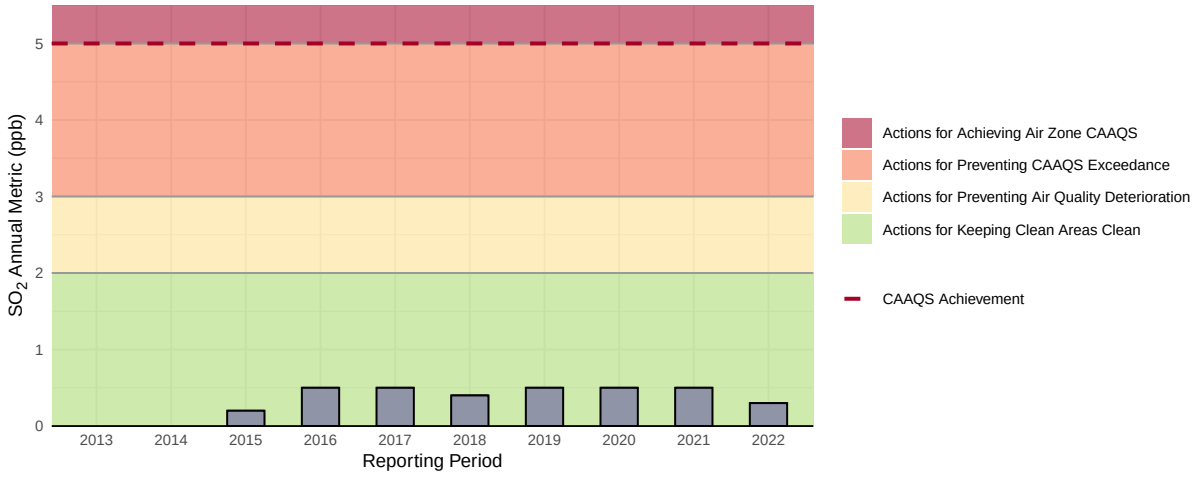


Air Zone: Coastal
Monitoring Station: Terrace Skeena Middle School

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 3.3ppb (3 year average)

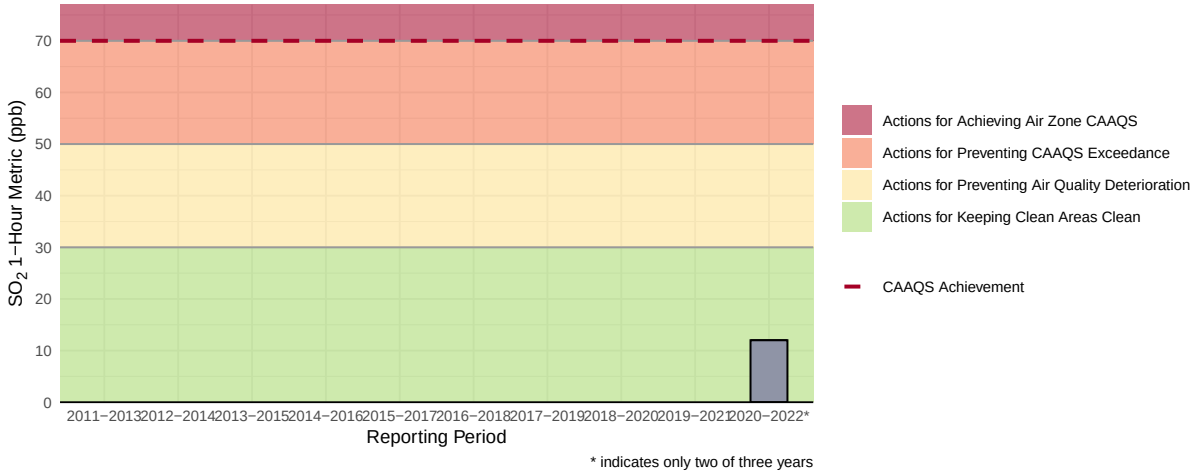


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

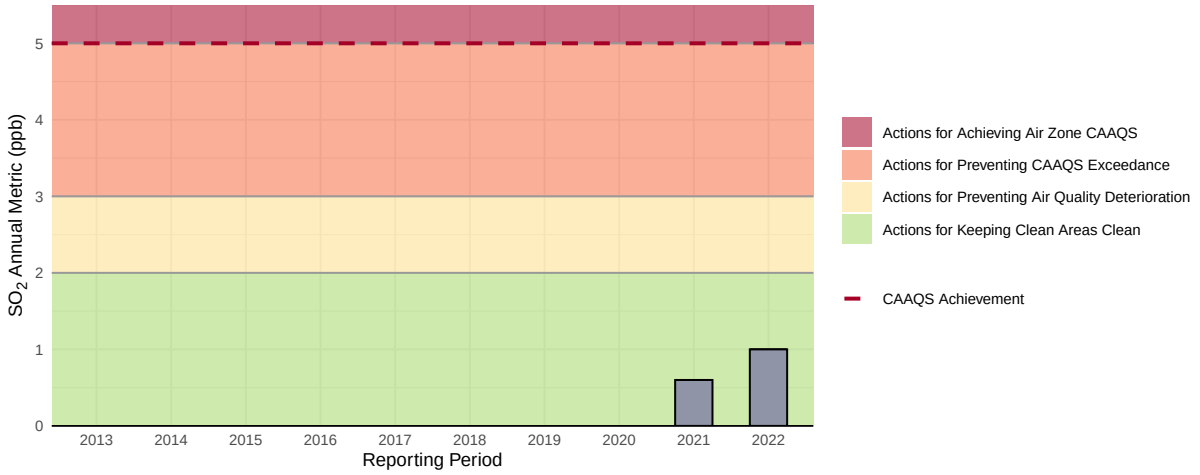


Air Zone: Georgia Strait
Monitoring Station: Crofton Elementary

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 12ppb (2 year average)

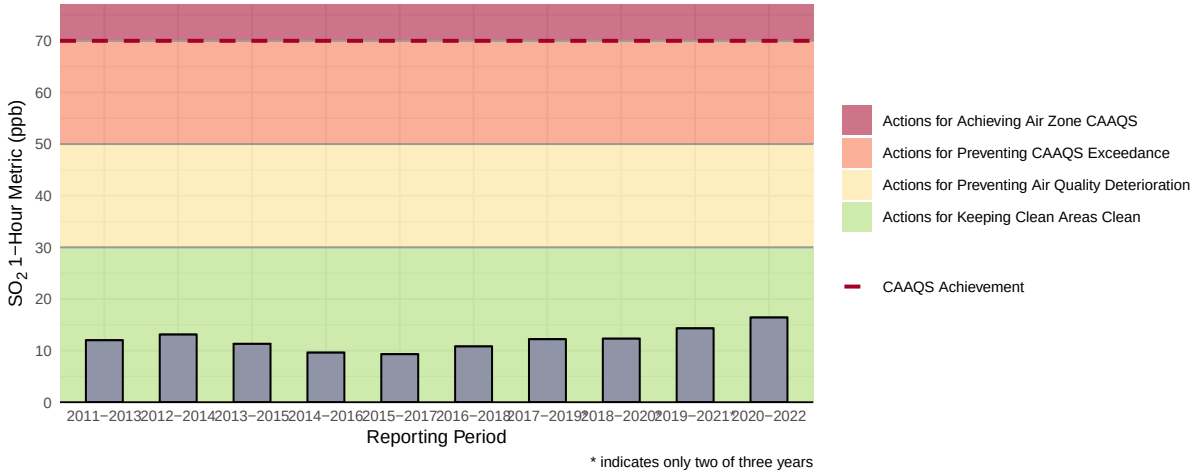


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 1ppb (1 year average)

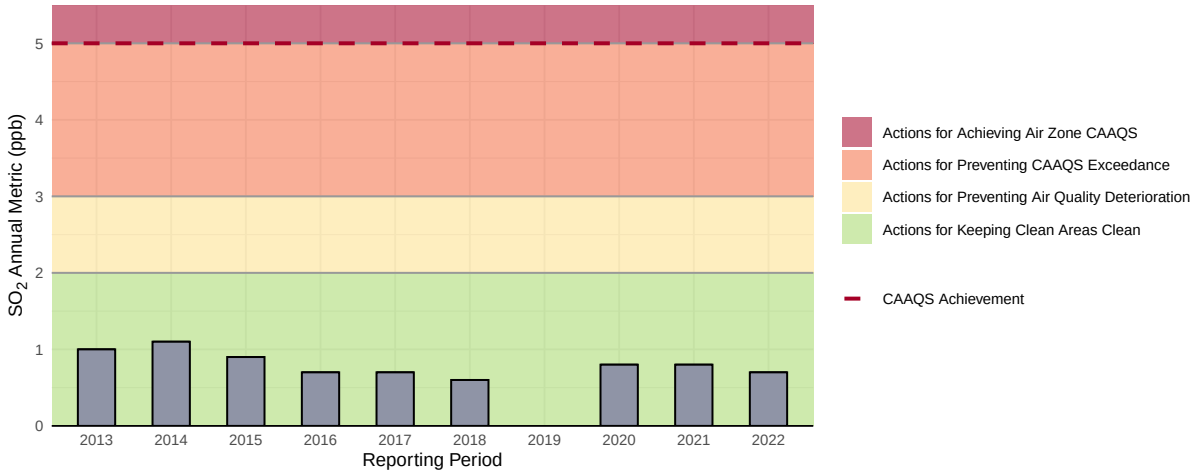


Air Zone: Georgia Strait
Monitoring Station: Langdale Elementary

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 16.4ppb (3 year average)

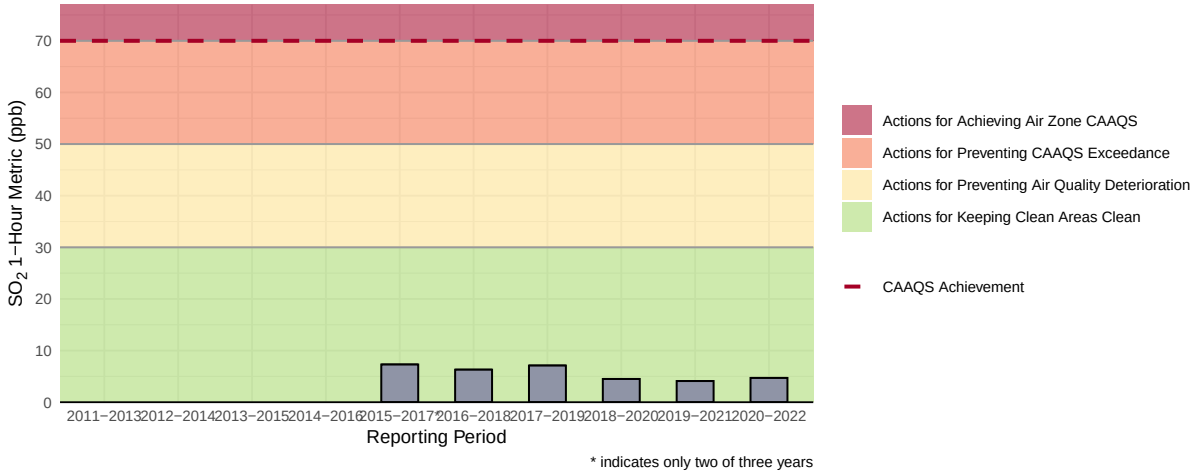


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.7ppb (1 year average)

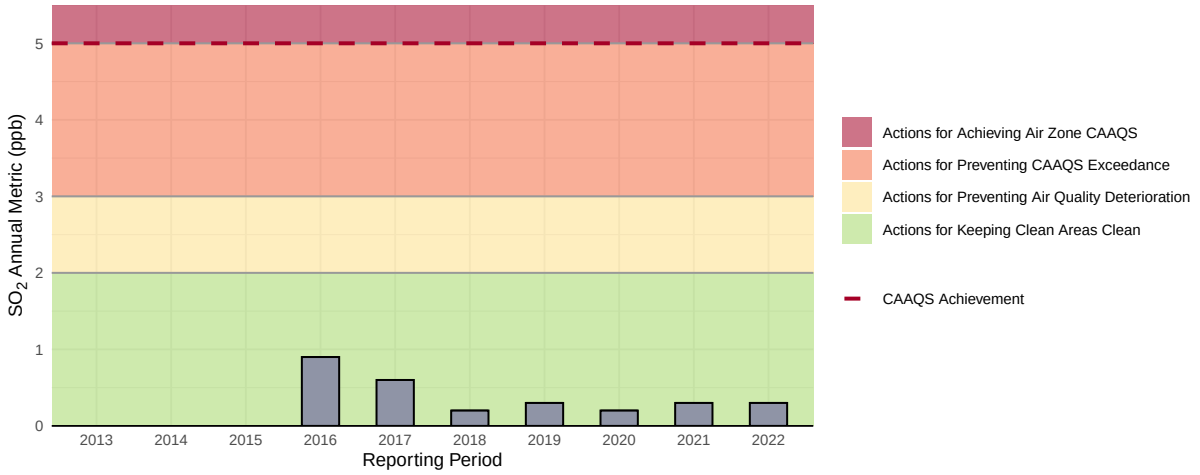


Air Zone: Georgia Strait
Monitoring Station: Squamish Elementary

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 4.7ppb (3 year average)

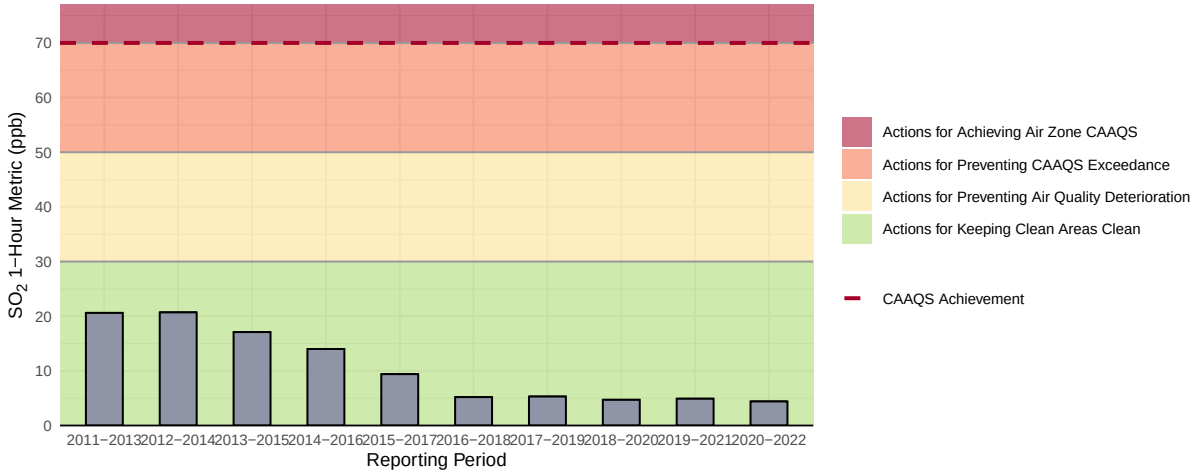


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

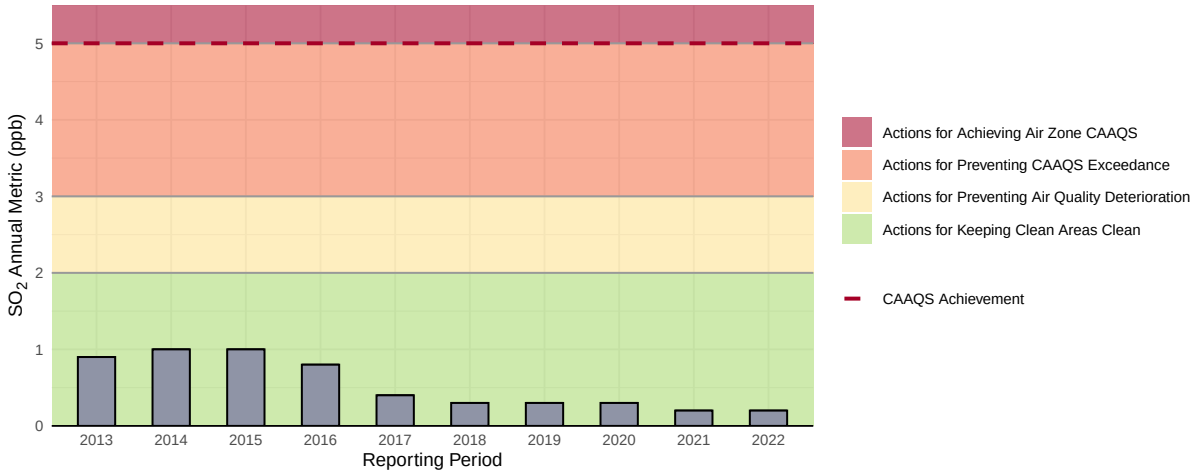


Air Zone: Georgia Strait
Monitoring Station: Victoria Topaz

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 4.4ppb (3 year average)

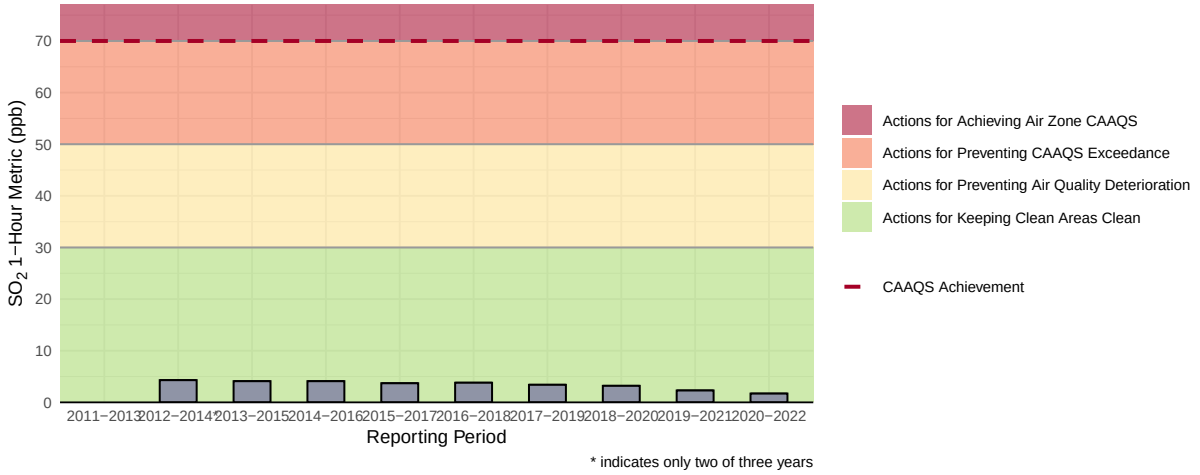


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

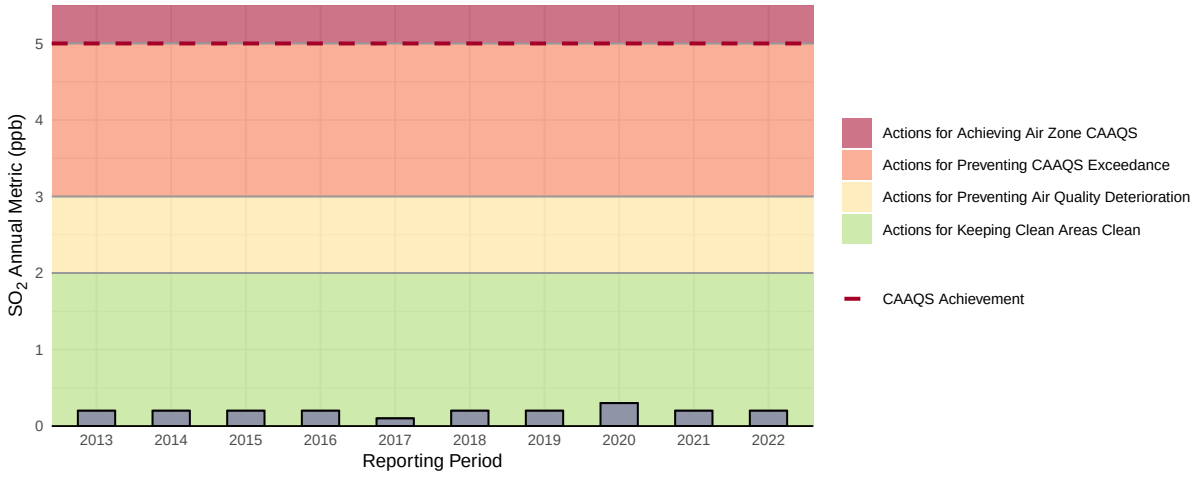


Air Zone: Lower Fraser Valley
Monitoring Station: Abbotsford A Columbia Street

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.7ppb (3 year average)

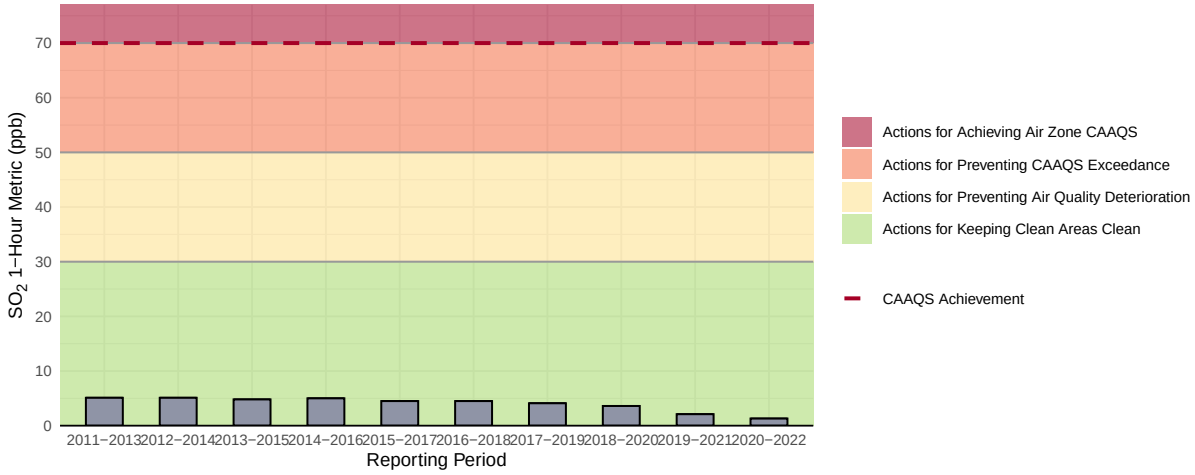


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

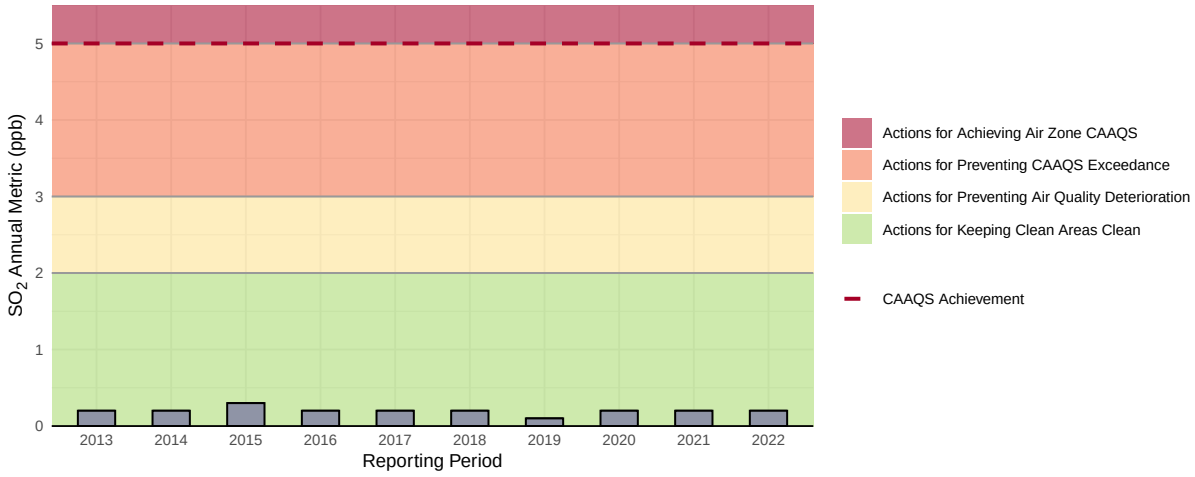


Air Zone: Lower Fraser Valley
Monitoring Station: Abbotsford Central

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.3ppb (3 year average)

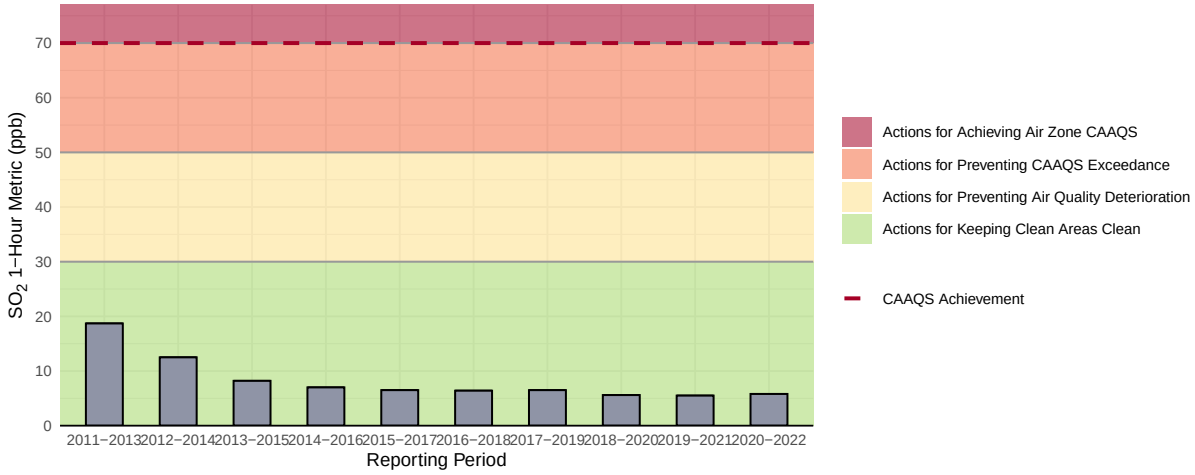


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

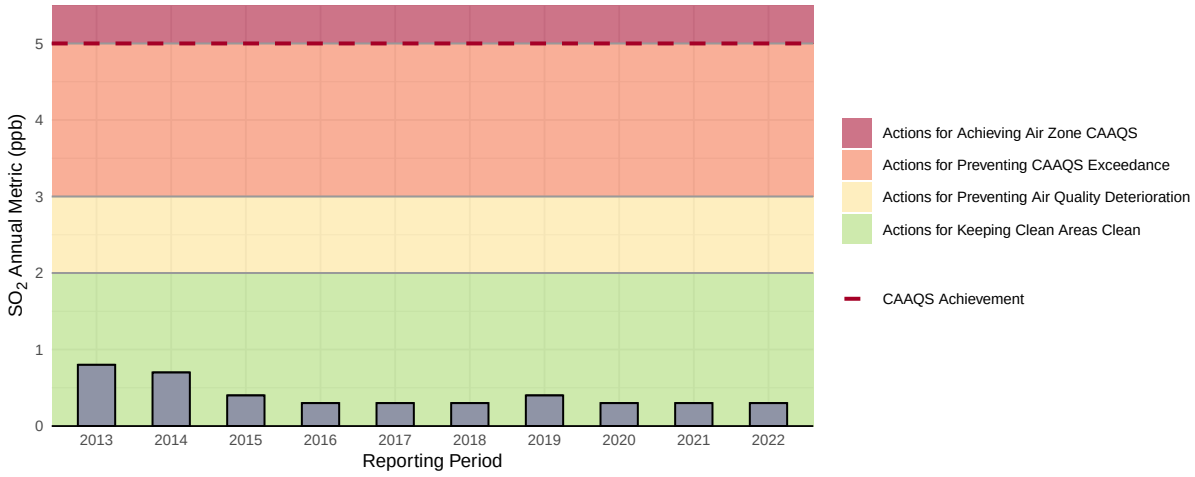


Air Zone: Lower Fraser Valley
Monitoring Station: Burnaby Kensington Park

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 5.8ppb (3 year average)

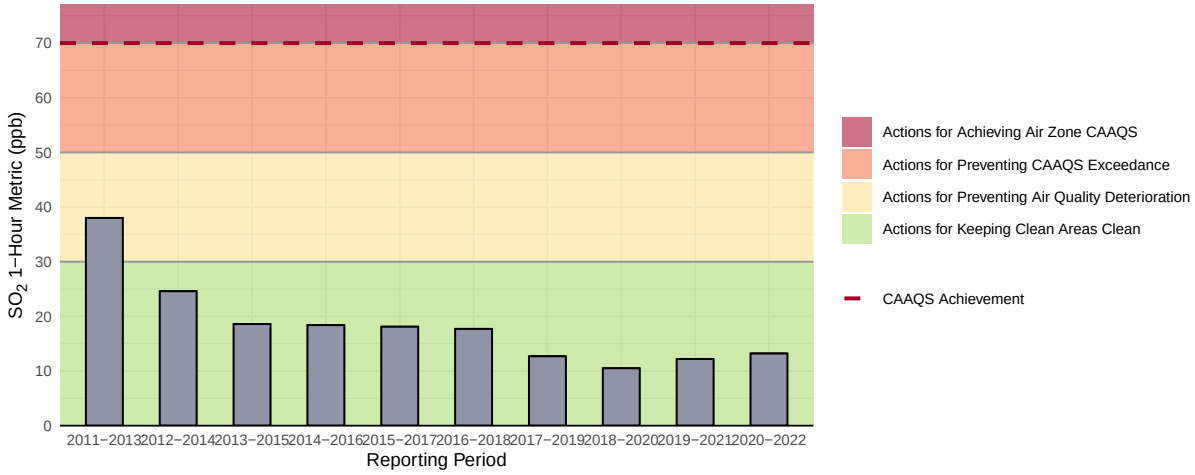


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

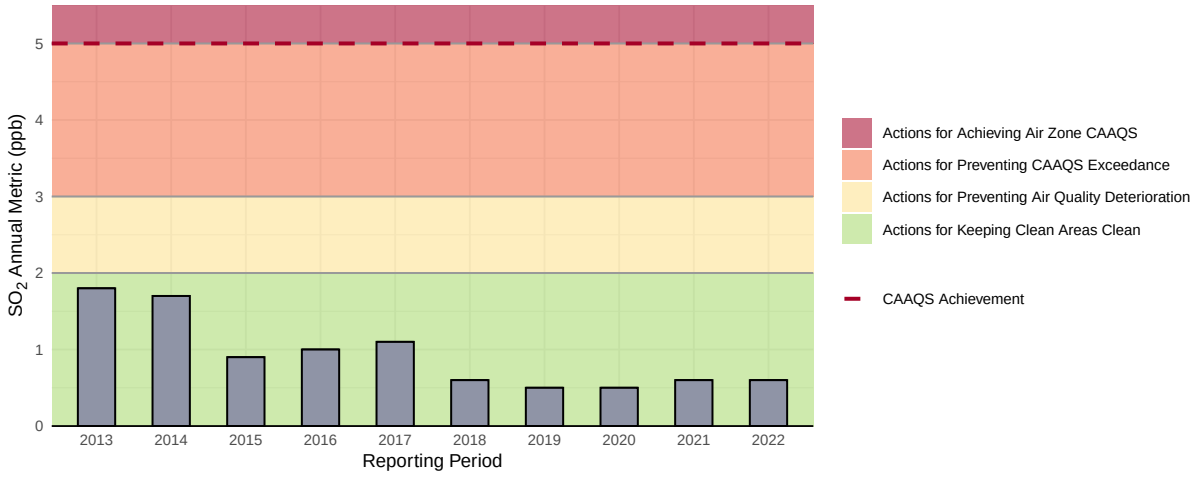


Air Zone: Lower Fraser Valley
Monitoring Station: Burnaby North Eton

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 13.2ppb (3 year average)

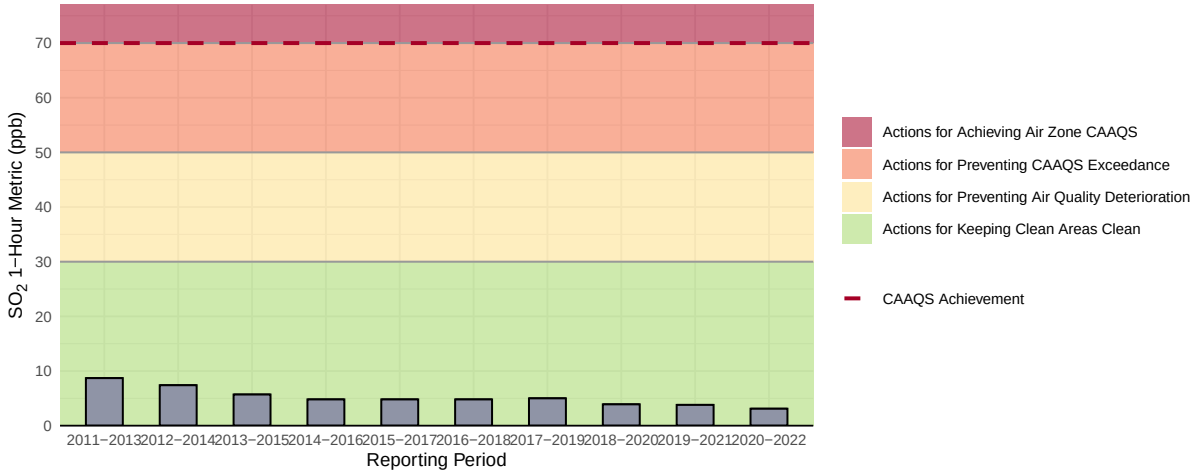


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.6ppb (1 year average)

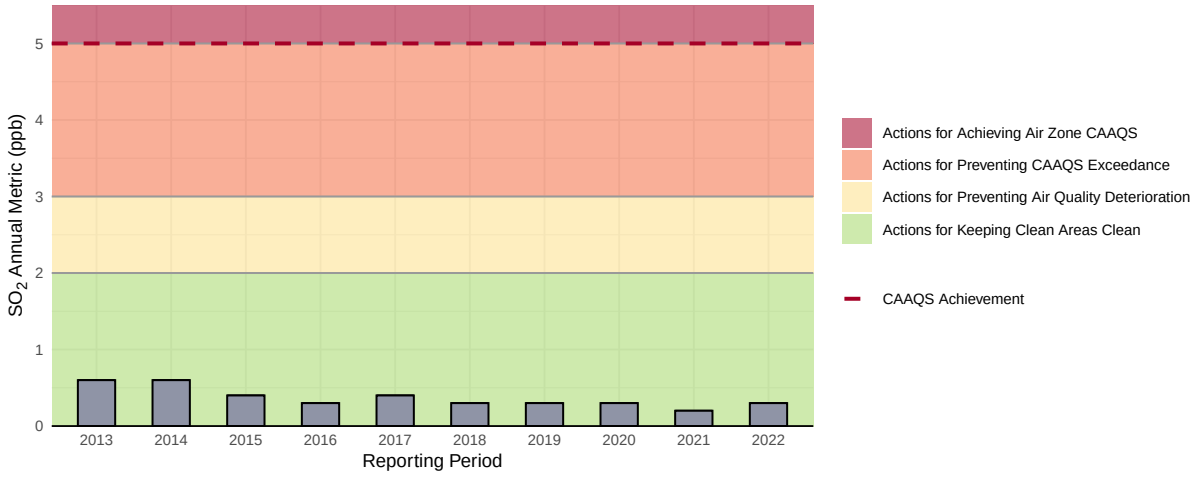


Air Zone: Lower Fraser Valley
Monitoring Station: Burnaby South

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 3.1ppb (3 year average)

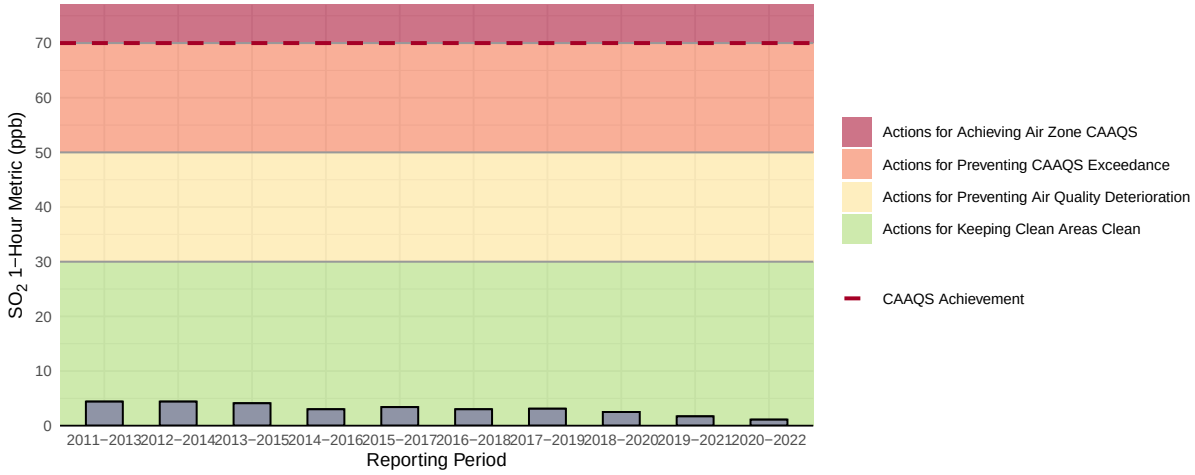


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

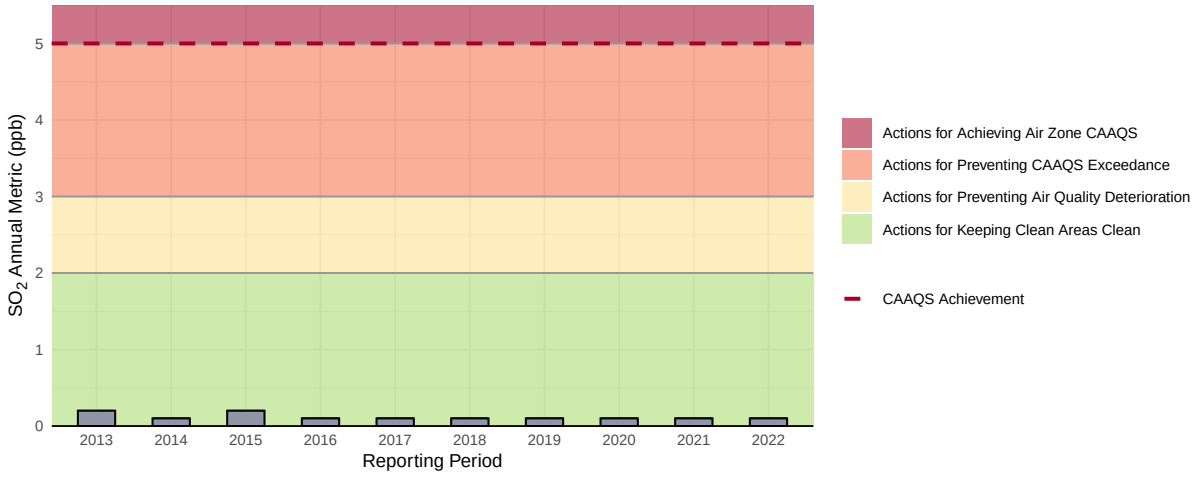


Air Zone: Lower Fraser Valley
Monitoring Station: Chilliwack Airport

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.1ppb (3 year average)

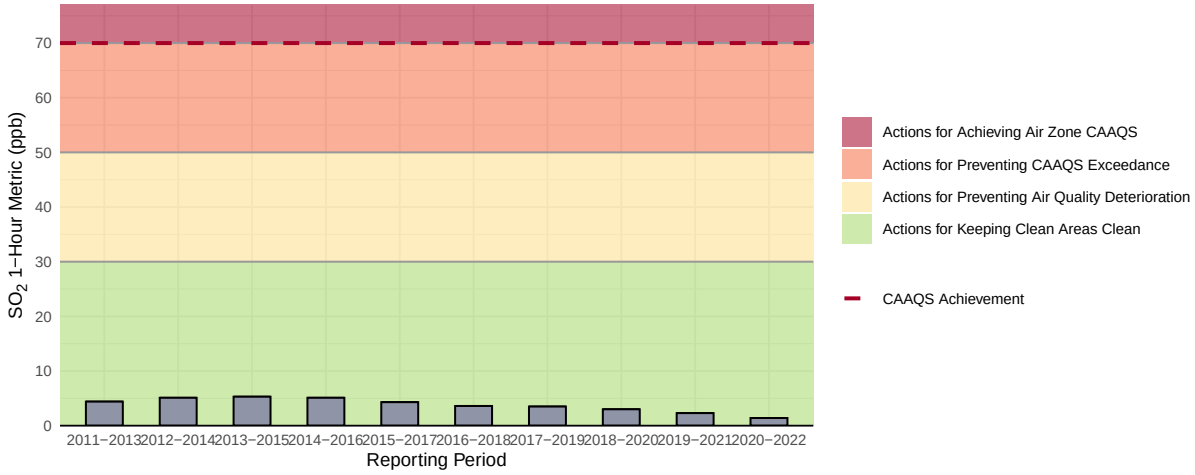


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.1ppb (1 year average)

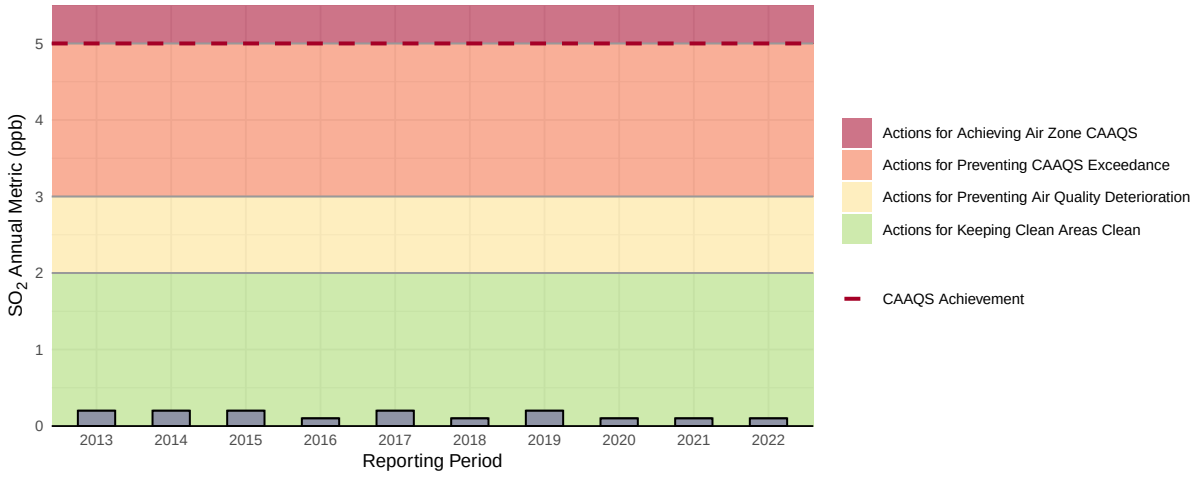


Air Zone: Lower Fraser Valley
Monitoring Station: Langley Central

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.4ppb (3 year average)

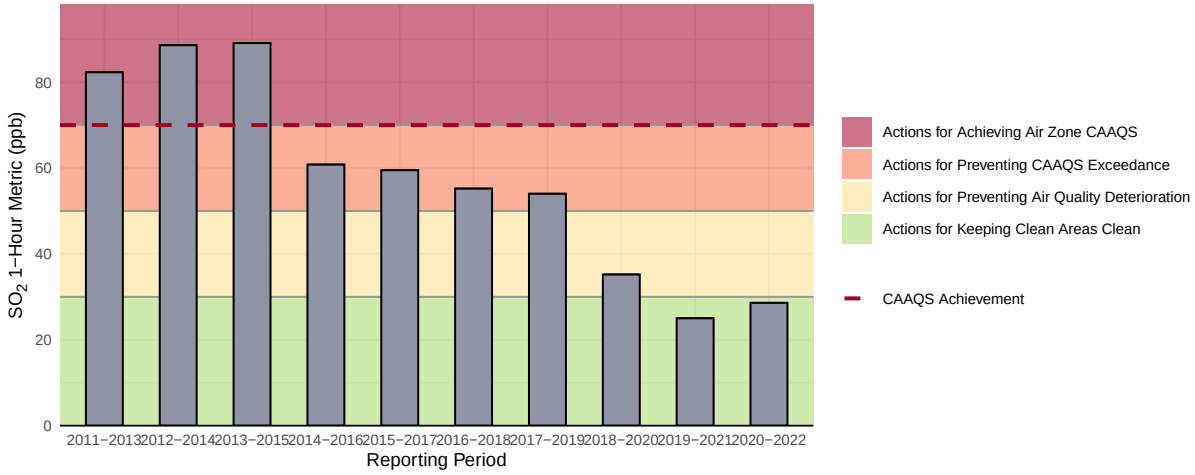


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.1ppb (1 year average)

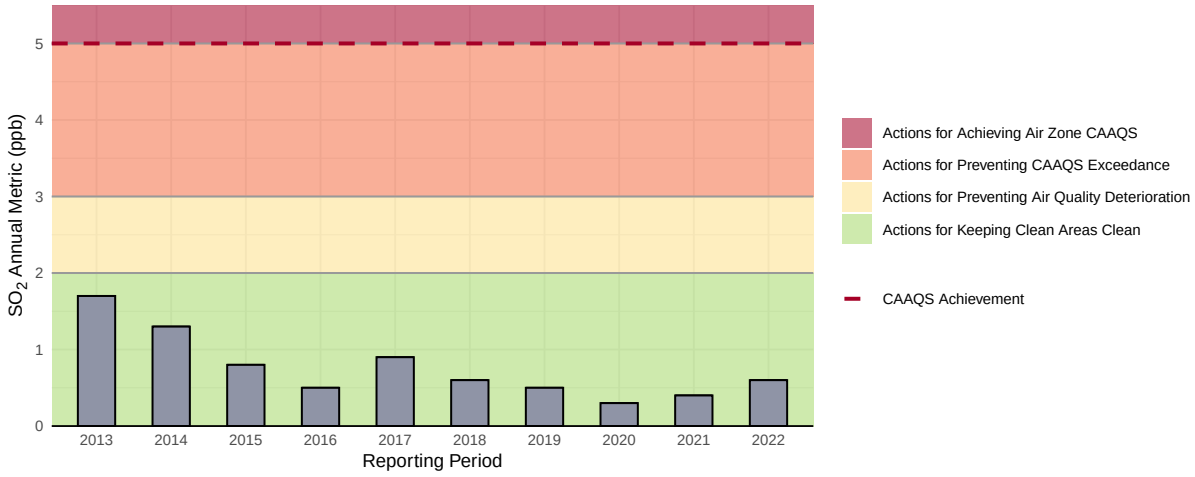


Air Zone: Lower Fraser Valley
Monitoring Station: North Burnaby Capitol Hill

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 28.6ppb (3 year average)

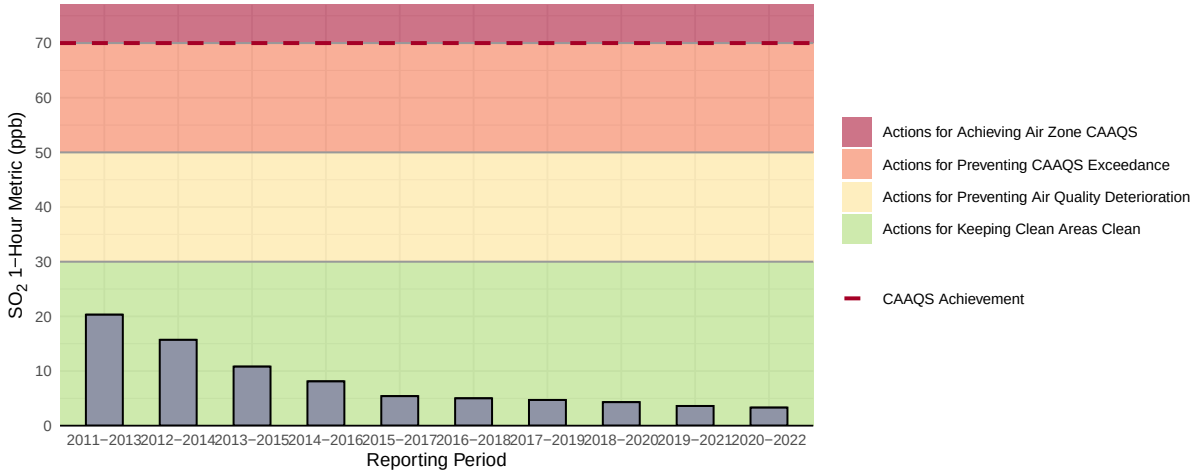


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.6ppb (1 year average)

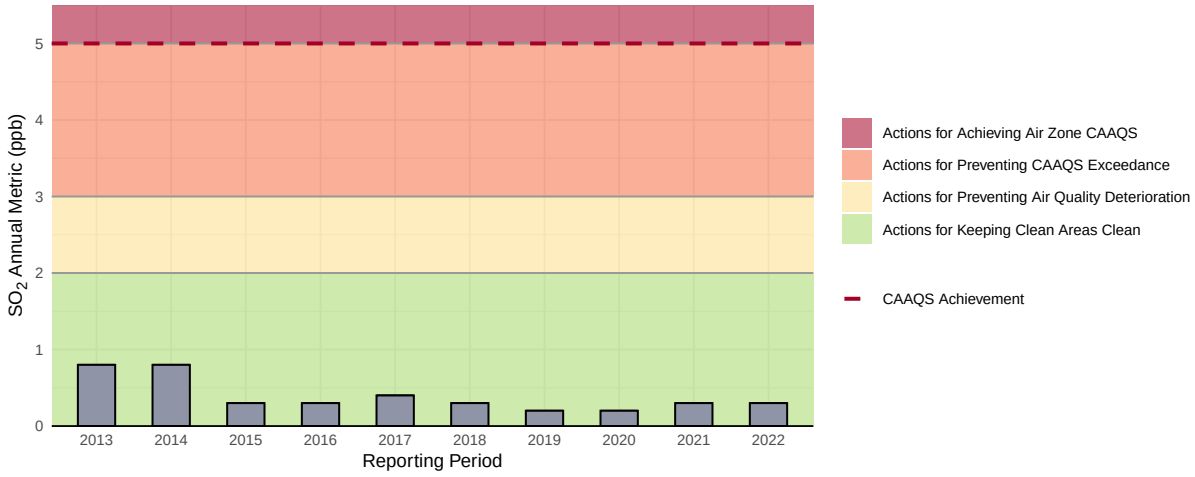


Air Zone: Lower Fraser Valley
Monitoring Station: North Vancouver Mahon Park

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 3.3ppb (3 year average)

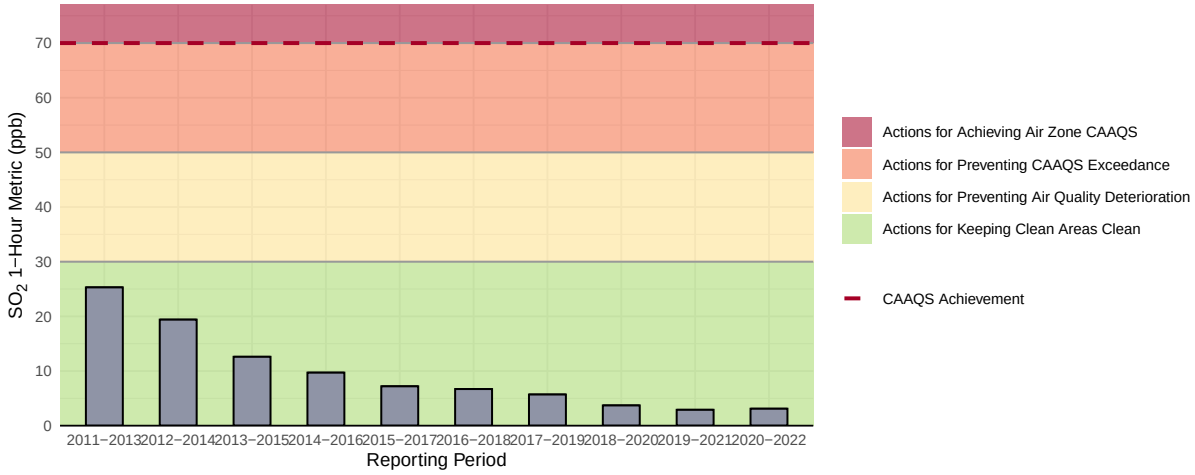


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

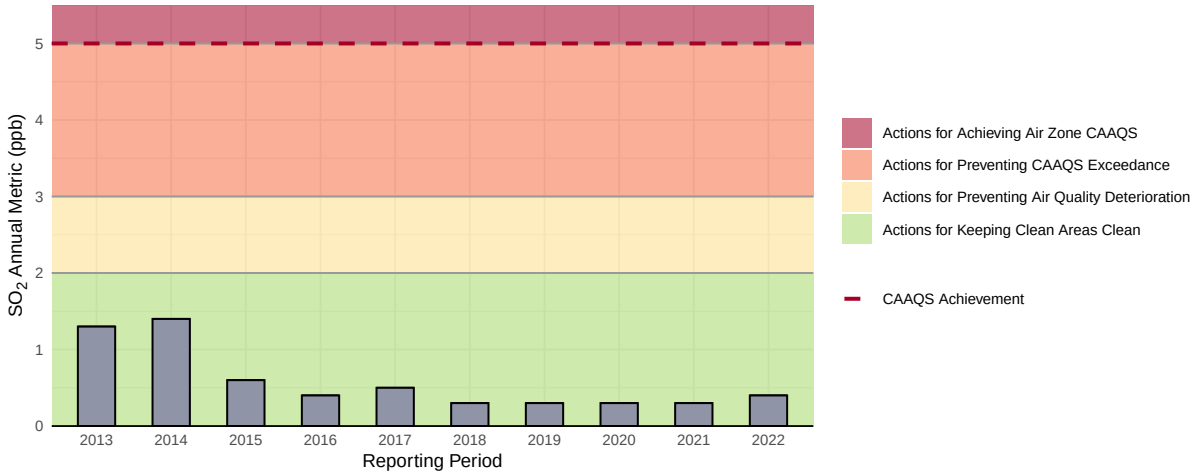


Air Zone: Lower Fraser Valley
Monitoring Station: North Vancouver Second Narrows

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 3.1ppb (3 year average)

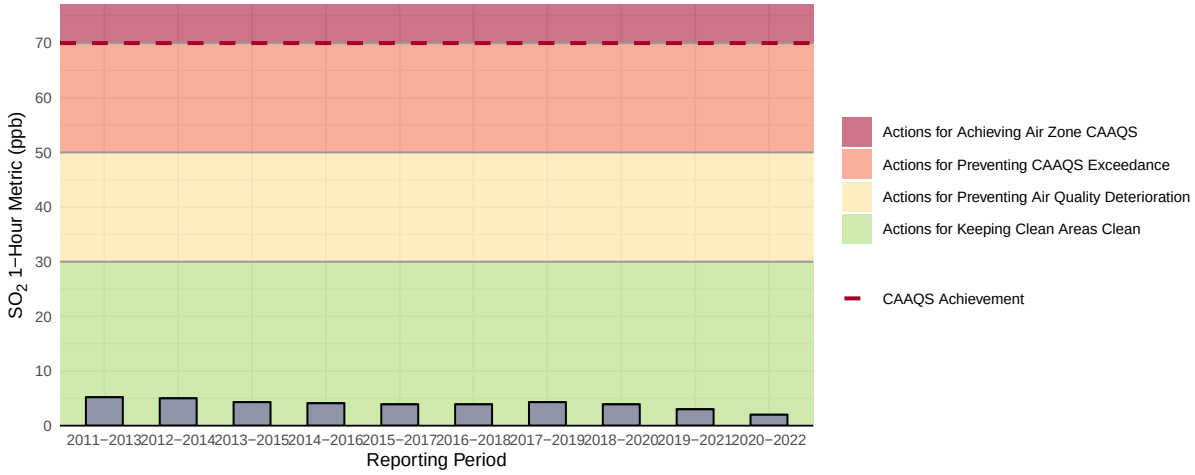


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.4ppb (1 year average)

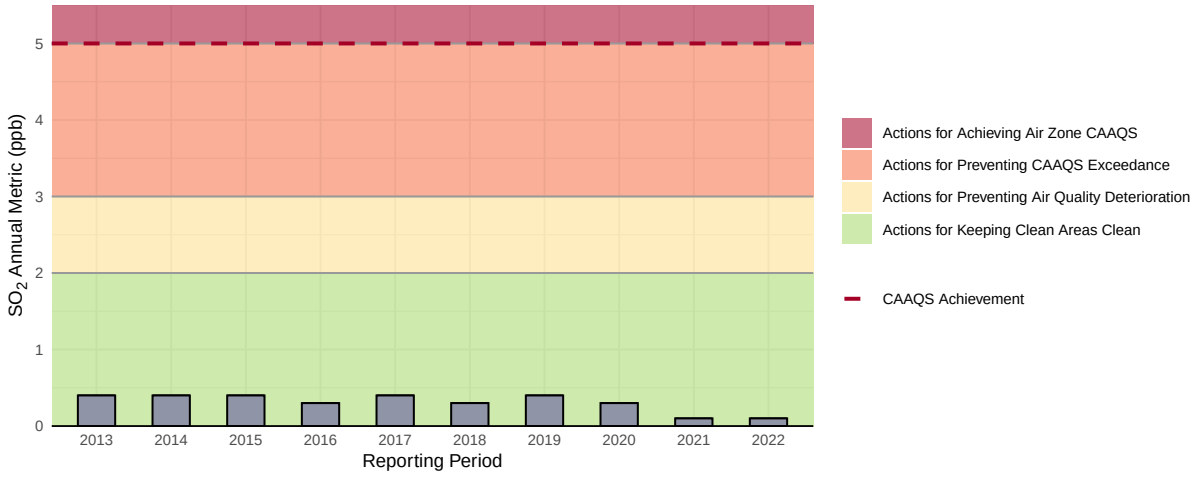


Air Zone: Lower Fraser Valley
Monitoring Station: Pitt Meadows Meadowlands School

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 2ppb (3 year average)

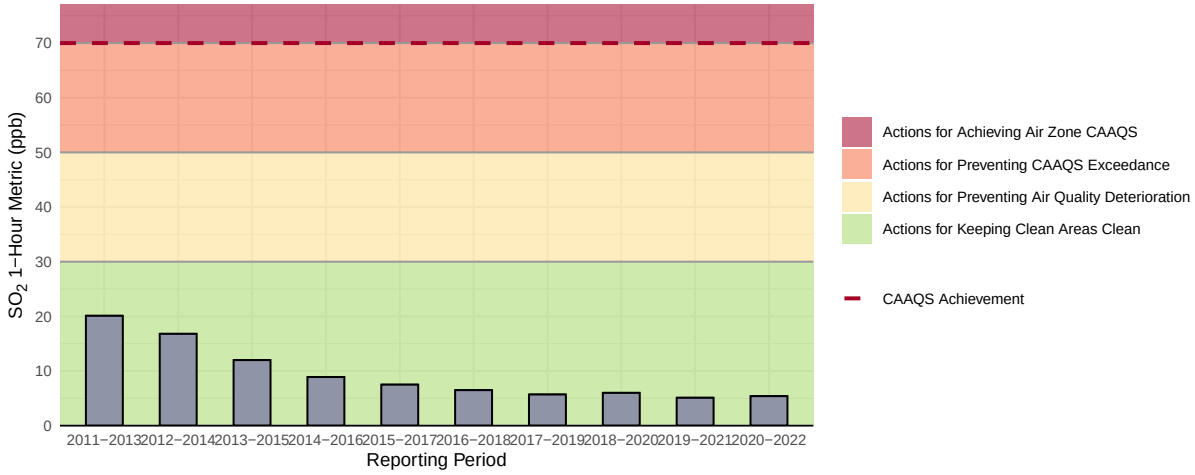


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.1ppb (1 year average)

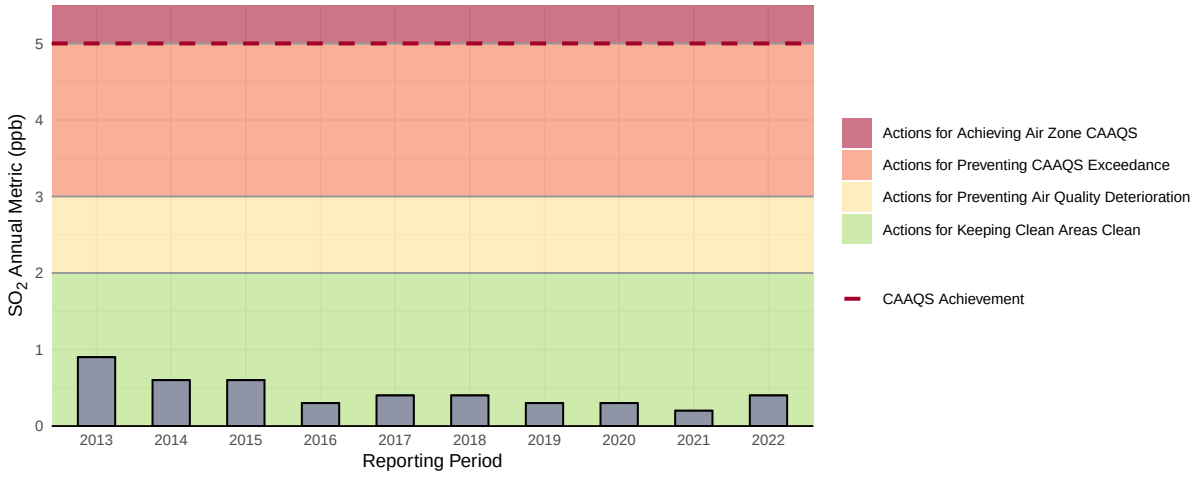


Air Zone: Lower Fraser Valley
Monitoring Station: Port Moody Rocky Point Park

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 5.4ppb (3 year average)

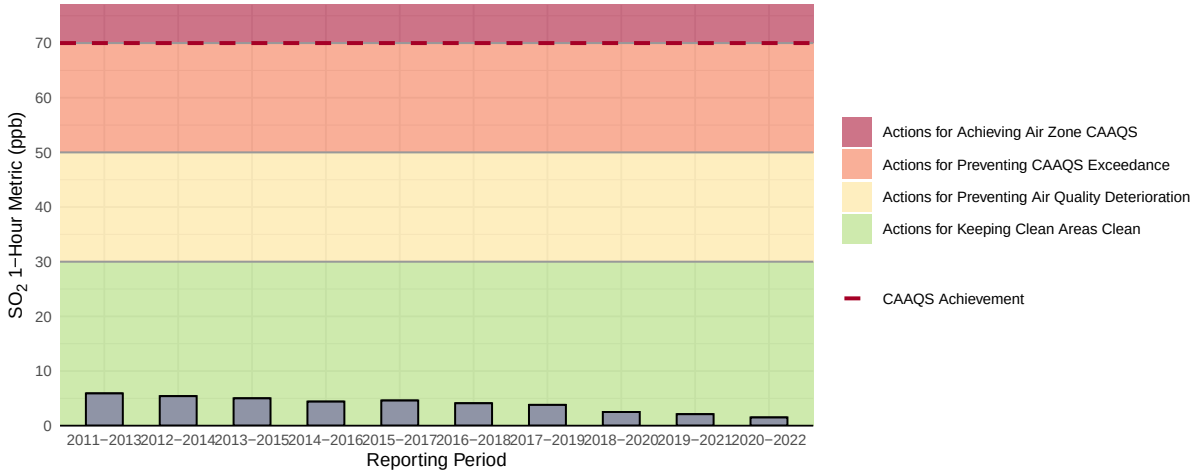


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.4ppb (1 year average)

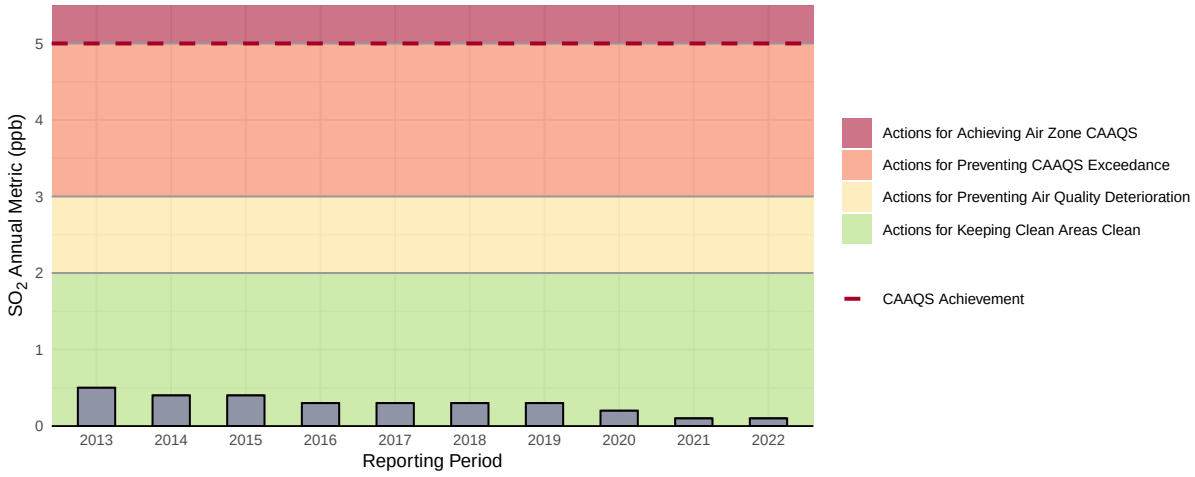


Air Zone: Lower Fraser Valley
Monitoring Station: Richmond South

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.5ppb (3 year average)

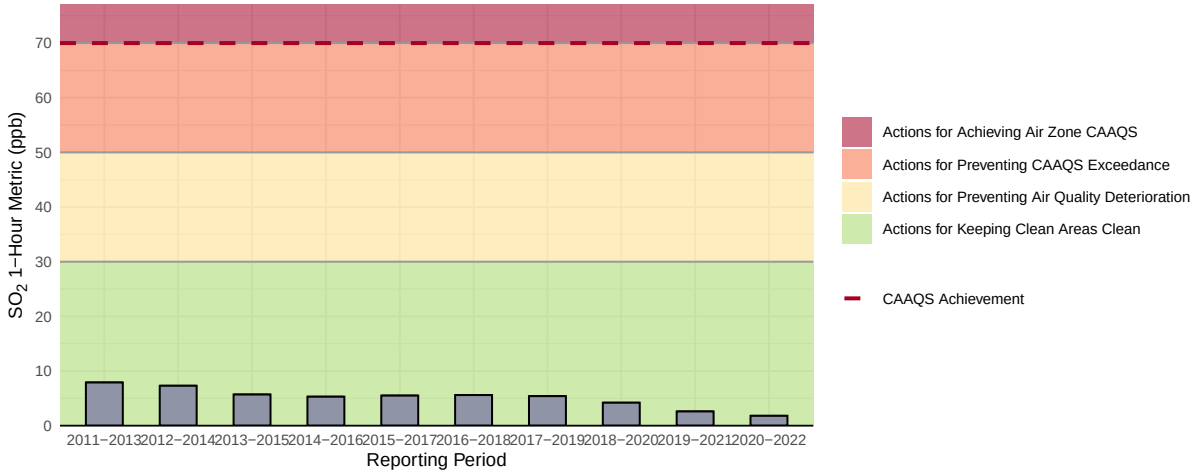


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.1ppb (1 year average)

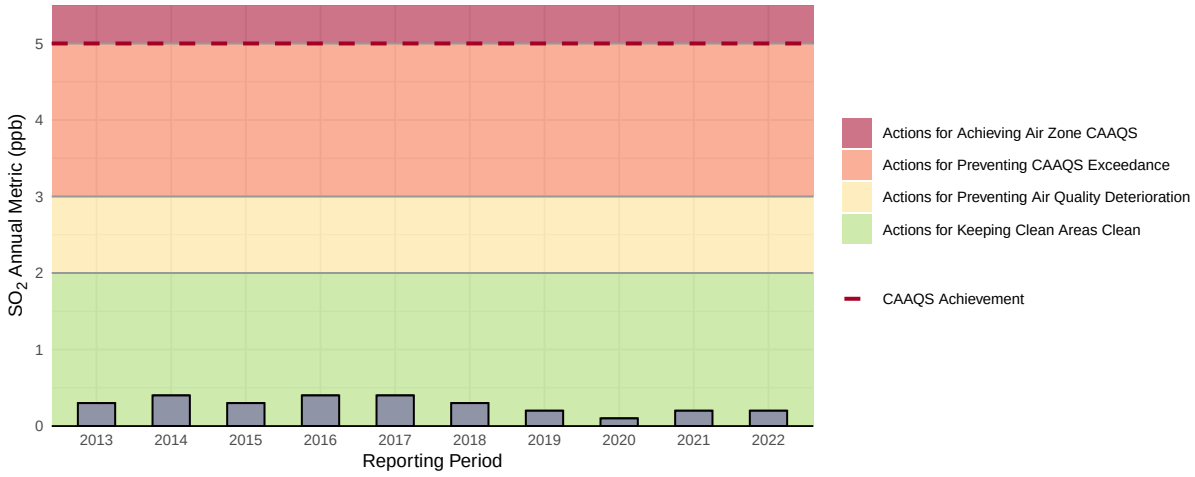


Air Zone: Lower Fraser Valley
Monitoring Station: Tsawwassen

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.8ppb (3 year average)

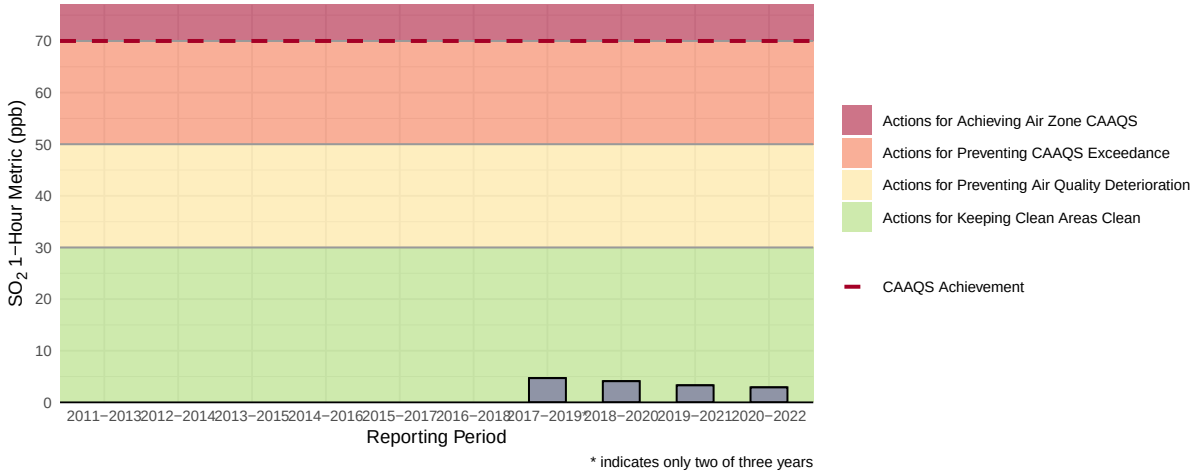


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

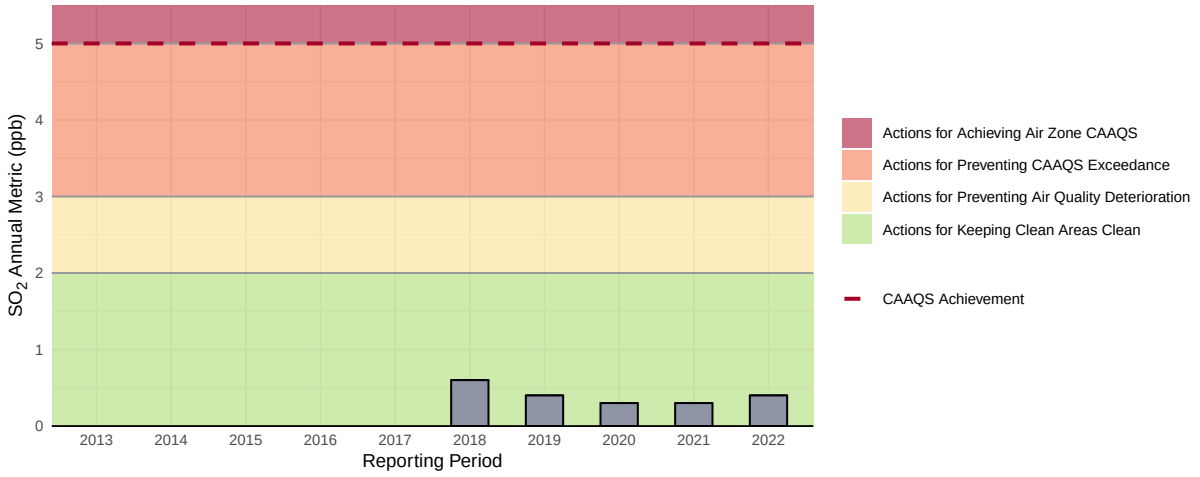


Air Zone: Lower Fraser Valley
Monitoring Station: Vancouver Clark Drive

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 2.9ppb (3 year average)

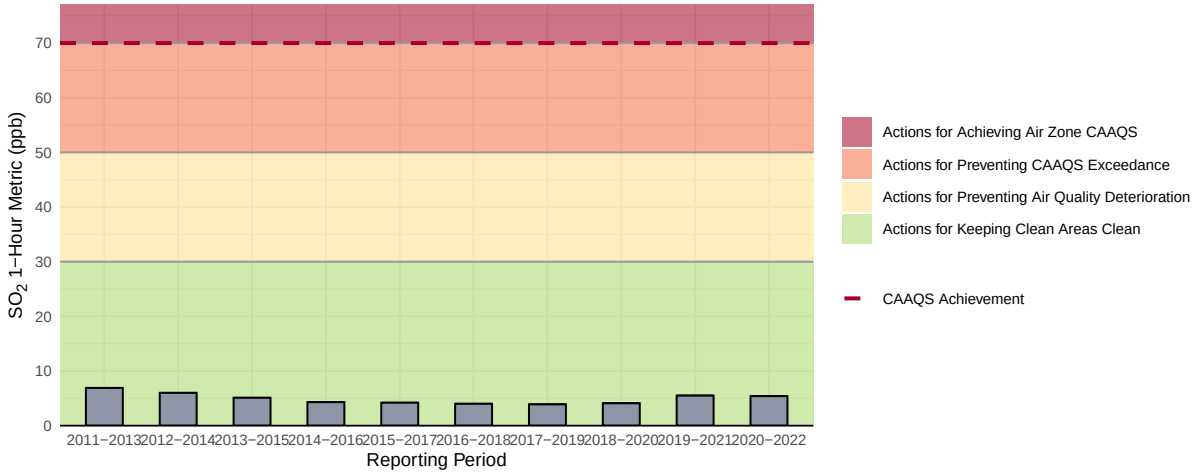


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.4ppb (1 year average)

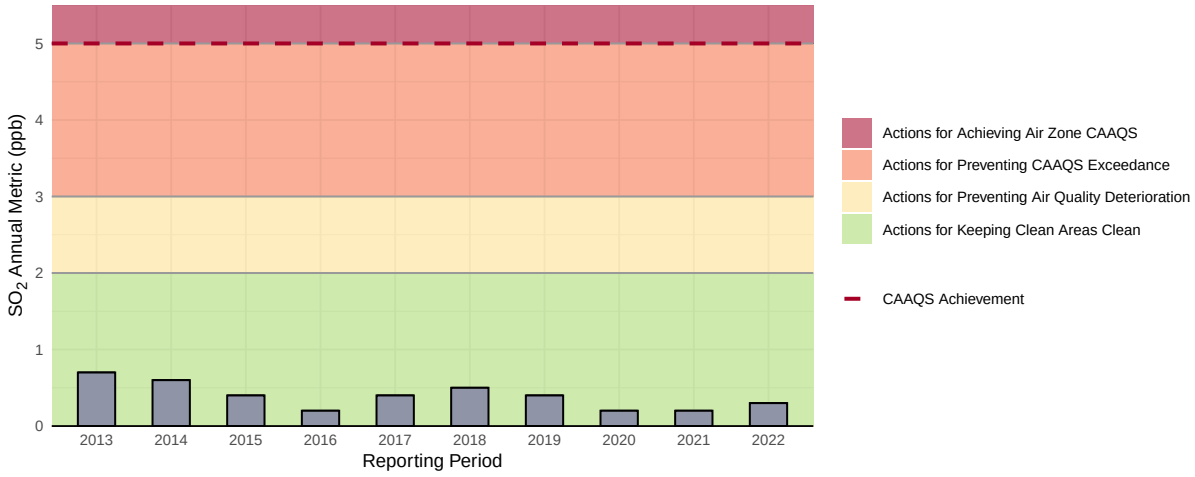


Air Zone: Lower Fraser Valley
Monitoring Station: Vancouver International Airport 2

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 5.4ppb (3 year average)

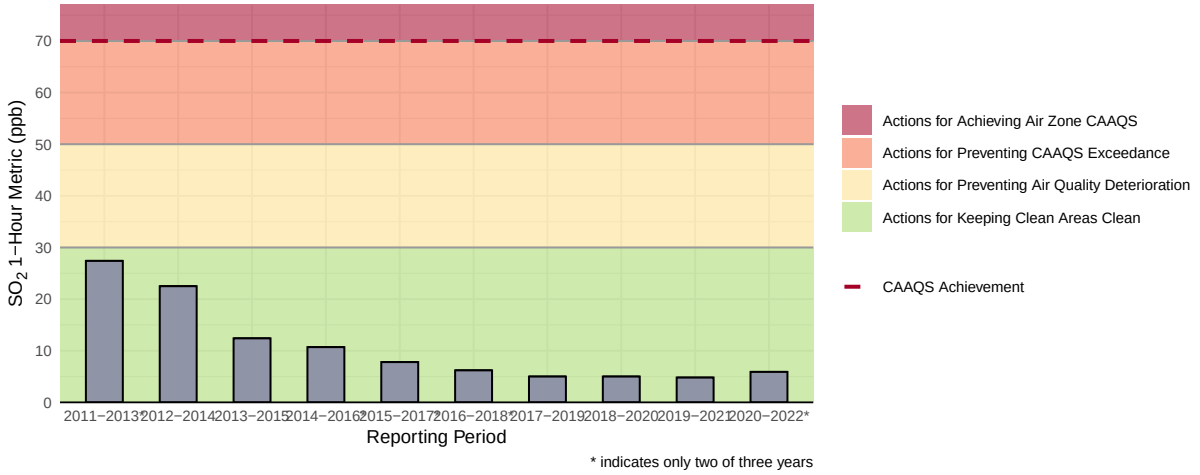


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

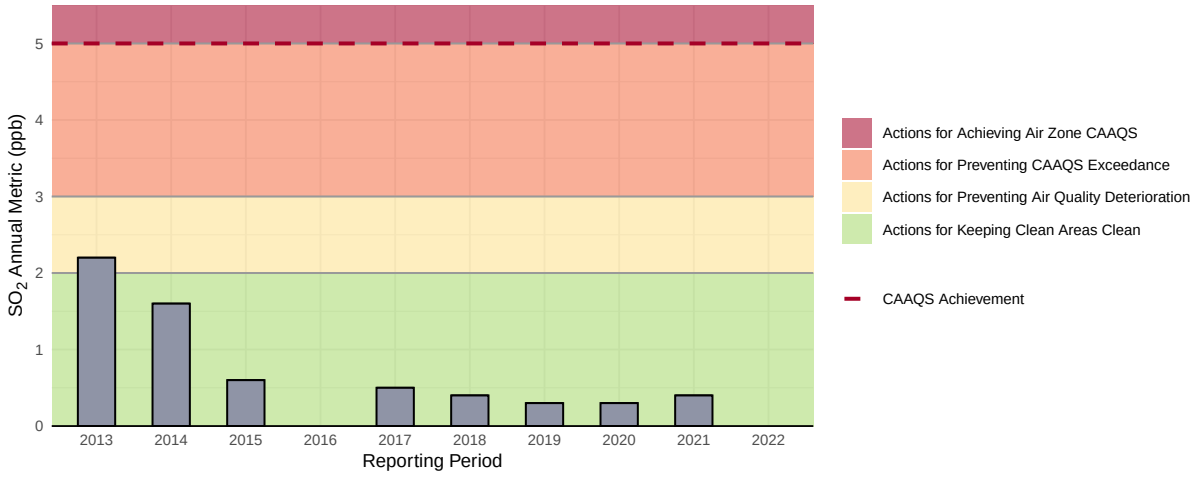


Air Zone: Lower Fraser Valley
Monitoring Station: Vancouver Robson Square

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 5.9ppb (2 year average)

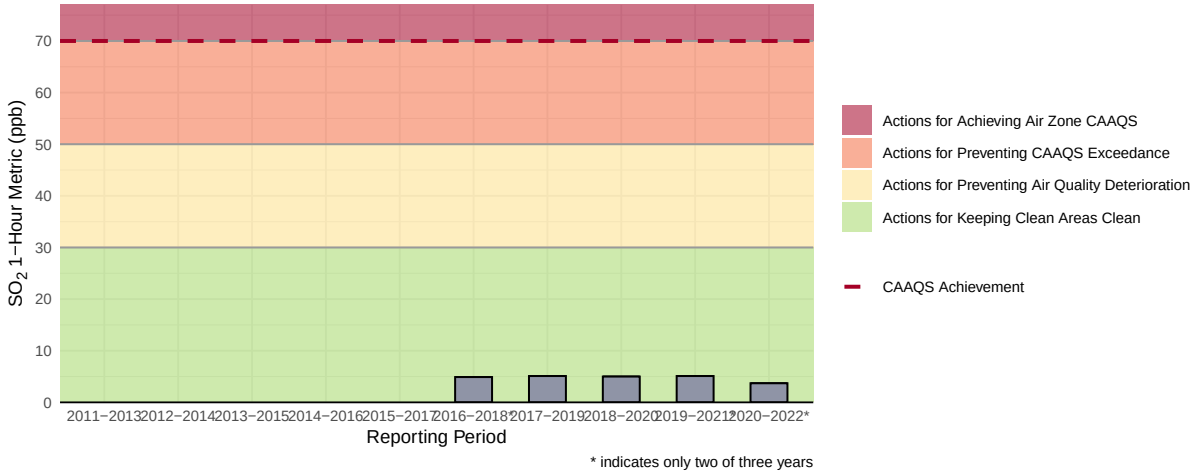


SO_2 Annual Air Quality Standard: Insufficient Data
SO_2 Annual Metric: Unknown

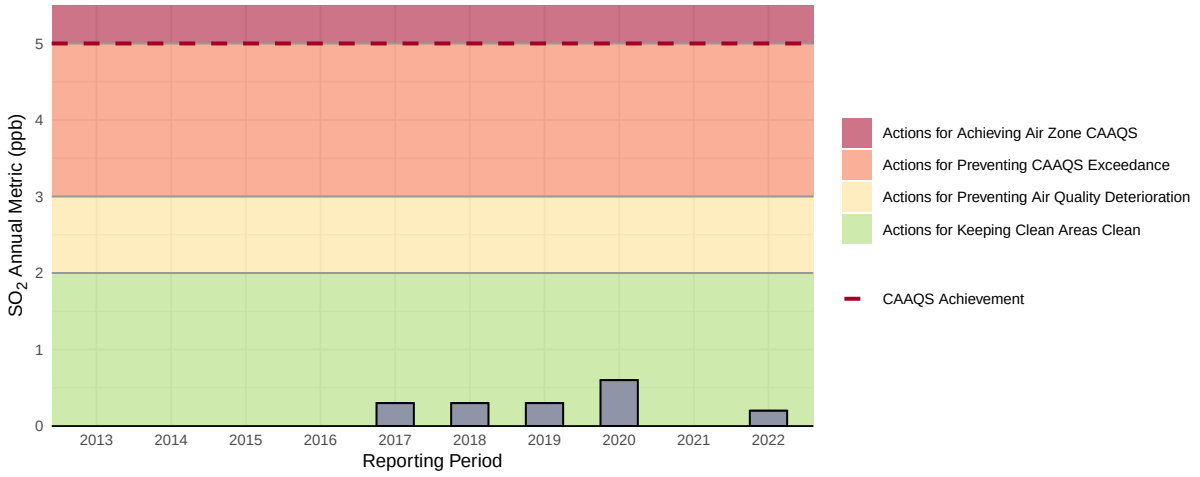


Air Zone: Northeast
Monitoring Station: Fort St John Key Learning Centre

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 3.7ppb (2 year average)

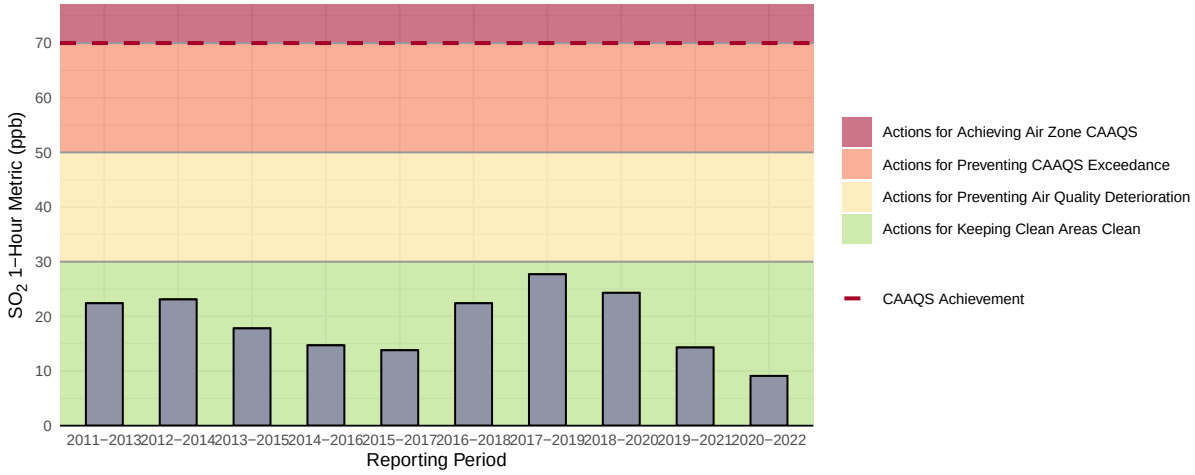


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.2ppb (1 year average)

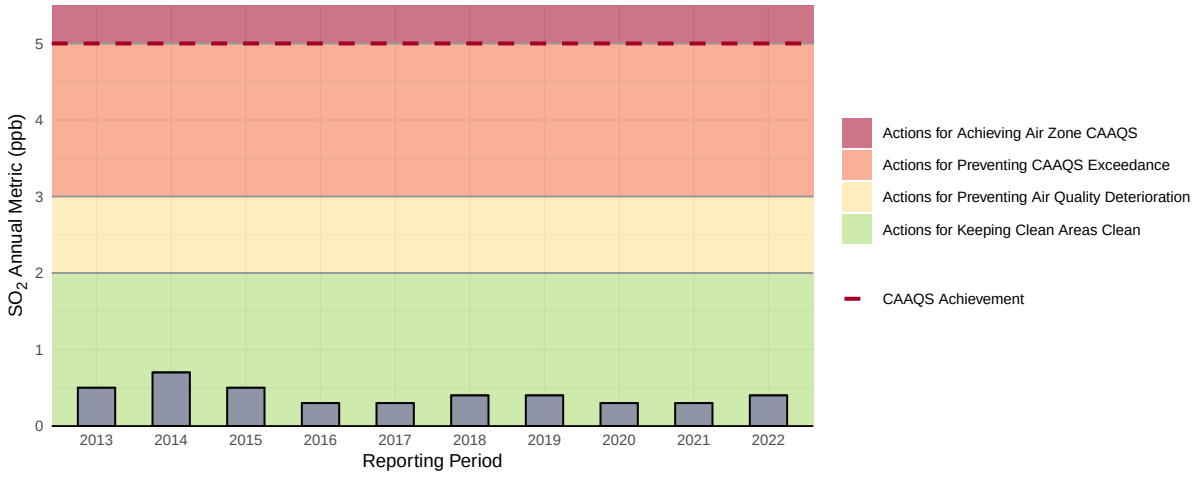


Air Zone: Northeast
Monitoring Station: Taylor South Hill

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 9.1ppb (3 year average)

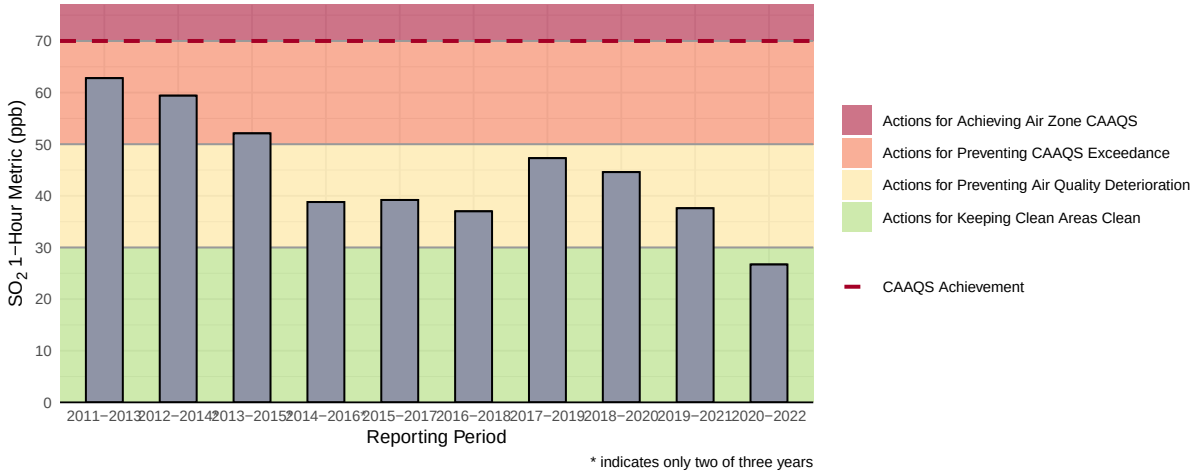


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.4ppb (1 year average)

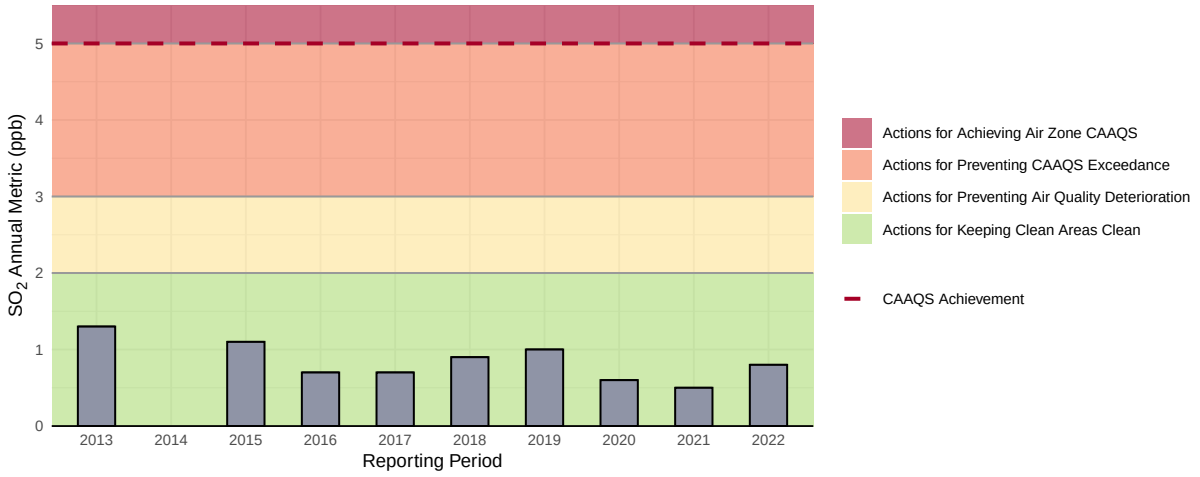


Air Zone: Northeast
Monitoring Station: Taylor Townsite

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 26.7ppb (3 year average)

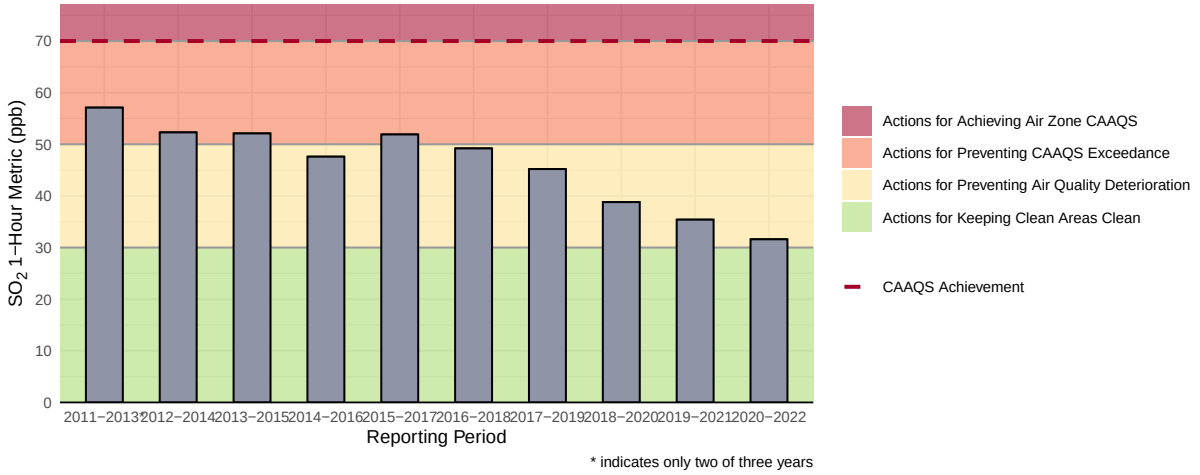


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.8ppb (1 year average)

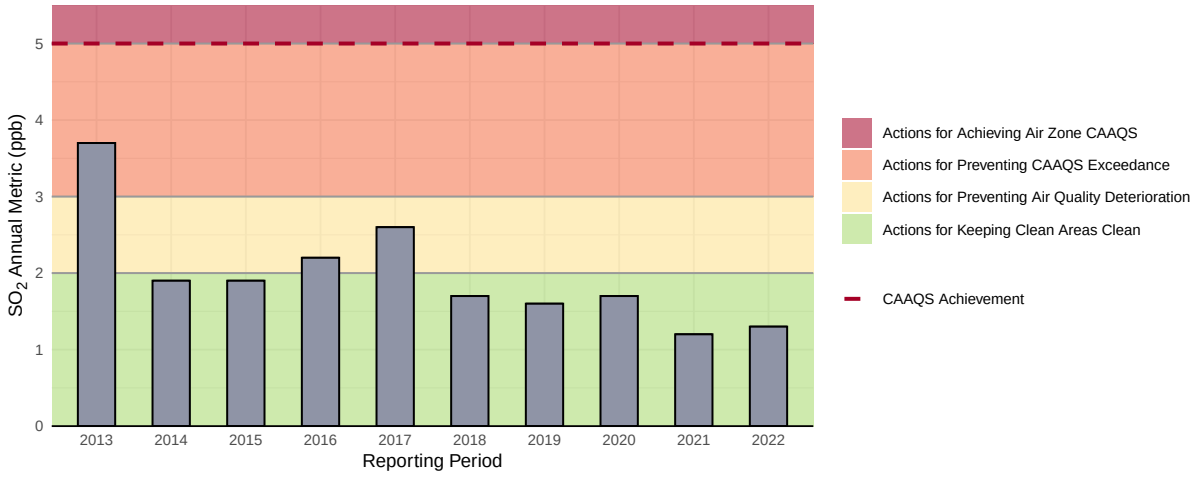


Air Zone: Southern Interior
Monitoring Station: Castlegar Zinio Park

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 31.6ppb (3 year average)

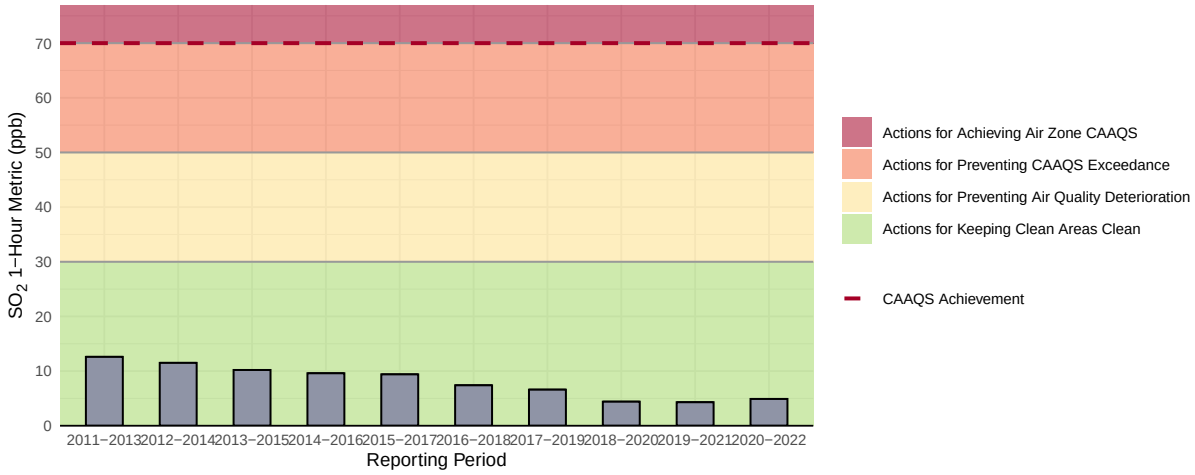


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 1.3ppb (1 year average)

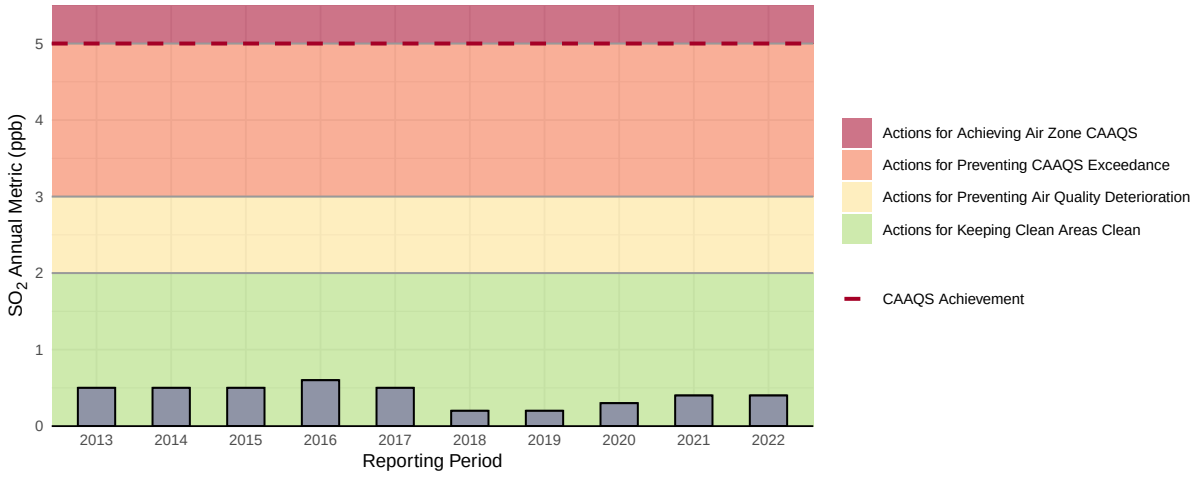


Air Zone: Southern Interior
Monitoring Station: Kamloops Federal Building

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 4.9ppb (3 year average)

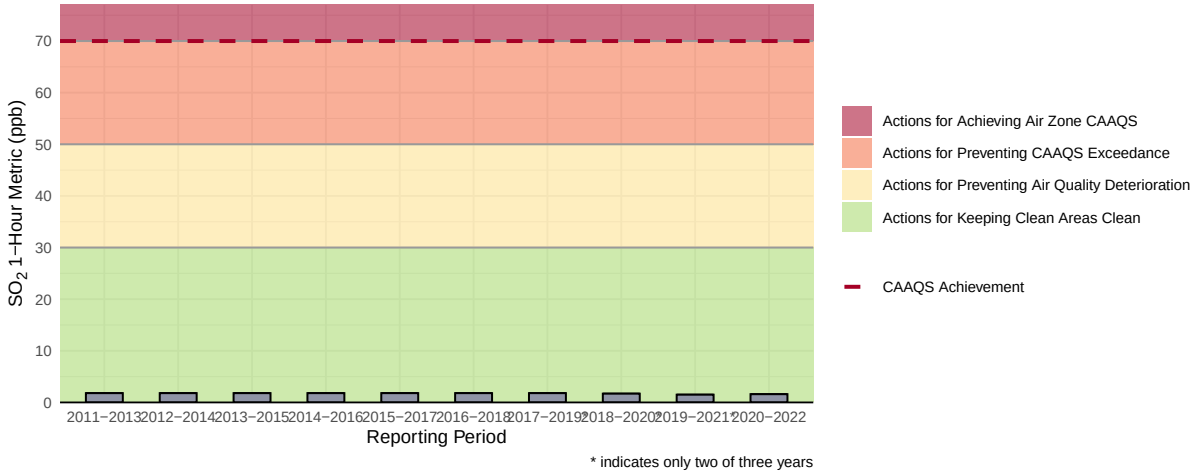


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.4ppb (1 year average)

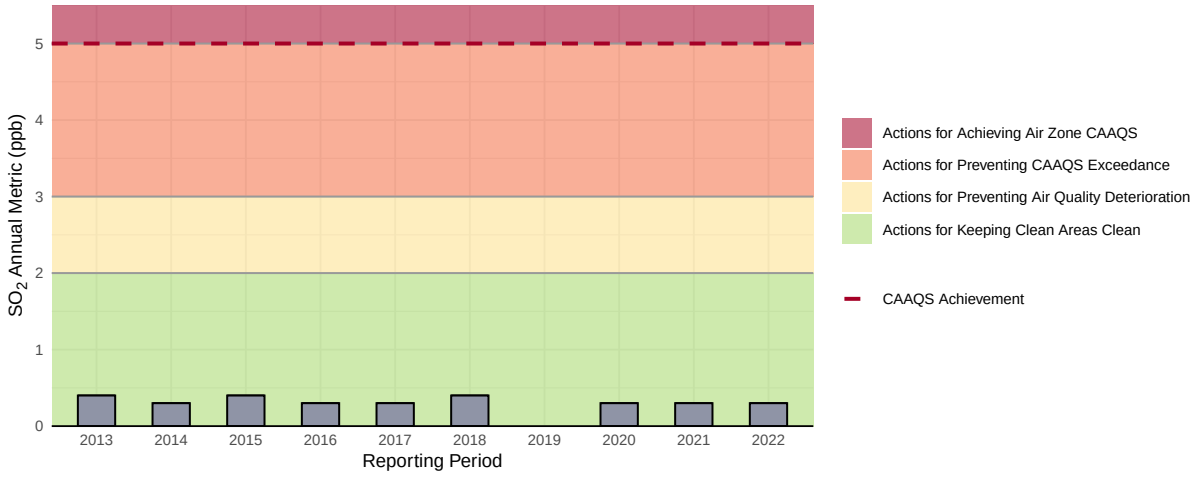


Air Zone: Southern Interior
Monitoring Station: Kelowna

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 1.6ppb (3 year average)

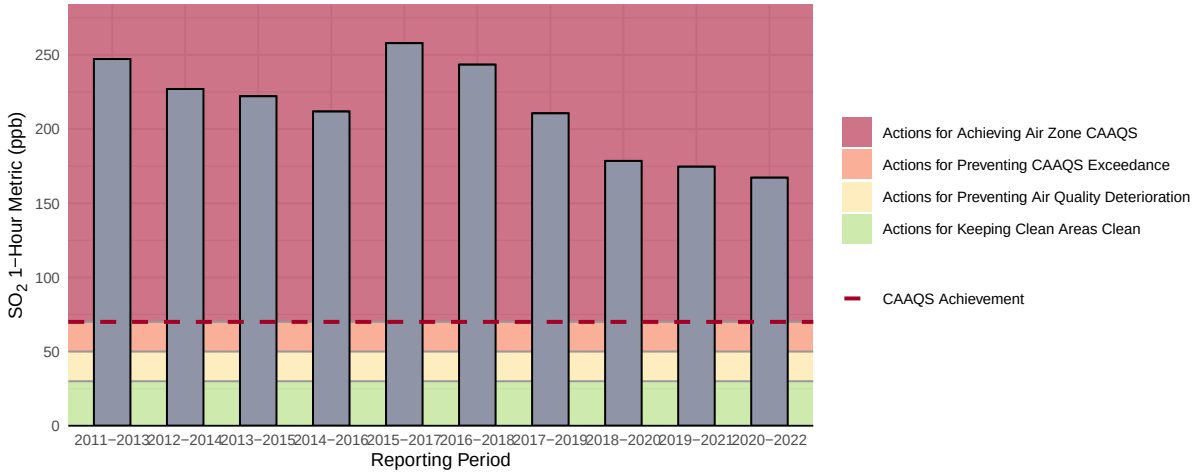


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 0.3ppb (1 year average)

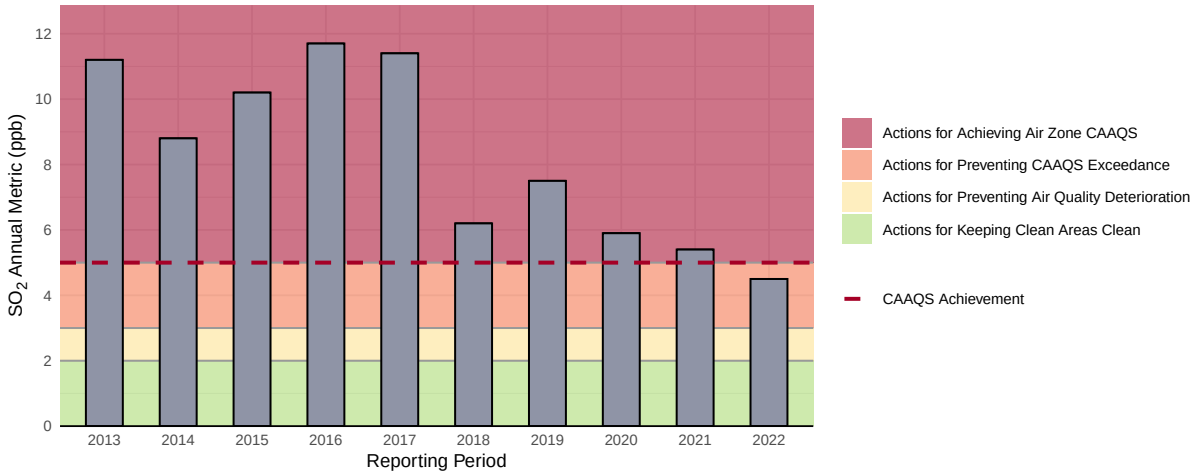


Air Zone: Southern Interior
Monitoring Station: Trail Butler Park

SO_2 1-hour Air Quality Standard: Not Achieved
SO_2 1-hour Metric: 167.2ppb (3 year average)

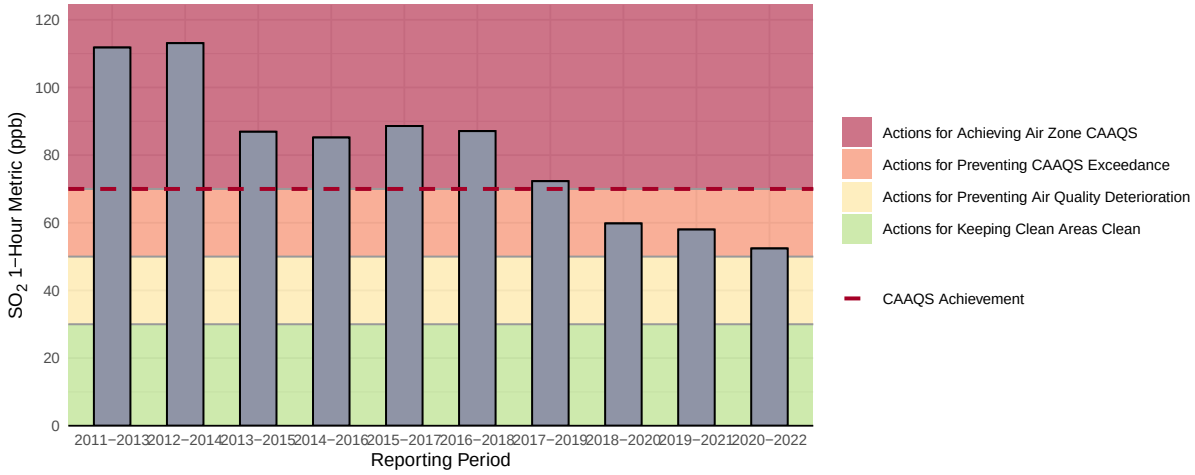


SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 4.5ppb (1 year average)



Air Zone: Southern Interior
Monitoring Station: Trail Columbia Gardens Airport

SO_2 1-hour Air Quality Standard: Achieved
SO_2 1-hour Metric: 52.4ppb (3 year average)



SO_2 Annual Air Quality Standard: Achieved
SO_2 Annual Metric: 2.3ppb (1 year average)