

Air Quality Program FAQ: Sulphur Dioxide (SO₂)

1. What is sulphur dioxide (SO₂)?

SO₂ is a colourless, reactive gas. At higher concentrations it can have a strong odour. It is produced during the combustion of sulphur-containing fuels and industrial operations involving sulphur-containing materials. Major sources of SO₂ in BC include the upstream oil and gas industry, metal smelting facilities, pulp / paper mills and marine operations (in the Lower Mainland area). Once released, one possibility is that SO₂ can react with other compounds in the air to form fine particulate matter (small solid or liquid particles suspended in air).

2. Why do we have SO₂ in Trail?

SO₂ is emitted by Teck Trail Operations as a by-product of processing mine concentrates, which contain sulphur, into metal and chemical products. With environmental improvements, SO₂ emissions continue to decline. Teck Trail Operations currently captures more than 99% of the sulphur and converts it to by-products, such as fertilizer and sulphuric acid. About 1% leaves the operation through emissions to air. Sulphur capture at Teck Trail Operations is similar to what you might find at a brand-new smelter. However, the dispersion of air emissions from the smelter is constrained due to the location of the smelter, weather and the surrounding topography. SO₂ levels in Trail are not static and fluctuate throughout the day, month and year. See FAQ 7 and 8 for more information on SO₂ levels.

3. How does SO₂ affect my health?

Short-term exposures to elevated SO₂ levels can cause the air passages in the lungs to constrict or tighten, leading to breathing difficulties and tightening in the chest. Symptoms may include constriction or tightening of the airways in the lungs, coughing, wheezing and shortness of breath. It may also irritate the nasal passage, throat and eyes. Those most sensitive to the effects of SO₂ include persons with chronic respiratory disease, especially persons with asthma. Symptoms may worsen during vigorous exercise or hard physical labour. See FAQ 7 and 8 for more information on SO₂ levels.

4. What are the long-term risks of SO₂ exposure?

Long-term exposure to the particles produced by the reaction of SO₂ with other compounds in the air may also affect your health. These particles penetrate deeply into the lungs. This can cause irritation and inflammation that can damage the lining of the lungs and affect other parts of the body. Particles can worsen existing heart and respiratory disease, including emphysema and bronchitis. Because of this, children who live in areas with elevated sulphur dioxide concentrations may develop more breathing problems as they get older.

5. How do I know if I am sensitive to SO₂?

Some people, particularly those with respiratory conditions, may be more sensitive to SO₂ exposure. Sensitivities may result in symptoms such as irritation of the eyes and respiratory symptoms such as coughing, wheezing and shortness of breath.

6. Who is at the highest risk of SO₂ exposure?

Workers in industrial facilities where SO₂ is used or is a by-product of industrial processes have the greatest exposure. People who live near these industries and other point sources can also be exposed to higher levels of SO₂. See FAQ 7 and 8 for more information on SO₂ levels.

7. What actions can I take to reduce potential health effects of SO₂?

When SO₂ concentrations are elevated, consider reducing or rescheduling activities outdoors, remaining indoors, and reducing indoor sources of SO₂ including tobacco smoke and unvented gas stoves. Persons with asthma should follow a management plan developed with their health care provider. If you are having trouble breathing, have chest pain or discomfort, or a severe cough, contact your health care provider or emergency department. See HealthLinkBC for a summary of health recommendations.

The SO₂ levels and health guidance in the table below are based on Health Canada's 2016 Human Health Risk Assessment for Sulphur Dioxide. For more information on the levels experienced in Trail, see FAQ 8.

SO ₂ Levels	Consider taking the following action at these levels
0-35 ppb	None
36-184 ppb	Persons with chronic respiratory conditions such as asthma should consider reducing or rescheduling strenuous outdoor activities if experiencing symptoms. No effects are expected for the general population.
185+ ppb	Persons with chronic respiratory conditions such as asthma should reduce or reschedule strenuous activities outdoors. Others, especially children and the elderly should also consider avoiding outdoor physical exertion.

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Air Quality Program FAQ: Sulphur Dioxide (SO₂) cont.

8. What are the SO₂ levels in Trail?

Actual ambient SO₂ concentrations in Trail fluctuate throughout the day, month and year.

This chart calculates the total hours of SO₂ measured in community air (by monitoring station) in 2020. For actions to take at different levels, see FAQ 7.

Station	SO ₂ Levels ppb	Hours / year*	% Time *
Birchbank	0-35	7604	97.4
Golf Course	36-184	200	2.6
	185+	0	0
Trail Butler Park	0-35	8050	96.7
	36-184	269	3.2
	185+	6*	0.1
Trail Columbia Gardens	0-35	8354	99.7
Airport	36-184	23	0.3
	185+	0	0
Warfield Elementary	0-35	7801	93.9
	36-184	495	6
	185+	10*	0.1

*In 2020 Birchbank Golf Course monitored 89% of the year, and the remaining three stations monitored 95% of the year.

**In 2020, all hours that measured above 185 occurred between 7am-11am.

Although levels fluctuate, monitoring data from recent years exceed the benchmarks for ambient air quality set by the Provincial and Federal governments that came into effect in 2020.

Find current and historical data online at:
<http://www.env.gov.bc.ca/epd/bcairquality/readings/find-stations-map-SO2.html>

9. Where is SO₂ monitored in Trail?

SO₂ is monitored by Teck at four locations throughout Trail and the surrounding areas – Birchbank, Butler Park, Columbia Gardens and Warfield. These stations operate continuously, with near real-time data publicly available. SO₂ levels fluctuate throughout the day, month and year. Find current and historical levels online at: <http://www.env.gov.bc.ca/epd/bcairquality/readings/find-stations-map-SO2.html>

10. What is Teck doing to reduce SO₂ emissions?

Over the past 30 years, over \$1.7 billion has been invested in a modernization program to improve the operational and environmental performance at Teck Trail Operations resulting in significant improvements in community air quality.

Teck Trail Operations currently captures more than 99% of the sulphur contained in feed and meets the highest standard for sulphur capture for base metal smelters across Canada.

Teck Trail Operations has made a 25% reduction in emissions in the last ten years, accomplished through the installation of two new state of the art Acid Plants and operational changes. Teck Trail Operations continues to drive improvements and is currently advancing capital projects to achieve further reductions by 2023.

In addition to SO₂ emissions reduction initiatives, Teck Trail Operations uses near real-time data to manage SO₂ (see FAQ 11 for details).

11. How does Teck Trail Operations use data to manage SO₂ levels in Trail?

In addition to reducing emissions, near real-time data is transmitted to Teck Trail Operations' process control systems. If SO₂ levels begin to rise (such as during a temperature inversion or during periods of higher emissions), plants at Teck Trail Operations are automatically notified so that actions can be taken to further reduce SO₂ at the source and in the community.

The Ministry of Environment and Climate Change and Teck Trail have the ultimate goal of achievement of the Provincial and Federal benchmarks.

12. Who regulates Teck with respect to SO₂?

Teck Trail Operations operates under permits established by the BC Ministry of Environment and Climate Change Strategy (ENV).

13. What are the applicable standards for SO₂?

Air quality is managed to protect the environment and human health relative to BC's Air Quality Objectives (AQOs) and the Canadian Ambient Air Quality Standards (CAAQS). For SO₂, BC AQO are the same as the CAAQS; more information about these standards can be found at: https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/fs_so2_caaqs.pdf.

BC uses these benchmarks to guide regulatory decisions, including permitting of discharges to air, to assess air quality, issue public advisories, aid regulatory development and support long-term air management strategies.

14. If I have a concern about air quality or health, who do I contact?

Residents who have concerns about air quality are encouraged to call the Teck Community and Environment Feedback line at (250) 364-4817, a phone line answered 24 hours a day. If you have health concerns, please contact your family doctor.