Air Quality

Pictured above: Greenhills Operations, Canada.

Air Quality

The 2019 World Environment Day theme "Beat Air Pollution" was a call to action by the United Nations to combat the challenge of poor air quality.[23] While economic growth can result in an increase in air pollution, alternative consumption and production models, knowledge advancements and innovative solutions can successfully reduce emissions to air.[24]

Industry context

Mining and mineral processing can contribute to air pollution through processes such as drilling, blasting, crushing, collection and storage, and transportation along the supply chain. Associated emissions to air include particulate matter (e.g., fine and coarse dust that can include minerals and metals) and gases. To maintain a transparent approach to managing these emissions, several governments, including the Canadian and American governments, require companies to monitor and mitigate their impacts on air quality and to disclose their emissions publicly through inventories such as the Toxic Release Inventory in the United States and the National Pollutant Release Inventory in Canada.

Teck context

Air quality, particularly related to dust, continues to be identified as a key concern by our communities of interest, especially at our steelmaking operations in the Elk Valley and Trail Operations in B.C. and at Carmen de Andacollo Operations in Chile. As air quality issues require close collaboration with local stakeholders, we continue to explore initiatives to improve air quality across our operations, as described on page 78.

GRI Indicator and Topic Boundary

305-7

This topic is considered one of the most material by our employees, Indigenous Peoples, local communities, government and regulators and society in the context of all of Teck's sites.

How Does Teck Manage This Topic?

Information about how we manage air quality, including relevant policies, management practices and systems, is available for download on our website.

[23] World Environment Day 2019. UN Environment Programme. 2019. [24] Towards a Pollution-Free Planet. UN Environment Assembly. 2017.

2019 Highlights

100% of community-based stations with annual average ambient concentrations of particulate matter of size less than 2.5 microns within the World Health Organization (WHO) guidelines

Implemented initiatives to improve air quality monitoring and minimize impacts of our activities on communities at our Carmen de Andacollo, Elkview and Trail operations.

Our Performance in Air Quality in 2019

Our Targets and Commitments We are committed to continually improving air quality for the benefit of workers, communities and the environment in areas affected by our activities. The following table summarizes our performance against our 2020 sustainability goals and targets for air quality.

2020 Sustainability Strategy Goals	Status	Summary of Progress in 2019
Improve monitoring and understanding of our releases to air and the potential impacts on people, communities and the environment.	On track	Implemented improvements to ambient air quality monitoring programs at Elkview, Line Creek and Cardinal River operations. Collected information on current emission monitoring programs and dust management practices for all operations. Implemented and further improved a road dust monitoring tool that was developed in 2018 at Trail Operations.
In consultation with communities, governments and other organizations, set air quality goals and establish risk-based action plans to achieve goals.	On track	Developed dust action plans specific to each steelmaking coal operation and their air quality impacts. Achieved quantitative targets set for particulate matter emissions at Carmen de Andacollo Operations and lead concentrations in ambient air at Trail Operations, ahead of schedule. Measures to achieve reductions continue to be in place. Continued advancing engagement with communities of interest at Carmen de Andacollo, Trail and in the Elk Valley with respect to dust management and air quality.
Strengthen the integration of air quality considerations into early stage project development.	On track	Developed a list of air quality considerations for incorporation into early project planning stages. Stage-gate criteria that incorporate air quality considerations have also been developed and expert input is being provided to project teams as required.

Key Performance Indicators

2019: 3,853 tonnes
2018: 3,659 tonnes
2017: 4,894 tonnes

Indicator
Sulphur dioxide (SO_2) emissions from stacks, stationary and mobile fossil fuel combustion

2019: 100% of stations
2018: 100% of stations
2017: 100% of stations

Indicator
% of community-based air quality stations with annual mean concentrations of ambient $PM_{2.5}$ within the World Health Organization guideline value of 10 µg/m^3

2019: 75% of stations
2018: 50% of stations
2017: 75% of stations

Indicator
% of community-based air quality stations with annual mean concentrations of ambient PM_{10} within the World Health Organization guideline value of 20 µg/m^3

Minimizing Emissions to Improve Air Quality

In 2019, we implemented measures to minimize impacts on the local air quality within the vicinity of our activities.

Table 29: Air Quality Improvements in 2019

Operation	Activities
Elk Valley	Continued to advance our dust management activities and evaluated air quality improvement initiatives. Programs evaluated in 2019 include pilot of MicroPulse LiDAR to identify and track movement of fugitive dust/air emission sources, pilot of on-vehicle continuous monitoring systems for ambient air, various in-pit dust suppressions and water application systems, and implementation of trigger-action response plans for excessive risk sources of fugitive dust at operations.
Trail	Continued to implement dust management initiatives to support additional reductions in the level of metals in ambient air in the surrounding community. The new road dust monitoring tool that was developed in 2018 was implemented and further improved in 2019. This includes the addition of smart tool functionality that incorporates sensor data on cleaning and washing with road dust data. An anticipated additional benefit is the reduction of water use at the site. Additional information on our efforts is available as a case study on our website.
Carmen de Andacollo	Established our first community-managed air quality monitoring station in Chile at our Carmen de Andacollo Operations. Community members manage the new equipment and will receive necessary training in 2020 to understand the operation and interpret and manage the data. Additional information on our efforts is available as a case study on our website.

Case Study: Improving Air Quality through Dust Mitigation at Elkview Operations

In 2019, several innovative solutions were successfully implemented at our Elkview Operations (EVO) to reduce fugitive dust, which is dust that becomes airborne due to wind or blasting. One of these solutions involved "capping" and revegetating parts of EVO's Natal waste rock dump, using aerial seeding. This new approach, and other solutions such as using real-time weather monitoring to support decisions on when to conduct blasting, have greatly reduced wind erosion as well as fugitive dust generation at EVO. Read the full case study at teck.com/news/stories/.

Monitoring and Reporting

The most material air quality issues relate to metals and SO_2 near our Trail Operations metallurgical facility and to particulate emissions at our mining operations. In addition to monitoring these two material indicators, our operations monitor and report on other air emission parameters in accordance with permit and regulatory requirements.

As shown in Table 30, SO_2 emissions from stacks and fossil fuel emissions in 2019 were approximately 3,858 tonnes, compared to 3,659 tonnes in 2018. Although SO_2 emissions are higher in 2019 when compared to 2018, low emissions in 2018 were the result of an extended maintenance shutdown of the KIVCET smelter at Trail Operations. SO_2 emissions have continued to decrease over the years, compared to 2016 and 2017. Trail Operations is the most significant source of SO_2 emissions for Teck and, as a result, all other operations have been aggregated in Table 30. Full results per operation are available in the 2019 Sustainability Performance Data spreadsheet.

Table 30: SO_2 Emissions from Stacks, Stationary and Mobile Fossil Fuel Combustion (tonnes)[(1),(2),(3),(4)]

Operations	2019	2018	2017	2016
All other operations	**42.0**	61.4	80.4	52.9
Trail	**3,811.0**	3,598.0	4,814.0	4,665.0
Total	**3,853.0**	3,659.4	4,894.4	4,717.9

(1) Aggregate data for all other operations presented here, as numbers are insignificant compared to Trail. See our website for full set of data.
(2) Information current at time of publication. However, values will be added, confirmed and/or changed once regulatory reporting for the 2019 period is complete. See our website for up-to-date information.
(3) Requirements and methods for determining air emissions can vary widely. Not all sites have monitoring equipment in place to measure releases from all sources and activities, and the frequency of sampling can vary.
(4) Our Canadian sites report annually to the National Pollutant Release Inventory (NPRI) and American operations report to the Toxic Release Inventory (TRI), which have different reporting requirements and calculation methods. Information in this table may not reflect exactly the contents of NPRI and/or TRI reports, due to different reporting definitions concerning site boundaries as well as the inclusion of mobile equipment in the above table, which is not required in some regulatory reporting requirements.

Trail has been a leader in driving down lead levels in air for a decade, and investments of over $40 million have resulted in a 56% reduction over the last three years. The primary way Trail is working towards reducing SO_2 emissions is through the new acid plant, which will reduce SO_2 emissions from zinc operations, although total emissions will vary year to year, based on production.

In 2019, Trail's air permit was reissued with more stringent ambient SO_2 requirements included by the B.C. Ministry of Environment and Climate Change Strategy. In response to these new requirements, Trail is developing an improved dispersion model with advanced predictive modelling and advancing milling and scrubbing engineering improvements, and evaluating other SO_2 reduction projects.

Case Study: Supporting Community-Led Air Quality Monitoring in Andacollo

In 2019, as part of our commitment to managing air quality, Teck supported the creation of a community-managed air quality monitoring station in the town of Andacollo, Chile, near our Carmen de Andacollo Operations. The monitoring station, which is the first of its kind in Chile, is fully managed by the town's Environmental Panel, giving community members control over real-time, reliable air quality data. The new air quality monitoring station complements Teck's existing monitoring network of six stations around Andacollo. Operated by the certified company SGS, the station measures particulate matter (PM) levels, allowing the local environmental panel to compare the data to Teck's monitoring stations and track progress on air quality management. Read the full case study at teck.com/news/stories/.

Ambient Air Quality Monitoring

As part of our ambient air quality monitoring program, we measure the concentration of particulate matter of a size less than 10 microns (PM_{10}) and particulate matter of a size less than 2.5 microns ($PM_{2.5}$) at monitoring stations. These monitoring stations use standardized equipment, per permit and regulatory requirements, and are located on our sites and in a number of community centres. Tables 31 and 32 summarize the ambient air quality during 2019 as measured at a number of community-based monitoring stations that we manage. Two values are presented:

- The annual average concentration that is based on the daily 24-hour average concentrations; this value reflects prolonged or repeated exposures over longer periods
- The annual peak 24-hour indicator that is based on the 98th percentile of the daily 24-hour average concentrations; this value reflects immediate exposures

At these monitoring stations, ambient air quality not only reflects the activities at our operations, but also other activities in the area such as other industries, vehicle traffic, firewood burning, forest fires and waste burning.

For all of the stations listed in Table 31, the annual average concentration of $PM_{2.5}$ was below the WHO Guideline value of 10 µg/m³. For the annual average concentration of PM_{10} at the stations listed in Table 32, 75% of the stations were below the WHO Guideline value of 20 µg/m³.

Table 31: Ambient Particulate Matter of Size Less Than 2.5 Microns (µg/m³)

Station	Nearest Operations	2019		2018		2017	
		Average Annual	98th Percentile	Average Annual	98th Percentile	Average Annual	98th Percentile
Urmeneta	Carmen de Andacollo	7	14	8	12	8	14
Downtown Sparwood	Elkview	7	14	8	52(1)	5	21
Elkford High School	Greenhills	4	16	7	52(1)	7	49

(1) Incomplete hourly data set, per the Canadian Council of Ministers of the Environment: Criteria ii. 2nd and 3rd quarters are not complete (<60% valid daily data sets in this quarter) for Elkview Operations and 3rd quarter is not complete for Greenhills Operations.

Table 32: Ambient Particulate Matter of Size Less Than 10 Microns (µg/m³)

Station	Nearest Operations	2019		2018		2017	
		Average Annual	98th Percentile	Average Annual	98th Percentile	Average Annual	98th Percentile
Urmeneta	Carmen de Andacollo	34	59	33	51	29	51
Downtown Sparwood	Elkview	13	44	17	82	14	44
Elkford High School	Greenhills	10	43	11	57	10	46(1)
Butler Park	Trail	14	28	26	165	18	54

(1) Incomplete hourly data set, per the Canadian Council of Ministers of the Environment: Criteria ii. 3rd quarter is not complete (<60% valid daily data sets in this quarter).

For more information about our emissions to air, such as nitrous oxides, volatile organic compounds and mercury, visit National Pollutant Release Inventory for our Canadian operations and Toxic Release Inventory for our American operations.

Outlook for Air Quality

In 2020, we will continue our commitment to improve air quality for the benefit of workers, communities and the environment in areas affected by our activities. We will evaluate more effective forms of dust suppressant for haul roads and tailings facilities, and conduct modelling to better understand how we can change our practices to improve air quality across our operations. Advancing additional ambient air quality monitoring at sites may allow for development of additional quantitative targets in the years to come.