

VO-TCS Report on Quality and Assurance

V1.0

For the “Guideline on SO₂ health effects” service

Quality assurance (data content)

During volcanic eruptions, various gases are emitted that are dispersed in the prevailing wind direction. Therefore, air pollution can be hazardous to humans, animals, vegetation and properties. The most common volcanic gas in volcanoes is water vapour, which is harmless. Carbon dioxide (CO₂), sulphur dioxide (SO₂) and hydrogen sulphide (H₂S) are also emitted. Lesser amounts of hydrogen chloride (HCl), hydrogen fluoride (HF) and carbon monoxide (CO) can also be emitted. The same volcanic gases can be found in geothermal areas.

During volcanic eruptions in Iceland, the Icelandic Meteorological Office measures pollution in the vicinity of the crater and runs a dispersion model to provide forecasts based on the measurements. The Environment Agency of Iceland measures air quality levels in settled areas and publishes the monitoring data on its website at loftgaedi.is.

During the eruption at Bárðarbunga volcano in 2014-2015 which featured the lava field in Holuhraun, the EAI issued a table to warn people about the possible effects due to exposure to SO₂ gas. The same values were used to visualize the results of the dispersal forecasts issued daily by IMO. The table was adopted from the one developed by the Hawaii Department of Public Health and in use at the Hawaiian Volcano Observatory (website of HDPH, 2016). The table was adapted to air quality standards valid in Iceland (EAI's website, 2016). Copies of this table were handed out personally to people living in the eastern part of the country (frequently affected by the gas cloud presence), prioritizing distribution in facilities and infrastructure for sensitive populations, such as schools, hospitals, and day care centres. People were asked to follow the recommendations reported in the table in order to reduce the potential health effects from exposure to dangerous concentrations of this gas. People were asked to consult the table for actions to take when high concentrations were forecasted and/or measured.

The same table was used during the management of the effusive eruptions which occurred in the Reykjanes peninsula in 2021 and 2022. On that occasion the Chief Epidemiologist, in collaboration with various institution in Iceland, issued a booklet “HEALTH RISKS DUE TO AIR POLLUTION FROM VOLCANIC ERUPTIONS” which contains the guideline for SO₂ exposure and health effects.

Quality check:

The Table is reported and presented in a variety of official documents published by

- the Environment Agency of Iceland, <https://ust.is/english/air-climate/air-pollution-during-a-volcanic-eruption/>

- the Directorate of Health,
https://www.landlaeknir.is/servlet/file/store93/item45005/Haetta%20a%20heilsutjoni%20vegn%20loftmengunar_EN%202.pdf
- the Icelandic Meteorological Office,
<https://www.sciencedirect.com/science/article/pii/S0377027319304020> (BARSOTTI, S., et al. Operational response and hazards assessment during the 2014–2015 volcanic crisis at Bárðarbunga volcano and associated eruption at Holuhraun, Iceland. *Journal of Volcanology and Geothermal Research*, 2020, 390: 106753).