Sulphur dioxide concentrations

This factsheet presents indicators of sulphur dioxide concentrations at monitoring sites in New Zealand between 2008 and 2017. Concentrations are measured against the National Environmental Standard for Air Quality (NESAQ) and a WHO guideline for sulphur dioxide exposure.

Key facts

Two out of nine monitoring sites (Christchurch and Mount Maunganui) exceeded the not-to-be exceeded upper national standard (one-hour average) for SO_2 twice each between 2008 and 2017.

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Four out of nine monitoring sites (Christchurch, Auckland and two sites in Mount Maunganui) exceeded the lower national standard (one-hour average) for SO_2 57-times between 2008 and 2017.

The WHO guideline (24-hour average) was exceeded by six monitoring stations 1,266-times between 2008 and 2017.

What is sulphur dioxide?

Sulphur dioxide (SO_2) is a colourless gas that has a strong smell. It is produced from the combustion of sulphur-containing fuels such as coal and oil (eg. electricity generation, domestic and international shipping). Other industrial activities such as aluminium production and fertilizer manufacturing are also a source of SO_2 (Ministry for the Environment 2011; Ministry for the Environment and Stats NZ 2018).

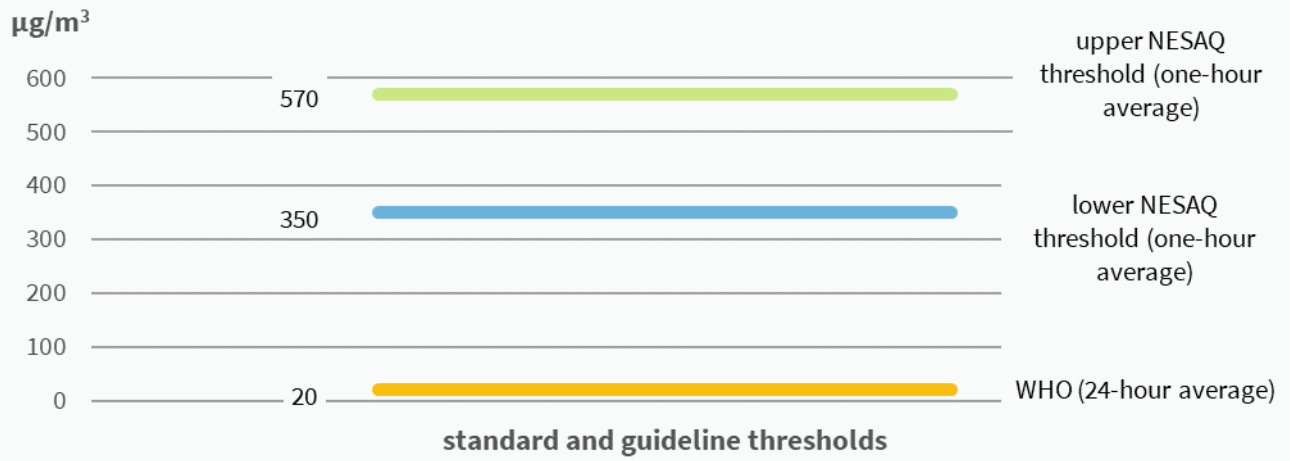
SO_2 easily reacts with other substances (eg. water) to form harmful compounds such as sulphuric acids (Ministry for the Environment 2011). It can also react with other air pollutants to form smaller, more harmful particles or create poor visibility (Ministry for the Environment and Stats NZ 2018; WHO 2013).

SO_2 increases the risk of respiratory illnesses

SO_2 exposure is associated with respiratory problems such as bronchitis and hospital admissions due to asthma. Children, asthmatics, and people with chronic lung disease are most at risk of developing these health problems (WHO 2013).

SO_2 air quality standards and guidelines have been developed to provide some level of protection against health risks. One-hour average SO_2 concentrations are measured against an upper and lower threshold value contained in the National Environmental Standards for Air Quality (NESAQ). Additionally, daily concentrations (24-hour average) can be compared against international WHO guidelines (Figure 1).

Figure 1: SO_2 standard (one-hour average) and guideline (24-hour average)

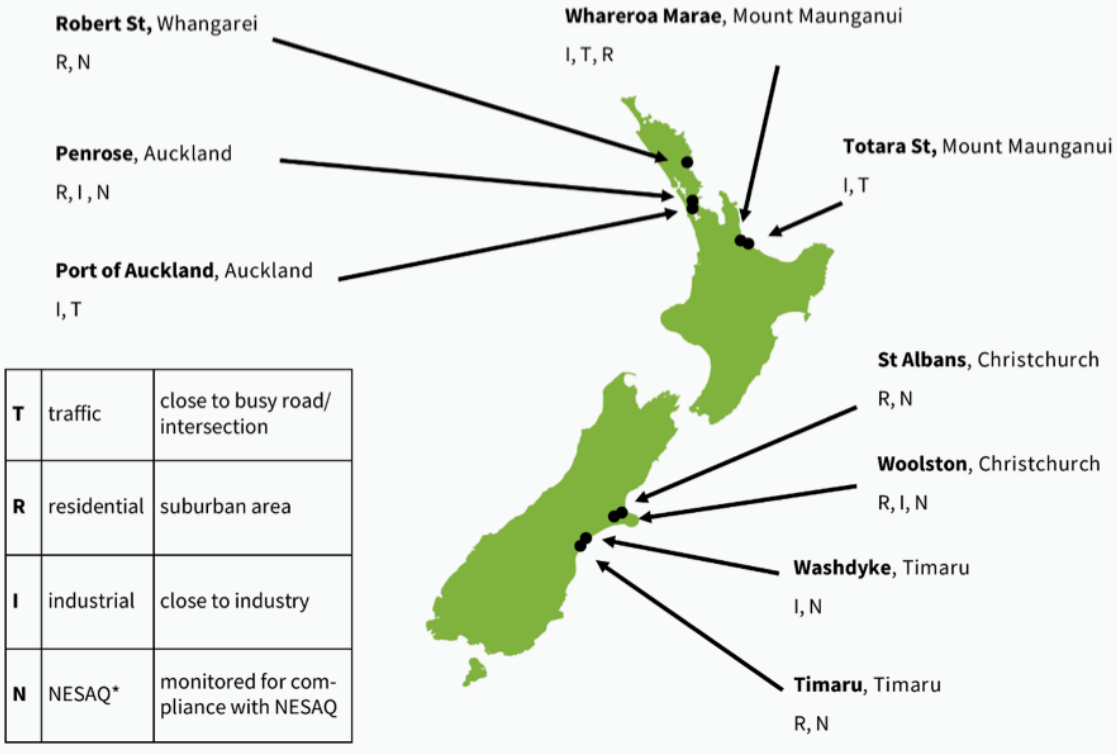


Source: Ministry for the Environment and Stats NZ 2018
Note: National Environmental Standards for Air Quality (NESAQ), World Health Organization (WHO). Exceedances occur when concentrations are greater than the stated values. Nine (zero) exceedances of the lower (upper) NESAQ threshold are allowed in a 12-month period.

Two monitoring sites exceeded the upper NESAQ threshold

Between 2008 and 2017, nine monitoring sites had valid data for SO2 exposure (Figure 2).

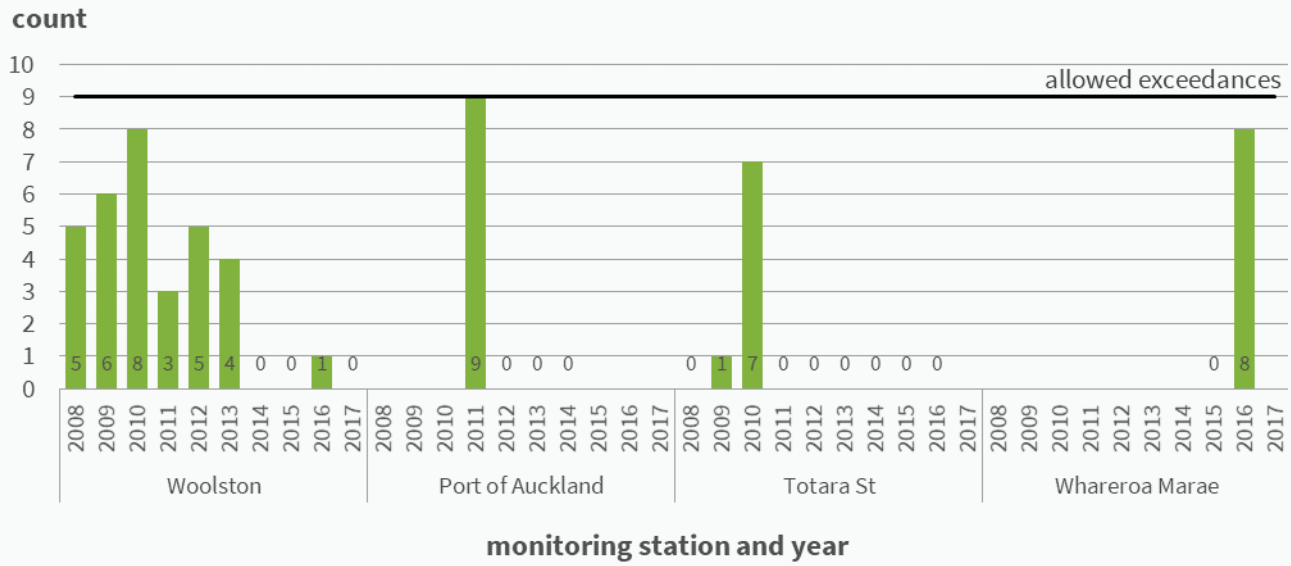
Figure 2: Monitoring stations with valid data, 2008-2017



Source: Ministry for the Environment and Stats NZ 2018
Note: *NESAQ (National Environmental Standards for Air Quality)

Four out of nine sites exceeded the lower 350 µg/m^3 threshold of the national one-hour average standard between 2008 and 2017 (Figure 3). None of the monitoring stations exceeded this threshold more than the allowed 9 times in a 12-month period.

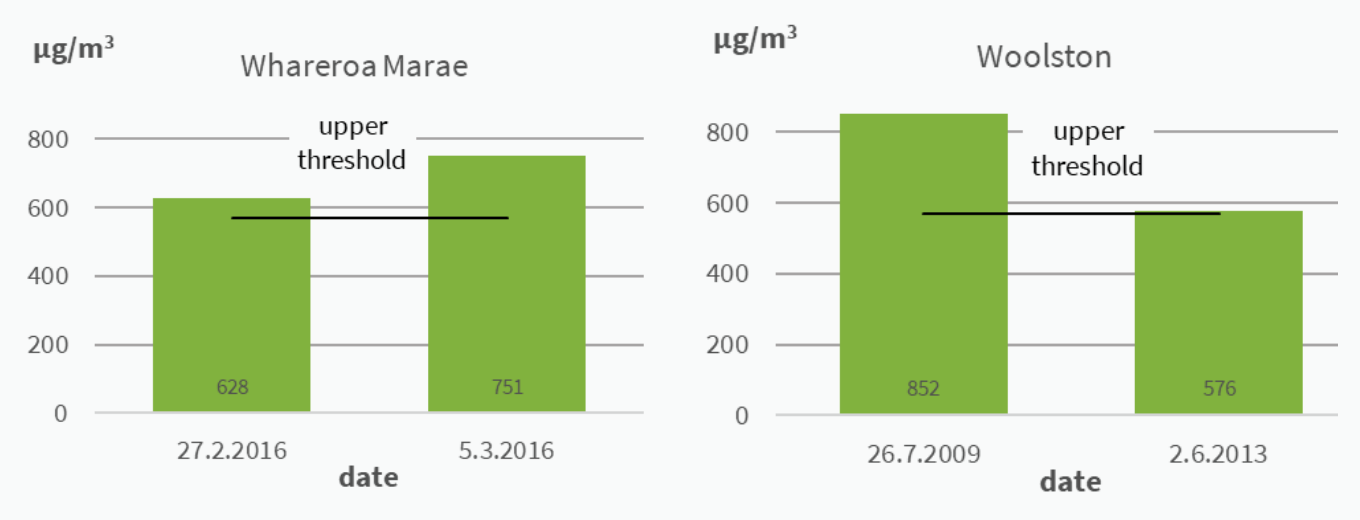
Figure 3: Number of exceedances of the NESAQ's lower threshold*, 2008-2017



Source: Ministry for the Environment and Stats NZ 2018
Note: *350µg/m^3, nine exceedances per 12-month period allowed. Missing data labels are associated with no data for that year, i.e. no monitoring data available or data not valid for that year.

Whareroa Marae (Mount Maunganui) and Woolston (Christchurch) exceeded the upper 570 µg/m^3 threshold of the national one-hour average standard twice between 2008 and 2017 (Figure 4). No exceedances of this threshold are allowed. Both sites are classified as industrial sites (i.e. close to industrial activities).

Figure 4: Monitoring stations exceeding NESAQ's upper threshold*, 2008-2017



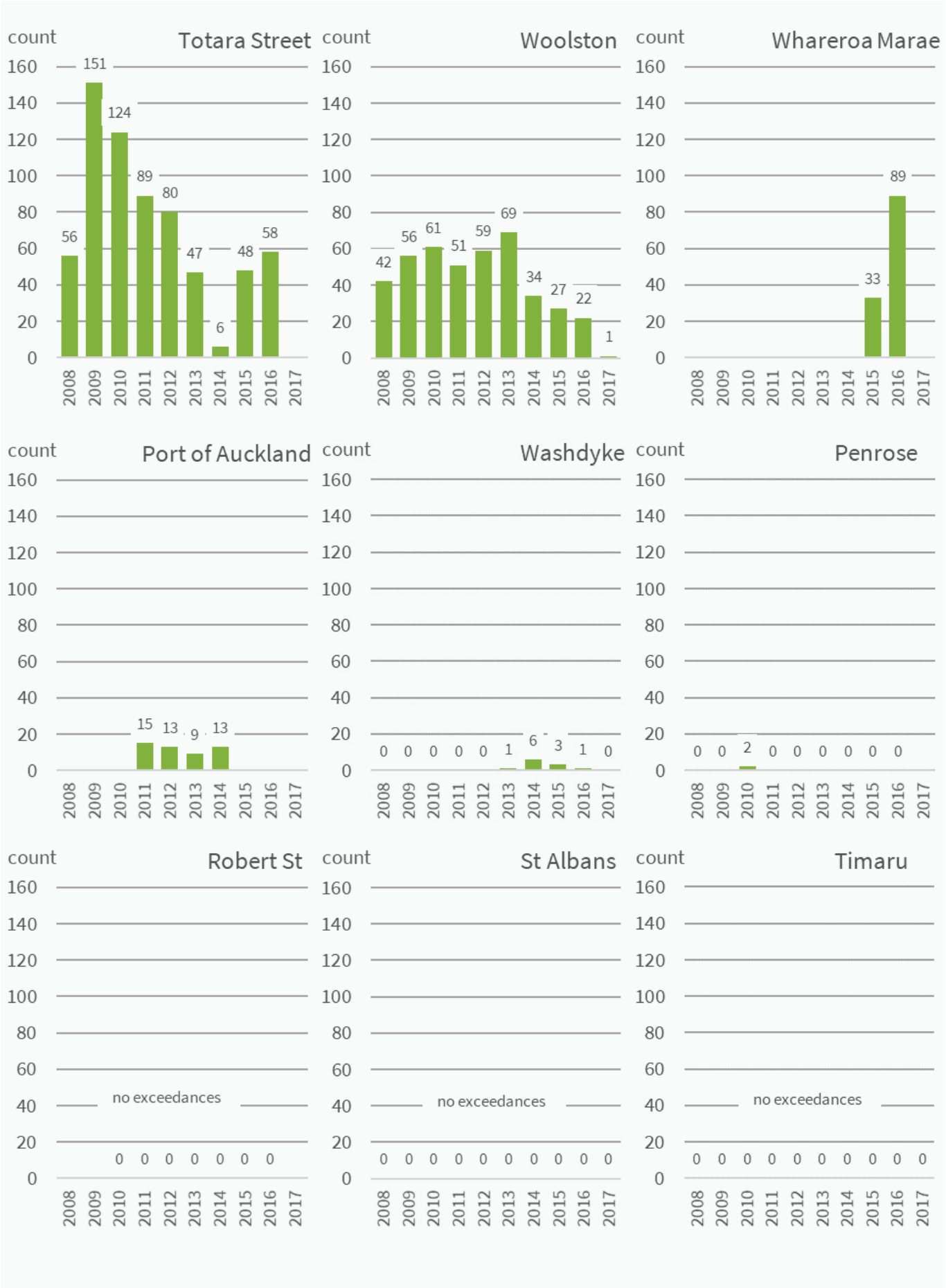
Source: Ministry for the Environment and Stats NZ 2018
Notes: *570µg/m^3, no exceedances allowed

The 24-hour average WHO guideline was exceeded by six out of nine monitoring stations

Six out of nine monitoring sites exceeded the 24-hour average WHO guideline of 20µg/m^3 between 2008 and 2017 (Figure 5).

Totara St (Mount Maunganui) exceeded the guideline the most – 659 times between 2008 and 2017. Residential monitoring sites such as Timaru, St Albans (Christchurch), Robert St (Whangarei) reported no exceedances of the WHO guideline between 2008 and 2017.

Figure 5: Number of exceedances of WHO 24-hour average guideline (20µg/m³), 2008-2017



Notes: Missing data labels are associated with no data for that year, i.e. no monitoring data available or data not valid for that year.

Data for this indicator

Monitoring sites exceeding the national environmental standard (one-hour average) for sulphur dioxide
One-hour average sulphur dioxide concentration data comes from the Ministry for the Environment and Stats NZ (Ministry for the Environment and Stats NZ 2018) as part of New Zealand's Environmental Reporting Series. One-hour average sulphur dioxide concentrations (in $\mu g/m^3$) are compared with the National Environmental Standard for Air Quality for sulphur dioxide. The lower threshold is exceeded when concentrations are above $350\mu g/m^3$ and the upper threshold is exceeded when concentrations are above $570\mu g/m^3$. The lower threshold is allowed to be exceeded nine times in a 12-month period, whereas the upper threshold is not allowed to be exceeded. For additional information, see the metadata link below.

Monitoring sites exceeding the WHO daily guideline for sulphur dioxide
One-hour average sulphur dioxide concentration data comes from the Ministry for the Environment and Stats NZ (Ministry for the Environment and Stats NZ 2018) as part of New Zealand's Environmental Reporting Series. 24-hour averages are calculated and measured against the WHO daily average guideline. Exceedances occur when concentrations are above $20\mu g/m^3$. For additional information, see the metadata link below.

References

Ministry for the Environment. 2011. *2011 User's Guide to the revised National Environmental Standards for Air Quality. Updated 2014.* Wellington: Ministry for the Environment.

Ministry for the Environment and Stats NZ. 2018. *Our air 2018. Data to 2017*. Wellington: Ministry for the Environment.

WHO. 2006. *WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide. Global update 2005. Summary of risk assessment.* Geneva: World Health Organization.

WHO. 2013. *Review of evidence on health aspects of air pollution – REVIHAAP Project*. Copenhagen: WHO Regional Office for Europe.

Other air quality topics include

- Wood and coal fires
- Motor vehicles
- Particulate matter
- Health effects of air pollution

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Further information

For descriptive information about the data one-hour average concentrations and daily average concentrations

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