AIR QUALITY

Key Points

▪ Air pollution can be an issue in Canterbury towns and cities, mainly during the coldest months
▪ Of the five contaminants listed in the National Environmental Standards for Air Quality (NESAQ):
  ▪ daily average PM$_{10}$ concentrations breach the NESAQ on some days during the coldest months every year
  ▪ SO$_2$ and CO have breached the NESAQ in Christchurch
  ▪ NO$_2$ and O$_3$ are unlikely to regularly breach the NESAQ
▪ The main source of PM$_{10}$ in Canterbury’s towns and cities is from burning wood for home heating. Other sources include industry and transport
▪ Environment Canterbury is working closely with industry to reduce SO$_2$ in Christchurch
▪ Other contaminants not listed in the NESAQ, including PM$_{2.5}$, benzo(a)pyrene (BaP) and arsenic, are of concern
▪ Home heating is the main source of PM$_{10}$ and BaP. Arsenic is emitted when treated timber is burned
▪ Strategies that reduce emissions of PM$_{10}$ from home heating will also lower emissions of PM$_{2.5}$, BaP and possibly arsenic
▪ The Canterbury earthquakes affected air quality in a number of ways in Christchurch.

See the airshed monitoring results pages for each Canterbury airshed

NATIONAL AIR QUALITY STANDARDS AND REGIONAL AIR QUALITY

The Government set national environmental standards for air quality in 2004 and updated these in 2011. These standards are currently under review. The legislation that sets these standards is called the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 – commonly referred to as the NESAQ. The standards include five main air contaminants that, when breathed in, can cause negative effects to people’s health (see table page 3):
▪ PM$_{10}$ (stands for particulate matter or particles of smoke, dust, pollen, soot or anything in the air that is smaller than 10 micrometres in diameter)
▪ sulphur dioxide (SO$_2$)
▪ carbon monoxide (CO)
▪ nitrogen dioxide (NO$_2$)
▪ ozone (O$_3$).

To find out more about these contaminants: http://mfe.govt.nz/air/specific-air-pollutants

Canterbury has eight gazetted airsheds (see map page 4) that are identified as having high levels of pollution that exceed the national environmental standard. Each of these airsheds (Christchurch, Kaiapoi, Rangiora, Ashburton, Timaru, Washdyke, Waimate and Geraldine) has targets for compliance with the NESAQ from 1 September 2016 and 2020.

What is Environment Canterbury doing in response to air pollution?
▪ Warmer Cheaper campaign
▪ Developing airshed strategies under the regional Air Plan to meet the NESAQ
▪ Helping householders to reduce emissions through better wood burning
▪ Encouraging development of ultra-low emissions technology for home heating
▪ Working with key partners and stakeholders
▪ Monitoring air quality.

Find out about other air quality monitoring information:
▪ LAWA air quality lawa.org.nz/explore-data/air-quality/
▪ Ministry for the Environment air quality reports mfe.govt.nz/publication-search

Find out about Warmer Cheaper
▪ warmercheaper.co.nz

To read more about guidelines for air quality, see page 2

Find out about the NESAQ:

AIRSHED MONITORING RESULTS

<table>
<thead>
<tr>
<th>Airshed</th>
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</thead>
<tbody>
<tr>
<td>Rangiora airshed</td>
<td>pg 5</td>
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<tr>
<td>Kaiapoi airshed</td>
<td>pg 6</td>
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<tr>
<td>Christchurch airshed</td>
<td>pg 7</td>
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<tr>
<td>Ashburton airshed</td>
<td>pg 9</td>
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<td>Geraldine airshed</td>
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<tr>
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<td>pg 11</td>
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<tr>
<td>Washdyke airshed</td>
<td>pg 13</td>
</tr>
<tr>
<td>Waimate airshed</td>
<td>pg 14</td>
</tr>
</tbody>
</table>

Find out about other air quality monitoring information:
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Find out about Warmer Cheaper
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To read more about guidelines for air quality, see page 2

Find out about the NESAQ:
GUIDELINES AND REGULATIONS FOR AIR CONTAMINANTS

In New Zealand regional councils are responsible for managing air quality. This is done with reference to the Ministry for the Environment’s Ambient Air Quality Guidelines (AAQG) as well as the NESAQ. The AAQG address 15 priority air contaminants, 5 of which have been developed into NESAQ. The AAQG “values are the minimum requirements that outdoor air quality should meet to protect human health and the environment. Where air pollution levels breach values, emission reduction strategies should be implemented to improve air quality. Where levels do not breach the values, efforts should be made to maintain air quality, and, if possible, reduce emissions.”

In instances where there is no NESAQ or AAQG, such as for PM$_{2.5}$, then contaminant concentrations are sometimes evaluated against international guidelines and standards (e.g. World Health Organisation, European Union and the United States Environment Protection Agency). At the national level, the Ministry for the Environment reports against both New Zealand and international guidelines and standards.

For the purpose of this snapshot, the focus is on New Zealand guidelines and standards. For PM$_{10}$ the daily and annual average values are the same in the New Zealand and World Health Organisation guidelines. Where there is no national guideline (e.g. annual average PM$_{2.5}$) reference is made to the World Health Organisation guidelines.

PM$_{10}$ – the main concern

The main air contaminant requiring action in Canterbury is PM$_{10}$. Although the annual average concentrations in most airsheds are below national guidelines, daily averages can breach the NESAQ. The NESAQ requires that from 1 September 2016 there shall be no more than:

- one high pollution day per year in Rangiora, Geraldine and Washdyke
- three high pollution days per year in Kaiapoi, Christchurch, Ashburton, Timaru and Waimate.

From 1 September 2020, all Canterbury airsheds must have no more than one high pollution day per year.

A high PM$_{10}$ pollution day is when the NESAQ threshold of 50 µ/m$^3$ for PM$_{10}$ is exceeded – measured as a 24-hr average. There are several high pollution days each year in Canterbury airsheds. The highest concentrations generally occur on still, cold evenings during winter. At this time the main source of emissions is usually from home heating.

The number of days with high PM$_{10}$ has decreased in most airsheds.

AIR QUALITY HAS BEEN MANAGED IN DIFFERENT WAYS ACROSS CANTERBURY’S EIGHT AIRSHEDS TO TAKE INTO ACCOUNT LOCAL CONDITIONS. MANAGEMENT HAS INCLUDED THE USE OF RULES THROUGH THE REGIONAL AIR PLAN FOR HOME HEATING IN SOME AIRSHEDS, AND NON-REGULATORY MEASURES, INCLUDING EDUCATION AND AWARENESS CAMPAIGNS, IN OTHERS.

While, generally, there have been improvements in air quality in Canterbury, further improvement is needed in all airsheds to meet the NESAQ.

A more integrated approach to air quality improvement – that includes education, incentives, compliance and enforcement is needed. This approach has been progressed through the Canterbury Air Regional Plan. For more information see ecan.govt.nz/airplan

MEETING THE NATIONAL AIR QUALITY STANDARD FOR PM$_{10}$ IN CANTERBURY

PM$_{10}$ – the main concern

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A high PM$_{10}$ pollution day is when the NESAQ threshold of 50 µ/m$^3$ for PM$_{10}$ is exceeded – measured as a 24-hr average. There are several high pollution days each year in Canterbury airsheds. The highest concentrations generally occur on still, cold evenings during winter. At this time the main source of emissions is usually from home heating.

The number of days with high PM$_{10}$ has decreased in most airsheds.

Air quality has been managed in different ways across Canterbury’s eight airsheds to take into account local conditions. Management has included the use of rules through the regional Air Plan for home heating in some airsheds, and non-regulatory measures, including education and awareness campaigns, in others.

While, generally, there have been improvements in air quality in Canterbury, further improvement is needed in all airsheds to meet the NESAQ.

A more integrated approach to air quality improvement – that includes education, incentives, compliance and enforcement is needed. This approach has been progressed through the Canterbury Air Regional Plan. For more information see ecan.govt.nz/airplan

PM$_{10}$: NUMBER OF HIGH POLLUTION DAYS

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<tr>
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<tr>
<td>Timaru</td>
<td>33</td>
<td>30</td>
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<td>26</td>
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</tbody>
</table>

GUIDELINES AND REGULATIONS FOR AIR CONTAMINANTS

In New Zealand regional councils are responsible for managing air quality. This is done with reference to the Ministry for the Environment’s Ambient Air Quality Guidelines (AAQG) as well as the NESAQ. The AAQG address 15 priority air contaminants, 5 of which have been developed into NESAQ. The AAQG “values are the minimum requirements that outdoor air quality should meet to protect human health and the environment. Where air pollution levels breach values, emission reduction strategies should be implemented to improve air quality. Where levels do not breach the values, efforts should be made to maintain air quality, and, if possible, reduce emissions.”

In instances where there is no NESAQ or AAQG, such as for PM$_{2.5}$, then contaminant concentrations are sometimes evaluated against international guidelines and standards (e.g. World Health Organisation, European Union and the United States Environment Protection Agency). At the national level, the Ministry for the Environment reports against both New Zealand and international guidelines and standards.

For the purpose of this snapshot, the focus is on New Zealand guidelines and standards. For PM$_{10}$ the daily and annual average values are the same in the New Zealand and World Health Organisation guidelines. Where there is no national guideline (e.g. annual average PM$_{2.5}$) reference is made to the World Health Organisation guidelines.
## AIR CONTAMINANTS OF CONCERN IN CANTERBURY (NESAQ AND OTHERS)

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>What is it and where does it come from</th>
<th>Human health effects</th>
<th>Actions everyone can take to reduce contaminant emissions</th>
</tr>
</thead>
</table>
| **Particulate Matter** | Airborne particles less than 10 micrometres in diameter (about a fifth of the thickness of a human hair). It includes fine particles (less than 2.5 micrometers) and coarse particles (between 2.5 and 10 micrometers). PM$_{2.5}$ is produced by the combustion of wood and fossil fuels (mostly by home heating and traffic). Dust, pollen and other natural particles are typically in the 2.5 to 10 micrometer range. | Airborne particles that are small enough to be breathed in, and to penetrate into the human lung can cause negative health effects for people's respiratory and cardiovascular systems. | **Home heating:**
  - Burn dry seasoned wood only
  - Get your fire going quickly and keep it burning hot
  - Don't damp your fire down over night
  - Switch to a non-emitting home heating source
  - Switch to a pellet fire or an ultra-low emissions wood burner.

**Vehicles:**
  - Keep your vehicle regularly serviced and tuned
  - Consider alternative travel methods - bus, bike or walk. |

**PM$_{2.5}$**
- *Fine fraction*

**PM$_{2.5-10}$**
- *Coarse fraction*

| **Benzo(a)pyrene (BaP)** | BaP is a polycyclic aromatic hydrocarbon (PAH). BaP is released into the air, as a by-product of incomplete combustion (eg in vehicle exhaust and in smoke produced from wood and coal fires). The main source of BaP is from transport and from the burning of wood and coal for home heating. | BaP is classified by the World health organisation (WHO) as ‘probably carcinogenic’ (cancer causing) to humans. BaP can enter the body through inhalation. When breathed in to the lungs, BaP can cause irritation to the lungs and respiratory system. | **Disposing of timber waste:**
  - Don’t burn treated timber
  - Dispose of treated timber waste to authorised landfill. |
Environment Canterbury monitors concentrations of various contaminants. PM$_{10}$ is currently measured at nine locations in Canterbury’s eight airsheds.

**HOW WEATHER IMPACTS AIR POLLUTION**

Due to the combined effects of high emissions and Canterbury’s weather and landscape, during calm winter nights pollution can be trapped in a layer of cold air near the surface.

**Early morning**
As the day starts, contaminants are emitted from towns and cities.

**Daytime**
The sun warms the earth’s surface and the resulting sea-breeze disperses the contaminants.

**Evening**
Rapid cooling of the ground creates a layer of cold air trapping emissions, e.g. from home heating.

**Night**
Cool air drains down the mountains and slowly moves the contaminants towards the coast.
Key Points

- Air pollution can be an issue in Rangiora, mainly during the coldest months.
- Of the five contaminants listed in the NESAQ, PM$_{10}$, SO$_2$, and CO have been measured over a number of years, and there have been no breaches of the NESAQ for SO$_2$ or CO. NO$_2$ and O$_3$ are unlikely to breach the NESAQ.
- Daily average PM$_{10}$ concentrations exceed 50 µg/m$^3$ mainly during the coldest months every year, but annual averages in the last few years have been below the national guideline.
- Of the three main sources of PM$_{10}$ (home heating using wood and coal, industry and transport), an estimated 79% of the PM$_{10}$ comes from home heating on a typical winter day.
- Other contaminants, including PM$_{2.5}$, benzo(a)pyrene (BaP) and arsenic, are of concern - PM$_{2.5}$ concentrations exceeded the WHO guideline of 25 µg/m$^3$ on 17 days during 2016.
  - Home heating is the main source of PM$_{2.5}$ and BaP in winter.
  - Arsenic is emitted when treated timber is burned.
  - Strategies that reduce PM$_{10}$ emissions from the burning of wood and coal for home heating, will lower emissions of PM$_{2.5}$, BaP and possibly arsenic.

Number of days PM$_{10}$ was greater than 50 µg/m$^3$

The graph below shows daily average PM$_{10}$ concentrations. The red line shows the NESAQ for PM$_{10}$. The red number is the total number of days the NESAQ was exceeded that year. The NESAQ target is 1 day from 1 September 2016.

How is PM$_{10}$ tracking in Rangiora?

The number of PM$_{10}$ exceedances each year in Rangiora has ranged from 3 to 13, driven mainly by weather. A reduction in PM$_{10}$ emissions is still needed to meet the NESAQ of no more than one exceedance from 1 September 2016.

See: lawa.org.nz/explore-data/air-quality/ to check air pollution in Rangiora during the last few hours and days. You can also find more information on Environment Canterbury’s air quality page: www.ecan.govt.nz/data/air-quality-data
**AIR QUALITY IN KAIAPOI**

**Winter 2016**

### Key Points

- Air pollution can be an issue in Kaiapoi mainly during the coldest months.
- Of the five contaminants listed in the NESAQ, PM$_{10}$, SO$_2$, and CO have been measured over a number of years, and there have been no breaches of the NESAQ for SO$_2$ or CO. NO$_2$ and O$_3$ are unlikely to breach the NESAQ.
- Daily average PM$_{10}$ concentrations exceed 50 µg/m$^3$ mainly during the coldest months every year, but annual averages in the last few years have been below the national guideline.
- Of the three main sources of PM$_{10}$ (home heating using wood and coal, industry, and transport), an estimated 90% of the PM$_{10}$ comes from home heating on a typical winter day.
- Other contaminants, including PM$_{2.5}$, benzo(a)pyrene (BaP) and arsenic, are of concern.
  - Home heating is the main source of PM$_{2.5}$ and BaP in winter.
  - Arsenic is emitted when treated timber is burned.
  - Strategies that reduce PM$_{10}$ emissions from the burning of wood and coal for home heating, will lower emissions of PM$_{2.5}$, BaP and possibly arsenic.

**The Kaiapoi airshed**

![Map of Kaiapoi airshed with monitoring station](image)

See: [lawa.org.nz/explore-data/air-quality/](lawa.org.nz/explore-data/air-quality/) to check air pollution in Kaiapoi in the last few hours and days. You can also find more information on Environment Canterbury’s air quality page: [www.ecan.govt.nz/data/air-quality-data](www.ecan.govt.nz/data/air-quality-data)

### PM$_{10}$ in Kaiapoi

The graph below shows daily average PM$_{10}$ concentrations. The red line shows the NESAQ for PM$_{10}$. The red number is the total number of days the NESAQ was exceeded that year. The NESAQ target is 3 days from 1 September 2016 and 1 day from 1 September 2020.

**How is PM$_{10}$ tracking in Kaiapoi?**

There has been an improvement in air quality since the early 2000s. A further reduction in PM$_{10}$ emissions is still needed to meet the NESAQ targets.

### Number of days PM$_{10}$ was greater than 50 µg/m$^3$

![Graph showing number of days PM$_{10}$ was greater than 50 µg/m$^3$](image)
AIR QUALITY IN CHRISTCHURCH

Winter 2016

Key Points

- All of the five contaminants listed in the NESAQ, PM$_{10}$, NO$_2$, SO$_2$, CO and O$_3$ have been measured over a number of years. SO$_2$ and CO have exceeded their NESAQ thresholds at times, but not regularly
  - Environment Canterbury is working closely with industry to reduce SO$_2$ emissions
- PM$_{10}$ concentrations exceed national guidelines and standards mainly during the coldest months
- Of the three main sources of PM$_{10}$ (home heating using wood and coal, industry and transport), an estimated 67% of the PM$_{10}$ comes from home heating on a typical winter day
- Other contaminants, including PM$_{2.5}$, benzo(a) pyrene (BaP) and arsenic, are of concern
  - PM$_{2.5}$ concentrations exceeded the WHO guidelines
  - Home heating is the main source of PM$_{2.5}$ and BaP in winter
  - Arsenic is emitted when treated timber is burned
  - Strategies that reduce PM$_{10}$ emissions from the burning of wood and coal for home heating, will lower emissions of PM$_{2.5}$, BaP and possibly arsenic

The Christchurch airshed

See: lawa.org.nz/explore-data/air-quality/ to check air pollution in Christchurch in the last few hours and days. You can also find more information on Environment Canterbury’s air quality page: www.ecan.govt.nz/data/air-quality-data

PM$_{10}$ in Christchurch

The graph below shows daily average PM$_{10}$ concentrations measured in Christchurch.

The red line shows the NESAQ for PM$_{10}$. The red number is the total number of days the NESAQ was exceeded that year. The NESAQ target is 3 days from 1 September 2016 and 1 day from 1 September 2020.

How is PM$_{10}$ tracking in Christchurch?

There has been an improvement in air quality since the 1990s. A further reduction in PM$_{10}$ emissions is still needed to meet the NESAQ targets.

Number of days PM$_{10}$ was greater than 50 µg/m$^3$

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<thead>
<tr>
<th>Year</th>
<th>Number of Days Above 50 µg/m$^3$</th>
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<td>2021</td>
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</table>

Main sources of PM$_{10}$ in Christchurch in winter

- Home Heating: 67%
- Vehicles: 14%
- Industry: 19%
In these graphs, each column shows the daily fine particle (dark) and coarse particle concentrations (light) during 2016. Together these show the PM$_{10}$ concentration each day it was measured. A seasonal variation is obvious in the concentrations of fine particles, but not coarse. The highest PM$_{10}$ and PM$_{2.5}$ concentrations occurred during the coldest months, when exceedances of guidelines occurred.

During 2016 there were 3 days measured at the monitoring site in St Albans and 4 days in Woolston when PM$_{10}$ was greater than 50 µ/m$^3$. There were 15 days in St Albans and 5 days in Woolston when PM$_{2.5}$ was greater than 25 µ/m$^3$ (WHO guideline value). On those PM$_{10}$ exceedance days in St Albans, 82% of the PM$_{10}$ were fine particles. On the exceedance days in Woolston site 41% of the PM$_{10}$ were fine particles.
AIR QUALITY IN ASHBURTON

Winter 2016

Key Points

- Air pollution can be an issue in Ashburton, mainly during the coldest months.
- Of the five contaminants listed in the NESAQ, PM$_{10}$, SO$_2$, and CO have been measured over a number of years, and there have been no breaches of the NESAQ for SO$_2$ or CO. NO$_2$ and O$_3$ are unlikely to breach the NESAQ.
- Daily average PM$_{10}$ concentrations exceed 50 µm$^{-3}$ mainly during the coldest months every year. Annual averages in most years have been above the national guideline.
- Of the three main sources of PM$_{10}$ (home heating using wood and coal, industry and transport), an estimated 93% of the PM$_{10}$ comes from home heating on a typical winter day.
- Other contaminants, including PM$_{2.5}$, benzo(a)pyrene (BaP) and arsenic, are of concern - PM$_{2.5}$ concentrations exceeded the WHO guideline of 25 µm$^{-3}$ on 23 days during 2016.
  - Home heating is the main source of PM$_{2.5}$ and BaP in winter.
  - Arsenic is emitted when treated timber is burned.
  - Strategies that reduce PM$_{10}$ emissions from the burning of wood and coal for home heating, will lower emissions of PM$_{2.5}$, BaP and possibly arsenic.

The Ashburton airshed

See: lawa.org.nz/explore-data/air-quality/ to check air pollution in Ashburton in the last few hours and days. You can also find more information on Environment Canterbury’s air quality page: www.ecan.govt.nz/data/air-quality-data

PM$_{10}$ in Ashburton

The graph below shows daily average PM$_{10}$ concentrations. The red line shows the NESAQ for PM$_{10}$. The red number is the total number of days the NESAQ was exceeded that year. The NESAQ target is 3 days from 1 September 2016 and 1 day from 1 September 2020.

How is PM$_{10}$ tracking in Ashburton?

There has been an improvement in air quality since the mid 2000s. A reduction in PM$_{10}$ may still be needed to consistently meet the NESAQ targets.

Number of days PM$_{10}$ was greater than 50 µm$^{-3}$
AIR QUALITY IN GERALDINE

Winter 2016

Key Points

- Air pollution can be an issue in Geraldine mainly during the coldest months.
- Of the five contaminants listed in the NES AQ, PM$_{10}$, SO$_2$, and CO have been measured over a number of years. There have been no breaches of the NES AQ for SO$_2$ or CO. NO$_2$ and O$_3$ are unlikely to breach the NES AQ.
- Daily average PM$_{10}$ concentrations exceed 50 µ/m$^3$ mainly during the coldest months every year, but annual averages in the last few years have been below the national guideline.
- Of the three main sources of PM$_{10}$ (home heating using wood and coal, industry and transport), an estimated 98% of the PM$_{10}$ comes from home heating on a typical winter day.
- Other contaminants, including PM$_{2.5}$, benzo(a)pyrene (BaP) and arsenic, are of concern - PM$_{2.5}$ concentrations exceeded the WHO guideline of 25 µ/m$^3$ on 20 days during 2016.
  - Home heating is the main source of PM$_{2.5}$ and BaP in winter.
  - Arsenic is emitted when treated timber is burned.
  - Strategies that reduce PM$_{10}$ emissions from the burning of wood and coal for home heating, will lower emissions of PM$_{2.5}$, BaP and possibly arsenic.

The Geraldine Airshed

![Geraldine Airshed Map]

See: lawa.org.nz/explore-data/air-quality/ to check air pollution in Geraldine in the last few hours and days. You can also find more information on Environment Canterbury’s air quality page: www.ecan.govt.nz/data/air-quality-data

PM$_{10}$ in Geraldine

The graph below shows daily average PM$_{10}$ concentrations. The red number is the total number of days the standard was exceeded that year. The NES AQ target is 1 day from 1 September 2016.

How is PM$_{10}$ tracking in Geraldine?

The number of PM$_{10}$ exceedances each year in Geraldine has ranged from zero to eight, driven mainly by weather. A reduction in PM$_{10}$ emissions may still be needed to consistently meet the NES AQ of no more than one exceedance from 1 September 2016.

Number of days PM$_{10}$ was greater than 50 µ/m$^3$
Air Quality in Timaru

Winter 2016

Key Points

- Of the five contaminants listed in the NESAQ, PM$_{10}$, SO$_2$, and CO have been measured over a number of years. There have been no breaches of the NESAQ for SO$_2$ or CO. NO$_2$ and O$_3$ are unlikely to breach the NESAQ.

- PM$_{10}$ concentrations exceed national guidelines and standards in Timaru mainly during the coldest months.

- Of the three main sources of PM$_{10}$ (home heating using wood and coal, industry, and transport), an estimated 95% of the PM$_{10}$ comes from home heating on a typical winter day.

- Other contaminants, including PM$_{2.5}$, benzo(a)pyrene (BaP) and arsenic, are of concern.
  - A study conducted in Timaru in 2007 found that daily average PM$_{2.5}$ concentrations exceeded WHO guideline, annual average BaP was greater than the ambient air quality guideline and concentrations of arsenic were elevated.
  - Home heating is the main source of PM$_{2.5}$ and BaP in winter.
  - Arsenic is emitted when treated timber is burned.
  - Strategies that reduce PM$_{10}$ emissions from the burning of wood and coal for home heating, will lower emissions of PM$_{2.5}$, BaP and possibly arsenic.

The Timaru airshed

See: lawa.org.nz/explore-data/air-quality/ to check air pollution in Timaru, in the last few hours and days. You can also find more information on Environment Canterbury’s air quality page: www.ecan.govt.nz/data/air-quality-data

PM$_{10}$ in Timaru

The graph below shows daily average PM$_{10}$ concentrations. The red line shows the NESAQ for PM$_{10}$. The red number is the total number of days the NESAQ was exceeded that year. The NESAQ target for Timaru is 3 days from 1 September 2016 and 1 day from 1 September 2020.

How is PM$_{10}$ tracking in Timaru

The number of PM$_{10}$ exceedances each year in Timaru has reduced, but there are still many exceedance days each winter. A reduction in PM$_{10}$ emissions is needed to meet the NESAQ targets.

Number of days PM$_{10}$ was greater than 50 µg/m$^3$

The Timaru airshed

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AIR QUALITY IN TIMARU

Winter 2016

Fine and coarse PM in Timaru

PM₁₀ includes fine particles (less than 2.5 micrometers) and coarse particles (between 2.5 and 10 micrometers). PM₂.₅ is produced by the combustion of wood and fossil fuels (mostly by home heating and traffic). Dust, pollen and other natural particles are typically in the 2.5 to 10 micrometer range or larger.

While there are national guidelines for both annual and daily average PM₁₀ concentrations, the NESAQ has a PM₁₀ standard for daily average only. There are currently no official national guidelines for PM₂.₅, though there are daily and annual guidelines from the World Health Organisation (WHO), which New Zealand guidelines are often influenced by.

Continuous measurement of fine particle concentrations at the Timaru monitoring site in Anzac Square started in early 2012.

In the following graph, each column shows the annual average fine particle (dark) and coarse particle concentrations (light). Together these show the annual average PM₁₀ concentrations compared to the national and WHO guideline of 20 µ/m³. The annual average PM₂.₅ concentrations were 16, 16, 17, 16 and 13 µ/m³ in these years, compared to the WHO guideline of 10 µ/m³.

In the following graph, each column shows the daily fine particle (dark) and coarse particle concentrations (light) during 2016. Together these show the PM₁₀ concentration each day it was measured. A seasonal variation is obvious in the concentrations with higher fine and lower coarse particles during the colder months. The highest PM₁₀ and PM₂.₅ concentrations occurred during the coldest months, when many exceedances of guidelines occurred. During 2016 there were 27 days when PM₁₀ was greater than 50 µ/m³ and 51 days when PM₂.₅ was greater than 25 µ/m³ (WHO guideline value). On those 27 PM₁₀ exceedance days, 73% of the PM₁₀ were fine particles.

Winter 2016

Annual average

Timaru fine and coarse particles
**Key Points**

- Of the five contaminants listed in the NESAQ, \( \text{PM}_{10}, \text{SO}_2 \) and \( \text{CO} \) have been measured over a number of years. There have been no breaches of the NESAQ for \( \text{SO}_2 \) or \( \text{CO} \). \( \text{NO}_2 \) and \( \text{O}_3 \) are unlikely to breach the NESAQ.

- \( \text{PM}_{10} \) concentrations exceed national guidelines and standards at times in Washdyke throughout the year.

- Of the three main sources of \( \text{PM}_{10} \) (home heating, industry and transport), an estimated 89% of the \( \text{PM}_{10} \) comes from industry on a typical winter day.

- Monitoring of fine and coarse particles since July 2015 shows that most of the \( \text{PM}_{10} \) are larger than 2.5 \( \mu \text{m}^3 \), especially outside the winter period and indicate sources like dust, rather than combustion.

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**PM\(_{10}\) in Washdyke**

The graph below shows daily average \( \text{PM}_{10} \) concentrations. The red line shows the NESAQ for \( \text{PM}_{10} \). The red number is the total number of days the NESAQ was exceeded that year. The NESAQ target for Washdyke is no more than one day from 1 September 2016.

**How is PM\(_{10}\) tracking in Washdyke?**

There are only a few exceedances each year, with only one during 2016. Environment Canterbury is working with local industries to reduce \( \text{PM}_{10} \) emissions.
AIR QUALITY IN WAIMATE

Winter 2016

Key Points

- Air pollution can be an issue in Waimate mainly during the coldest months.
- Of the five contaminants listed in the NESAQ, PM$_{10}$, SO$_2$, and CO have been measured over a number of years. There have been no breaches of the NESAQ for SO$_2$ or CO. NO$_2$ and O$_3$ are unlikely to breach the NESAQ.
- Daily average PM$_{10}$ concentrations exceed 50 µg/m$^3$ mainly during the coldest months every year, but annual averages in the last few years have been below the national guideline.
- Of the three main sources of PM$_{10}$ (home heating using wood and coal, industry and transport), an estimated 96% of the PM$_{10}$ comes from home heating on a typical winter day.
- Other contaminants, including PM$_{2.5}$, benzo(a) pyrene (BaP) and arsenic, are of concern - PM$_{2.5}$ concentrations exceeded the WHO guideline of 25 µg/m$^3$ on 19 days during 2016.
  - Home heating is the main source of PM$_{2.5}$ and BaP in winter.
  - Arsenic is emitted when treated timber is burned.
  - Strategies that reduce PM$_{10}$ emissions from the burning of wood and coal for home heating, will lower emissions of PM$_{2.5}$, BaP and possibly arsenic.

The Waimate airshed

See: lawa.org.nz/explore-data/air-quality/ to check air pollution in Waimate in the last few hours and days. You can also find more information on Environment Canterbury's air quality page: www.ecan.govt.nz/data/air-quality-data

PM$_{10}$ in Waimate

The graph below shows daily average PM$_{10}$ concentrations. The red line shows the NESAQ for PM$_{10}$. The red number is the total number of days the NESAQ was exceeded that year. The NESAQ target is 3 days from 1 September 2016 and 1 day from 1 September 2020.

How is PM$_{10}$ tracking in Waimate?

The number of PM$_{10}$ exceedances each year at the Waimate Stadium monitoring site has ranged from one to eleven, driven mainly by weather. The monitoring site was moved in late 2015, because of the upgrade to the Stadium. The two sites may not have comparable PM$_{10}$ concentrations.