

# SEPA response to flaring at Mossmorran: Air quality data summary

Friday 20 September 2019

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We call this **One Planet Prosperity**



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## Executive Summary

SEPA deployed three particulate monitors during the flaring at ExxonMobil Chemical Ltd. that began on Monday, 12 August 2019. These monitors have remained in place during the ExxonMobil Chemical Limited plant shut down and this report provides detail of the monitoring SEPA carried out.

A summary of the latest findings are below:

- PM<sub>10</sub> levels were within the daily (UK) Air Quality Standard of 50 µg/m<sup>3</sup> (micrograms per cubic metre).
- PM<sub>10</sub> and PM<sub>2.5</sub> would be classified as “low” using the (UK) Daily Air Quality Index bandings.
- More information on particulate matter and Daily Air Quality Index bandings is available in the Supplementary information section at the end of this report.

## **1. Introduction**

ExxonMobil Chemical Limited began unplanned elevated flaring on Monday, 12 August at Mossmorran Fife Ethylene Plant (FEP).

Flaring ceased on Thursday, 15 August and the FEP is now in shutdown. There is ongoing ground flaring at the Mossmorran complex, which is coming from Shell U.K. Limited's facility.

Reports have been issued weekly that cover all data from 12 August 2019.

## **2. Monitoring**

SEPA has had a particulate monitor deployed at a location in Lochgelly since Thursday, 4 July 2019 to assess long-term air quality conditions and this remains in place gathering data.

SEPA also deployed semi-permanent monitoring equipment in Auchtertool and Donibristle (Cowdenbeath) on Wednesday, 14 August 2019 to cover a wider area and ensure there are monitors downwind of the prevailing wind conditions. It also means we have comparable data from upwind of the Mossmorran Complex.

## **3. Results**

The graphs on the next page show the measured data since Thursday, 12 September 2019 for PM<sub>10</sub> particles and PM<sub>2.5</sub> particles (Figures 1 – 4).

These are compared against the relevant UK Daily Air Quality Index (DAQI) and the daily Air Quality Standard (AQS). All measurements are within the 'Low' banding. The average values for the monitoring periods are outlined in Table 1.

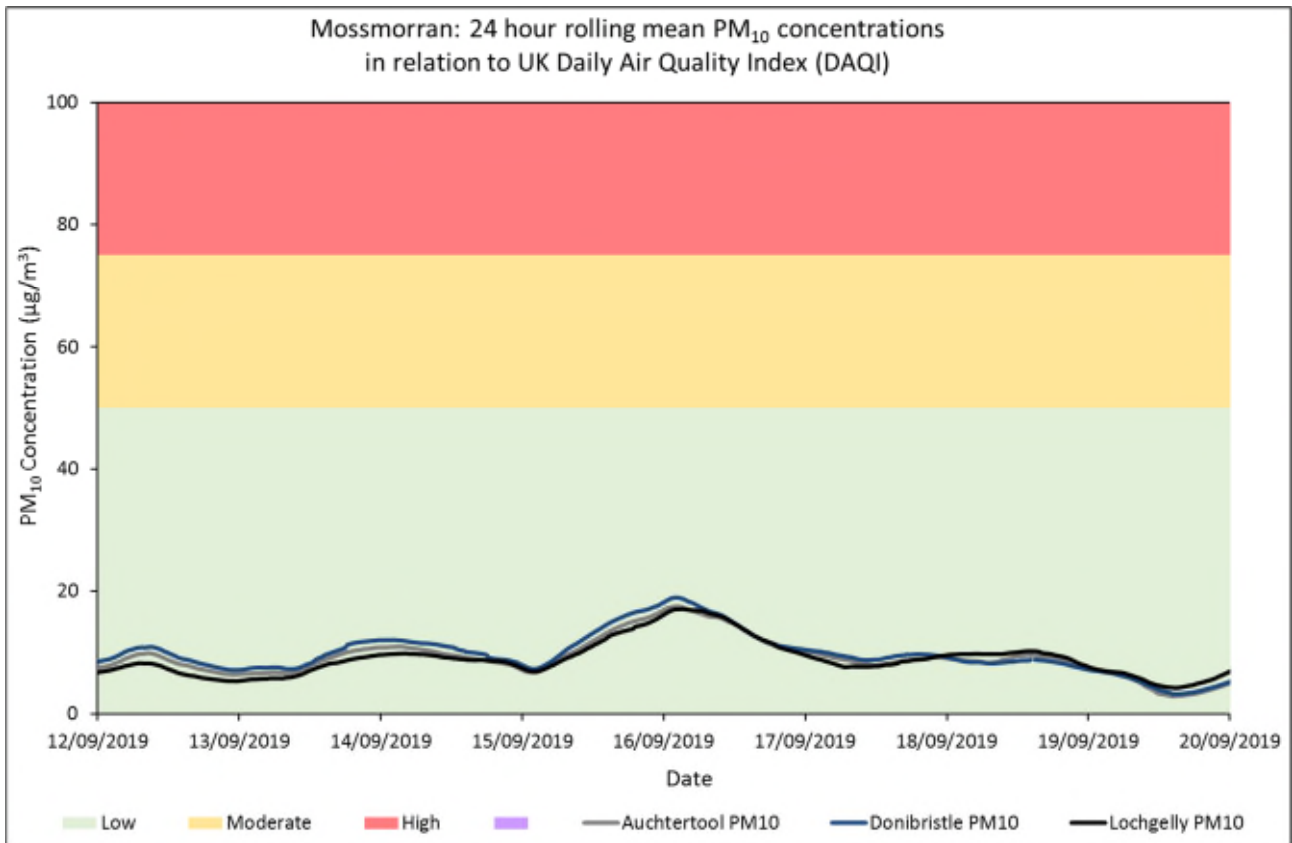
The PM<sub>10</sub> daily AQS of 50 µg/m<sup>3</sup> (which cannot be breached more than seven times in a year) was not breached at any location. There is no daily AQS for PM<sub>2.5</sub>.

Annual Air Quality Standards exist for PM<sub>10</sub> (18 µg/m<sup>3</sup>) and PM<sub>2.5</sub> (10 µg/m<sup>3</sup>) – which is why we have also shown the overall average.

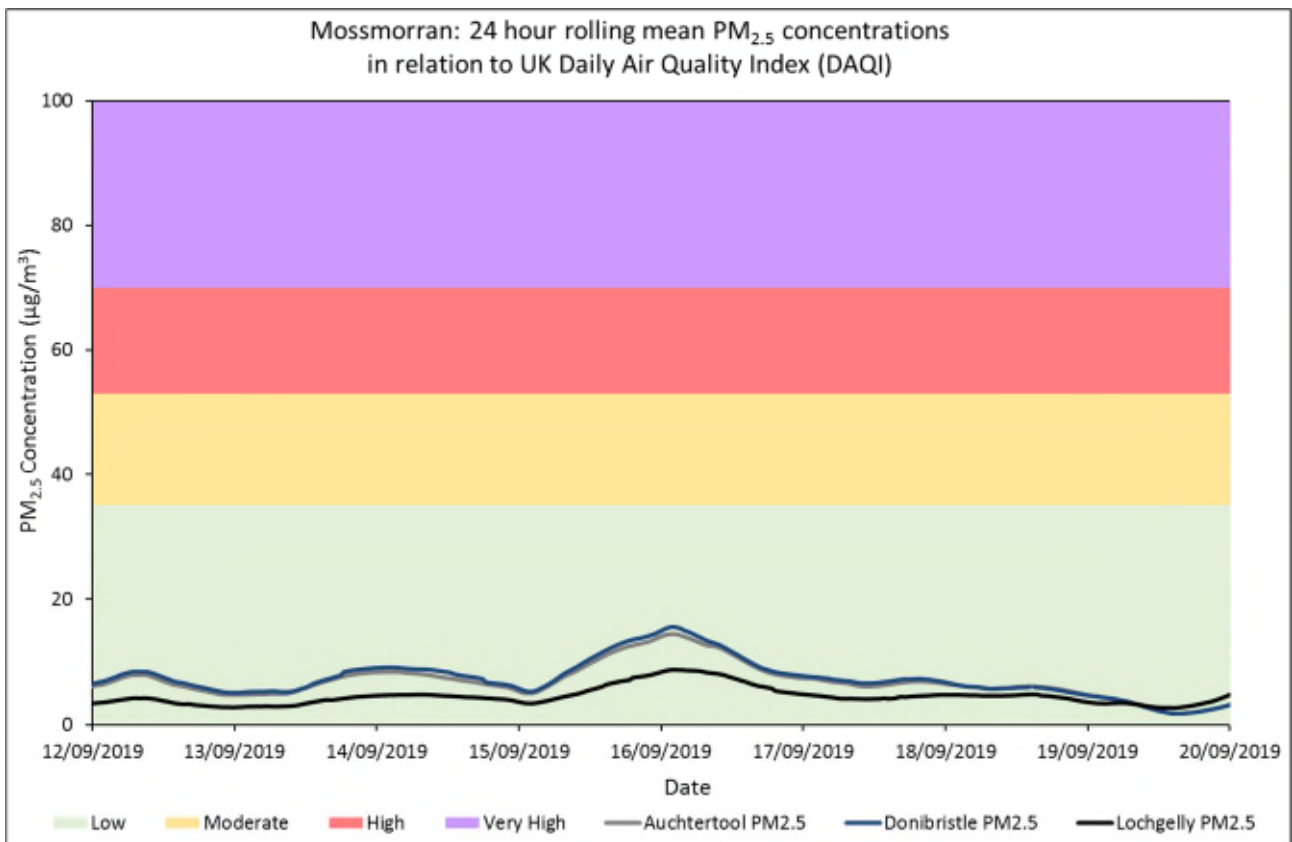
**Table 1:** A summary of the particulate data collected at Lochgelly, Auchtertool and Donibristle.

| Location    | Data Collection Period         | Daily Average ( $\mu\text{g}/\text{m}^3$ ) |                  |                   | Overall Average ( $\mu\text{g}/\text{m}^3$ )* |                   |
|-------------|--------------------------------|--------------------------------------------|------------------|-------------------|-----------------------------------------------|-------------------|
|             |                                | Dates                                      | PM <sub>10</sub> | PM <sub>2.5</sub> | PM <sub>10</sub>                              | PM <sub>2.5</sub> |
| Lochgelly   | 11:45 04 July 2019 – Ongoing   | 12 September 2019                          | 5.39             | 2.78              | 8.35                                          | 4.60              |
|             |                                | 13 September 2019                          | 9.62             | 4.63              |                                               |                   |
|             |                                | 14 September 2019                          | 7.43             | 3.62              |                                               |                   |
|             |                                | 15 September 2019                          | 16.14            | 8.39              |                                               |                   |
|             |                                | 16 September 2019                          | 9.57             | 4.84              |                                               |                   |
|             |                                | 17 September 2019                          | 9.57             | 4.75              |                                               |                   |
|             |                                | 18 September 2019                          | 7.67             | 3.59              |                                               |                   |
|             |                                | 19 September 2019                          | 6.92             | 4.76              |                                               |                   |
| Auchtertool | 09:30 14 August 2019 – Ongoing | 12 September 2019                          | 6.48             | 4.73              | 8.34                                          | 5.07              |
|             |                                | 13 September 2019                          | 10.82            | 8.36              |                                               |                   |
|             |                                | 14 September 2019                          | 7.18             | 5.31              |                                               |                   |
|             |                                | 15 September 2019                          | 16.92            | 14.06             |                                               |                   |
|             |                                | 16 September 2019                          | 10.11            | 7.41              |                                               |                   |
|             |                                | 17 September 2019                          | 9.05             | 6.50              |                                               |                   |
|             |                                | 18 September 2019                          | 7.31             | 4.75              |                                               |                   |
|             |                                | 19 September 2019                          | 5.00             | 3.16              |                                               |                   |
| Donibristle | 12:00 14 August 2019 – Ongoing | 12 September 2019                          | 7.17             | 5.09              | 8.04                                          | 5.24              |
|             |                                | 13 September 2019                          | 12.01            | 9.05              |                                               |                   |
|             |                                | 14 September 2019                          | 7.96             | 5.74              |                                               |                   |
|             |                                | 15 September 2019                          | 18.16            | 14.96             |                                               |                   |
|             |                                | 16 September 2019                          | 10.45            | 7.76              |                                               |                   |
|             |                                | 17 September 2019                          | 9.22             | 6.75              |                                               |                   |
|             |                                | 18 September 2019                          | 7.20             | 4.67              |                                               |                   |
|             |                                | 19 September 2019                          | 5.25             | 3.15              |                                               |                   |

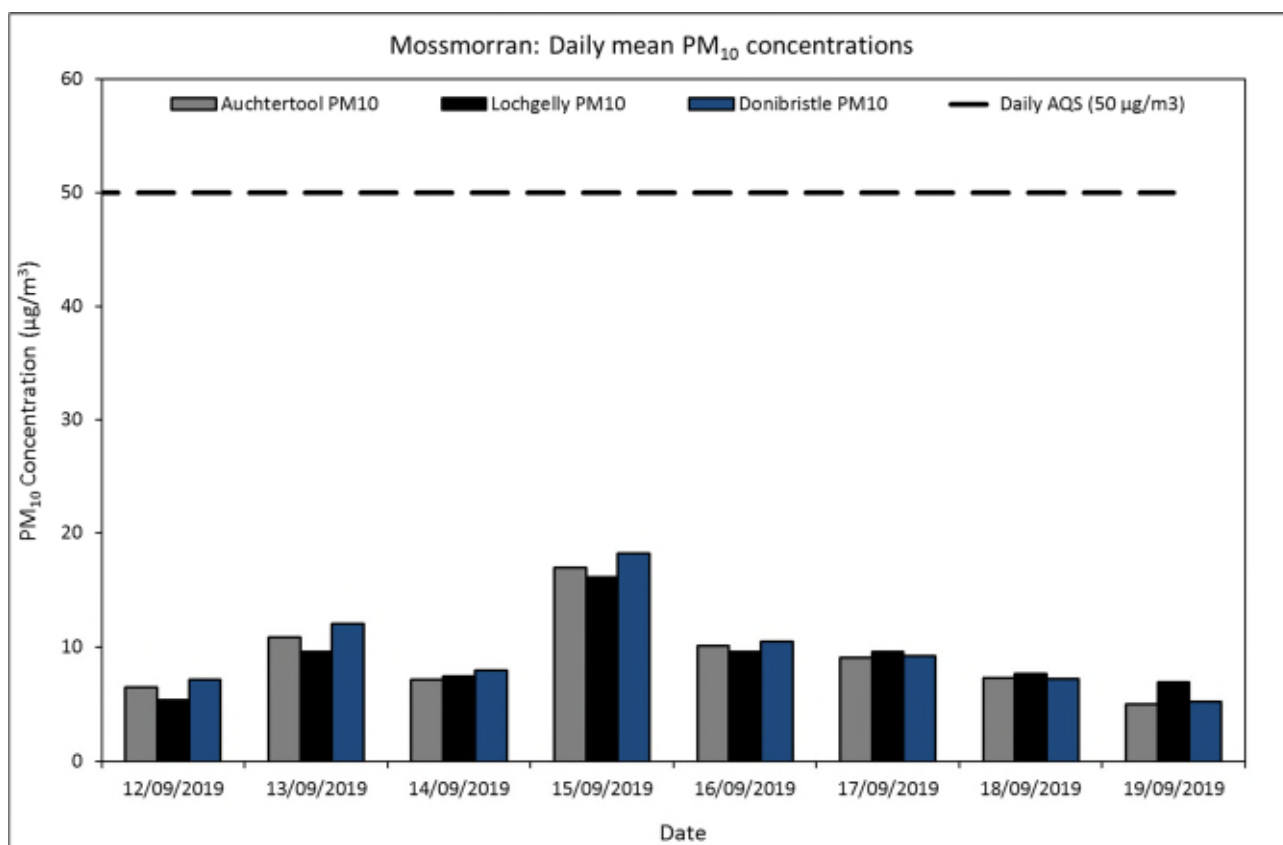
\*The overall average is a calculation of the average since monitoring began.



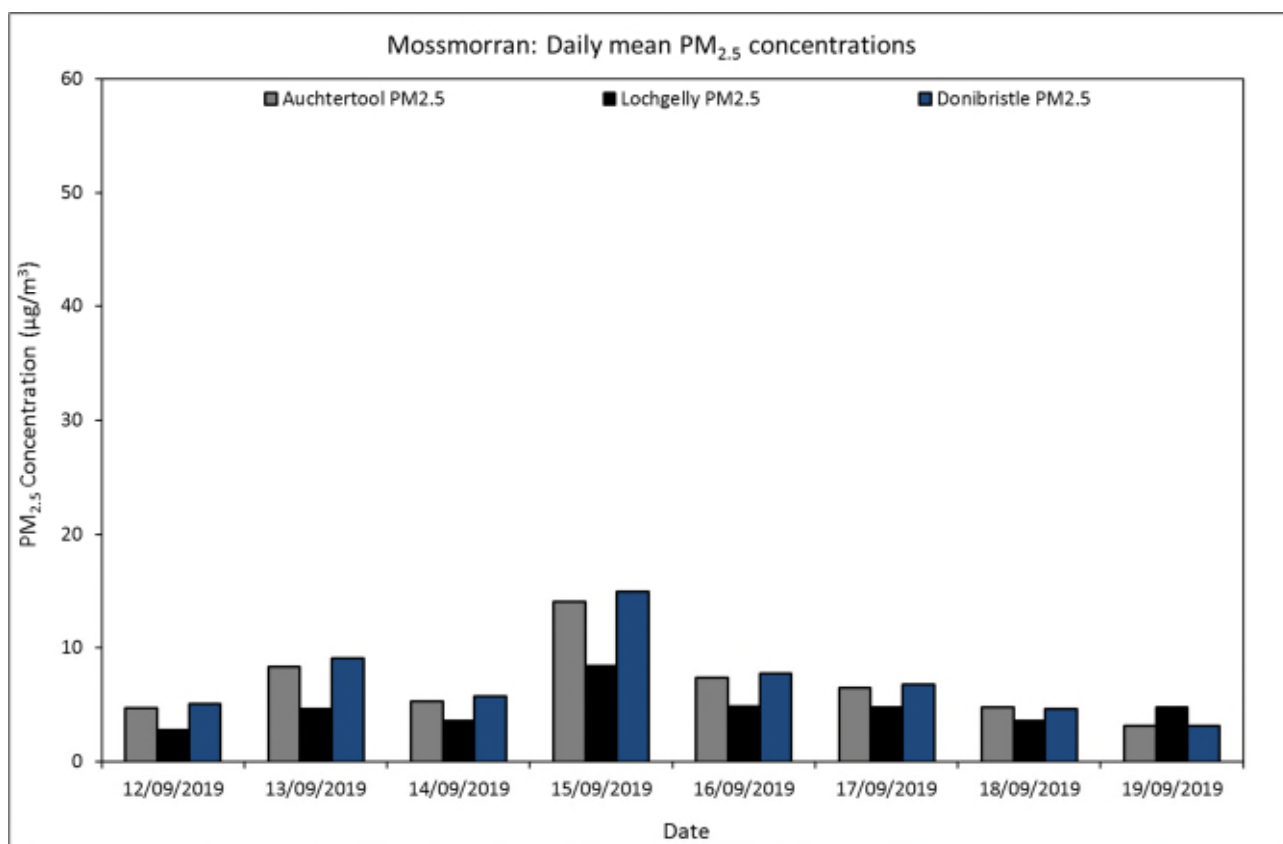
**Figure 2:** 24 hour rolling means for PM<sub>10</sub> at Lochgelly, Auchtertool and Donibristle.



**Figure 3:** 24 hour rolling means for PM<sub>2.5</sub> at Lochgelly, Auchtertool and Donibristle.



**Figure 4:** Daily rolling means for PM<sub>10</sub> at Lochgelly, Auchtertool and Donibristle.



**Figure 5:** Daily rolling means for PM<sub>2.5</sub> at Lochgelly, Auchtertool and Donibristle.

## **4. Conclusion**

PM<sub>10</sub> levels were within the daily (UK) Air Quality Standard of 50 µg/m<sup>3</sup> (micrograms per cubic metre) and the values recorded for both PM<sub>10</sub> and PM<sub>2.5</sub> would be classified as “low” using the (UK) Daily Air Quality Index (DAQI) bandings.

## Appendix 1 – Supplementary Information

### Particulate Matter

Particulate matter is made up of a number of components, including chemical substances, and soil and dust particles and comes from both human-made and natural sources. It consists of substances, which are released directly from the source into the atmosphere, and secondary components, which are formed in the atmosphere by chemical reactions.

Particulate matter is not made up of one type of substance; it is a classification of particles by size. It is measured in micrometres ( $\mu\text{m}$ ). A human hair is approximately 100  $\mu\text{m}$  wide.

Larger particles are generally filtered in the nose and throat, but particulate matter smaller than about 10 micrometres ( $\mu\text{m}$ ) can be inhaled, which is why these are the ones measured for air quality monitoring.

- $\text{PM}_{10}$  means the particles are 10 $\mu\text{m}$  or smaller. The measurement of this figure includes  $\text{PM}_{2.5}$ .
- $\text{PM}_{2.5}$  means the particles are 2.5  $\mu\text{m}$  or smaller.

Particulate levels can vary for a variety of reasons, such as rush hour traffic, building work, elevated pollen levels and emissions from industrial activities. Changes in wind direction can also have an impact on the measurements at a monitoring site.

### What does the UK Daily Air Quality Index mean?

The following information is taken from the Air Quality in Scotland website at

<http://www.scottishairquality.scot/air-quality/daqj>.

In the UK most air pollution information services use the index and banding system approved by the [Committee on Medical Effects of Air Pollution Episodes](#) (COMEAP).

The overall Daily Air Quality Index (DAQI) looks at five substances, not just  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$ . These tables are included to help put the levels detected by SEPA into context.

**PM<sub>10</sub> Particles** - Based on the daily mean concentration for historical data, latest 24 hour running mean (24 hour average) for the current day.

| Index             | 1    | 2     | 3     | 4        | 5        | 6        | 7     | 8     | 9      | 10          |
|-------------------|------|-------|-------|----------|----------|----------|-------|-------|--------|-------------|
| Band              | Low  | Low   | Low   | Moderate | Moderate | Moderate | High  | High  | High   | Very High   |
| µg/m <sup>3</sup> | 0-16 | 17-33 | 34-50 | 51-58    | 59-66    | 67-75    | 76-83 | 84-91 | 91-100 | 101 or more |

**PM<sub>2.5</sub> Particles** - Based on the daily mean concentration for historical data, latest 24 hour running mean (24 hour average) for the current day.

| Index             | 1    | 2     | 3     | 4        | 5        | 6        | 7     | 8     | 9     | 10         |
|-------------------|------|-------|-------|----------|----------|----------|-------|-------|-------|------------|
| Band              | Low  | Low   | Low   | Moderate | Moderate | Moderate | High  | High  | High  | Very High  |
| µg/m <sup>3</sup> | 0-11 | 12-23 | 24-35 | 36-41    | 42-47    | 48-53    | 54-58 | 59-64 | 65-70 | 71 or more |

| Air Pollution Banding | Value | Accompanying health messages for at-risk individuals*                                                                                                                                                                                                                                                                                       | Accompanying health messages for the general population                                                                                 |
|-----------------------|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Low                   | 1-3   | Enjoy your usual outdoor activities.                                                                                                                                                                                                                                                                                                        | Enjoy your usual outdoor activities.                                                                                                    |
| Moderate              | 4-6   | Adults and children with lung problems, and adults with heart problems, <b>who experience symptoms</b> , should <b>consider reducing</b> strenuous physical activity, particularly outdoors.                                                                                                                                                | Enjoy your usual outdoor activities.                                                                                                    |
| High                  | 7-9   | Adults and children with lung problems, and adults with heart problems, should <b>reduce</b> strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms.<br>People with asthma may find they need to use their reliever inhaler more often. Older people should also <b>reduce</b> physical exertion. | Anyone experiencing discomfort such as sore eyes, cough or sore throat should <b>consider reducing</b> activity, particularly outdoors. |
| Very High             | 10    | Adults and children with lung problems, adults with heart problems, and older people, should <b>avoid</b> strenuous physical activity.<br>People with asthma may find they need to use their reliever inhaler more often.                                                                                                                   | <b>Reduce</b> physical exertion, particularly outdoors, especially if you experience symptoms such as cough or sore throat.             |

\* Adults and children with heart or lung problems are at greater risk of symptoms. Follow your doctor's usual advice about exercising and managing your condition. It is possible that very sensitive individuals may experience health effects even on Low air pollution days. Anyone experiencing symptoms should follow the guidance provided on the [Defra UK-AIR](https://www.defra.gov.uk/uk-air) website.