

SEPA Monitoring around Mossmorran Complex: Particulate Matter Air Quality Data Summary

December 2022

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Executive Summary

SEPA have had particulate monitors deployed around the Mossmorran Complex since the Summer of 2019.

A summary of the findings from the monitoring undertaken at three surrounding locations between 01 and 31 of December 2022 are below:

- PM₁₀ levels were within the daily (UK) Air Quality Standard of 50 µg/m³ (micrograms per cubic metre).
- PM₁₀ and PM_{2.5} are classified as “low” using the (UK) Daily Air Quality Index bandings.

1. Introduction

This report presents the particulate matter (PM₁₀ and PM_{2.5}) data collected by SEPA for the month of December 2022.

In response to elevated flaring at the Mossmorran complex in 2019, SEPA deployed particulate monitoring equipment at three locations (Auchtertool, Donibristle (nr Cowdenbeath) and Lochgelly) around the complex to assess long-term air quality conditions with respect to PM₁₀ and PM_{2.5} that remain in place gathering data.

2. Monitoring

PM₁₀ and PM_{2.5} monitoring at Auchtertool (East of the complex) and at Donibristle (West) were completed using calibrated Turnkey Osiris particulate monitors, following SEPA procedures. The results from the Osiris are classed as “indicative”.

PM₁₀ and PM_{2.5} monitoring at Lochgelly, approximately (North) was completed using a calibrated Palas FIDAS 200 particulate monitor, following SEPA procedures.

3. Results

The particulate matter data was compared against the relevant UK Daily Air Quality Index (DAQI) and the daily Air Quality Standard (AQS) for PM₁₀. All measurements were within the ‘Low’ DAQI banding. More information on particulate matter and Daily Air Quality Index bandings is available in the Supplementary Information section at the end of this report.

A summary of the daily average values from the three monitoring locations for the period are outlined in Table 1.

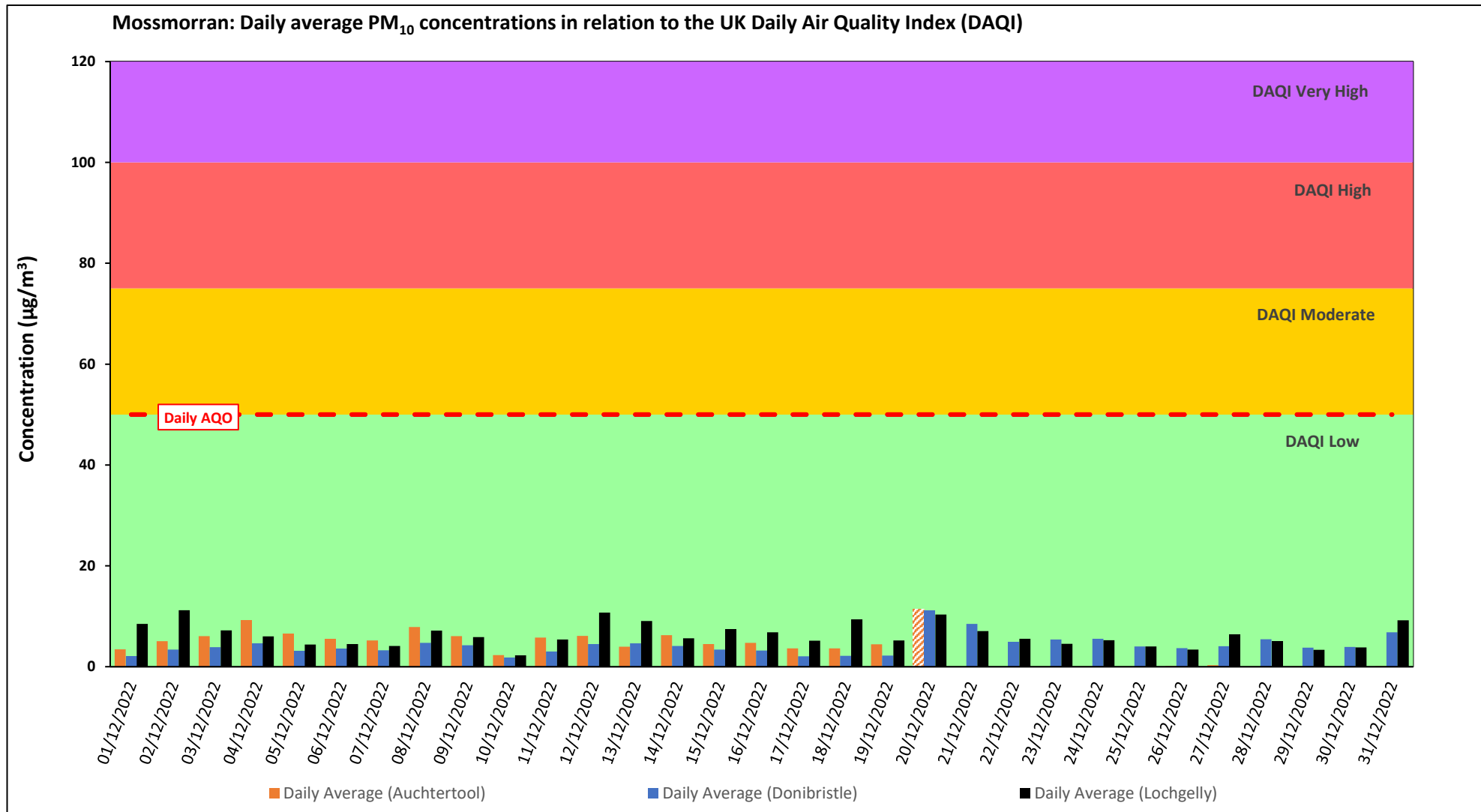
The graphs on the following pages show the daily average PM₁₀ and PM_{2.5} values measured at each location between 01 and 31 of 2022 (Figures 1 and 2). The PM₁₀ daily Air Quality Standard of 50 µg/m³ (which should not be breached more than seven times in a year) was not exceeded at any location. There is no daily Air Quality Standard for PM_{2.5}.

Table 1: A summary of particulate data collected at Auchtertool, Donibristle and Lochgelly during the period 01 to 31 of December 2022:

Date	Daily Average ($\mu\text{g}/\text{m}^3$)					
	Auchtertool		Donibristle		Lochgelly	
	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
01/12/2022	3.5	2.0	2.0	1.5	8.5	7.1
02/12/2022	5.1	2.6	3.4	2.6	11.2	9.2
03/12/2022	6.1	2.5	3.9	2.7	7.2	3.8
04/12/2022	9.2	4.4	4.6	3.7	6.0	3.2
05/12/2022	6.6	2.8	3.1	2.5	4.4	2.7
06/12/2022	5.5	3.3	3.6	3.2	4.5	2.6
07/12/2022	5.2	2.9	3.3	2.8	4.1	2.3
08/12/2022	7.9	4.4	4.7	4.1	7.1	4.0
09/12/2022	6.1	3.7	4.2	3.6	5.9	3.6
10/12/2022	2.3	1.1	1.8	1.3	2.2	1.6
11/12/2022	5.8	2.6	3.0	2.4	5.4	3.3
12/12/2022	6.1	3.9	4.5	3.5	10.7	8.0
13/12/2022	4.0	2.7	4.6	3.9	9.0	7.1
14/12/2022	6.3	3.7	4.1	3.6	5.6	2.9
15/12/2022	4.5	2.6	3.4	2.7	7.4	5.2
16/12/2022	4.7	2.8	3.2	2.5	6.8	5.2
17/12/2022	3.7	1.7	2.1	1.5	5.2	3.9
18/12/2022	3.6	2.5	2.1	1.9	9.4	8.5
19/12/2022	4.5	2.4	2.2	1.9	5.2	3.8
20/12/2022	* 11.4	* 6.1	11.1	9.9	10.3	5.8
21/12/2022	-	-	8.5	7.8	7.1	4.3
22/12/2022	-	-	5.0	3.8	5.6	3.6
23/12/2022	-	-	5.4	3.7	4.6	2.6
24/12/2022	-	-	5.5	4.2	5.3	3.1
25/12/2022	-	-	4.0	3.3	4.0	2.6
26/12/2022	-	-	3.7	2.5	3.4	1.9
27/12/2022	-	-	4.1	2.7	6.3	4.5
28/12/2022	-	-	5.5	3.9	5.0	3.0
29/12/2022	-	-	3.8	3.0	3.3	1.9
30/12/2022	-	-	3.9	3.3	3.8	2.1
31/12/2022	-	-	6.8	5.2	9.2	5.3
* Represents mean values based on less than 24 hours of data collection						
Average across the month (December 22)	5.3	2.9	4.2	3.4	6.3	4.1
Maximum Daily Average	11.4	6.1	11.1	9.9	11.2	9.2

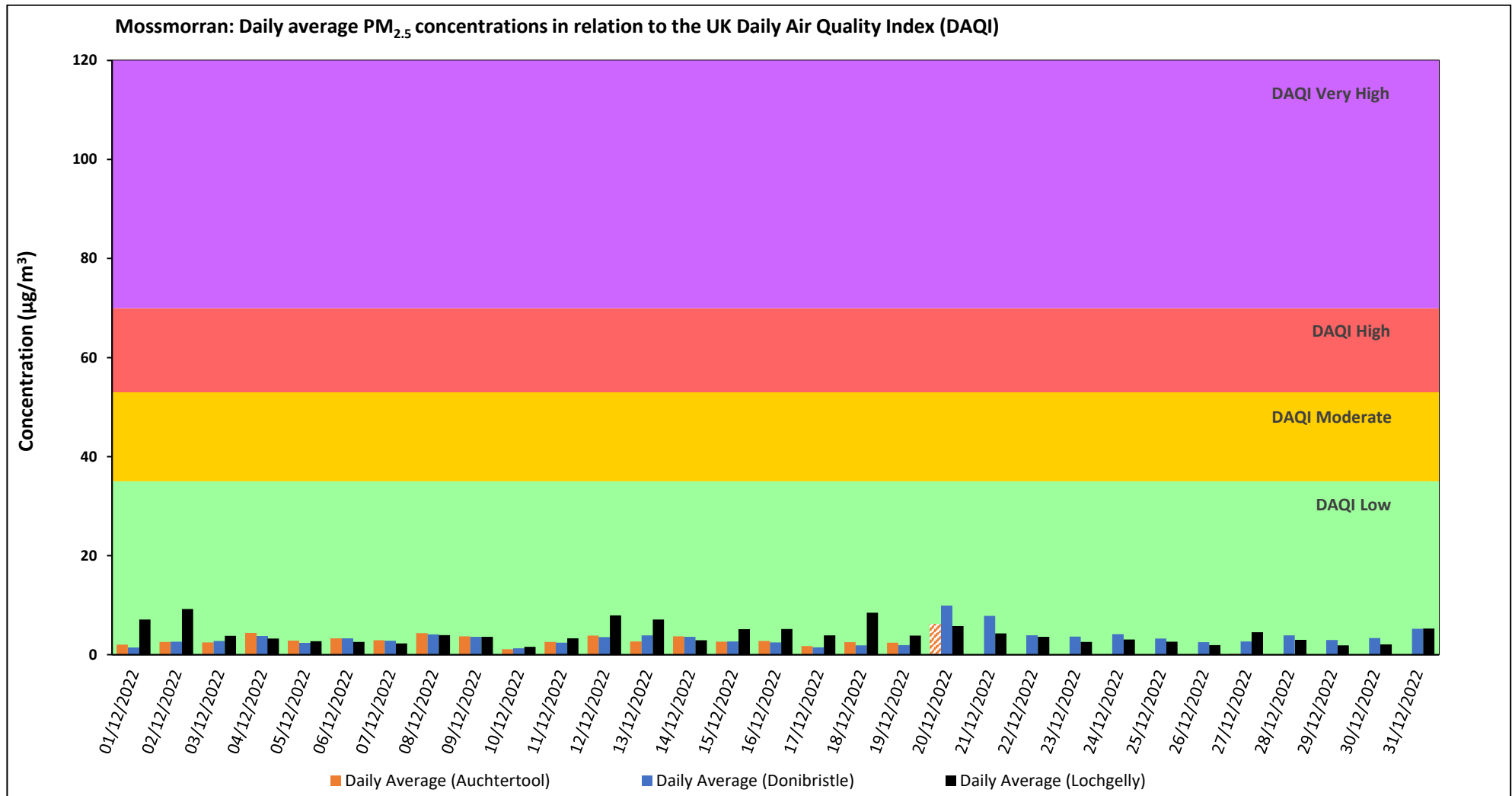
A fault developed with the Osiris unit located at the Auchtertool site on 20 December and continued until the analyser was withdrawn in early January 2023.

Figure 1: Daily Average PM₁₀ concentrations at Auchtertool, Donibristle and Lochgelly 01 - 31 December 2022:



*Shaded columns represent mean values based on less than 24 hours of data collection.

Figure 2: Daily Average PM_{2.5} Concentrations at Auchtertool, Donibristle and Lochgelly 01 - 31 of December 2022:



*Shaded columns represent mean values based on less than 24 hours of data collection.

4. Conclusion

PM₁₀ levels were within the daily (UK) Air Quality Standard of 50 µg/m³ (micrograms per cubic metre) and the values recorded for both PM₁₀ and PM_{2.5} are 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 (μm). A human hair is approximately 100 μm wide. Larger particles are generally filtered in the nose and throat, but particulate matter smaller than about 10 micrometres (μm) can be inhaled, which is why these are the ones measured for air quality monitoring.

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

These tables are included to help put the levels detected by SEPA into context.

PM₁₀ Particles - Based on the daily mean concentration for historical data, latest 24-hour running mean (24-hour average) for the current day.

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

PM_{2.5} Particles - Based on the daily mean concentration for historical data, latest 24-hour running mean (24-hour average) for the current day.

Band	Low			Moderate			High			Very High
Index	1	2	3	4	5	6	7	8	9	10
µg/m ³	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, who experience symptoms , should consider reducing 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 reduce strenuous physical exertion, particularly outdoors, and particularly if they experience symptoms. People with asthma may find they need to use their reliever inhaler more often. Older people should also reduce physical exertion.	Anyone experiencing discomfort such as sore eyes, cough or sore throat should consider reducing activity, particularly outdoors.
Very High	10	Adults and children with lung problems, adults with heart problems, and older people, should avoid strenuous physical activity. People with asthma may find they need to use their reliever inhaler more often.	Reduce 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.

Appendix 2 – Equipment and Methodologies

The Turnkey Osiris is a light scattering-type analyser which is certified (Sira MC090157/06 initial certification 30 September 2009, Renewed 29 September 2019) to measure PM₁₀ in the range 0 to 100 µg/m³. Turnkey Osiris units are capable of measurement of PM₁₀ and PM_{2.5} to 6000 µg/m³; however, the unit is not certified for PM₁₀ levels above 100 µg/m³ or for PM_{2.5}. This means that results for these are classed as “indicative”.

The Palas FIDAS 200 is a light scattering-type analyser which is certified (Sira MC16290/02 issued 23 February 2017) to measure PM₁₀ and PM_{2.5} in the range 0 to 10,000 µg/m³.