Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

SEPA response to flaring at Mossmorran: Air quality data summary

Tuesday 23 July 2019

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We call this One Planet Prosperity

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Executive Summary

SEPA deployed three particulate monitors during the planned flaring at ExxonMobil Chemical Ltd on Thursday 4 July to 6 July. This report provides detail about the monitoring SEPA carried out and a summary of the findings is below:

- PM_{10} levels were within the daily (UK) Air Quality Standard of 50 µg/m^3 (micrometres per cubic metre).
- PM_{10} and $PM_{2.5}$ 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

SEPA received notification from ExxonMobil Chemical Ltd on Sunday, 30 June 2019 of their intention to undertake controlled flaring at the Mossmorran Fife Ethylene Plant from Monday, 1 July 2019, for a period of no more than five days.

In advance of the controlled flaring, SEPA made efforts to deploy monitoring equipment to assess air quality conditions. Flaring began in the morning of Thursday 4 July and SEPA received notification of the completion of work in the afternoon of Saturday 6 July 2019.

2. Monitoring

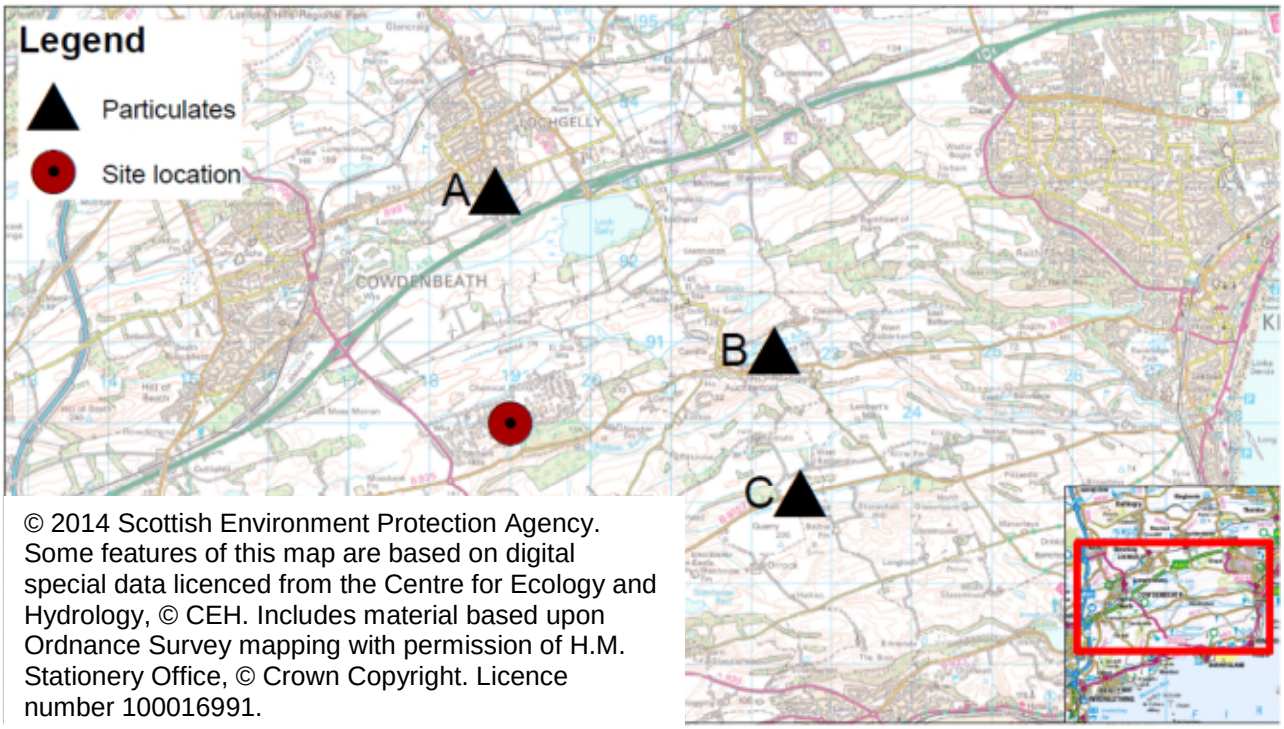

Figure 1: Map of particulate monitoring units deployed around the Mossmorran facility.

On Tuesday 2 July 2019, SEPA deployed two real-time particulate monitoring units in locations which were forecast to be predominantly downwind of the Fife Ethylene Plant (FEP) over expected five-day flaring period (B and C above). A third monitor became operational on Thursday 4 July 2019 at location A.

Data was collected at regular intervals or once the flaring had ceased, dependent on the equipment deployed.

3. Results

The graphs below show the measured data over the monitoring period for PM_{10} particles and $PM_{2.5}$ particles (Figures 2 – 5). 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_{10} daily AQS of 50 µg/m^3 (which cannot be breached > 7 times in a year) was not been breached at any location. There is no daily AQS for $PM_{2.5}$. Annual AQSs exist for PM_{10} and $PM_{2.5}$ and these are set at 18 µg/m^3 and 10 µg/m^3 respectively.

Table 1: A summary of the particulate data collected at Locations A, B and C.

Location	Data Collection Period	Daily Average (µg/m^3)			Overall Average (µg/m^3)	
		Date	PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
A	11:45 04 July 2019 – Ongoing	04 July 2019*	7.79	3.56	5.99	2.80
		05 July 2019	5.53	1.56		
		06 July 2019	4.45	2.10		
		07 July 2019	3.75	1.95		
		08 July 2019	8.29	3.68		
		09 July 2019	7.12	4.38		
B	15:45 02 July 2019 – 00:00 10 July 2019	02 July 2019*	5.54	3.46	5.68	2.60
		03 July 2019	4.99	2.69		
		04 July 2019	3.77	1.90		
		05 July 2019	2.40	0.95		
		06 July 2019	4.09	2.32		
		07 July 2019	4.38	1.84		
		08 July 2019	7.91	4.19		
		09 July 2019	12.01	3.91		
C	15:27 01 July 2019 – 00:00 08 July 2019	01 July 2019*	4.92	2.75	4.28	1.92
		02 July 2019	5.32	2.90		
		03 July 2019	5.09	2.37		
		04 July 2019	4.28	1.65		
		05 July 2019	2.52	0.8		
		06 July 2019	3.62	2.06		
		07 July 2019	5.16	1.96		

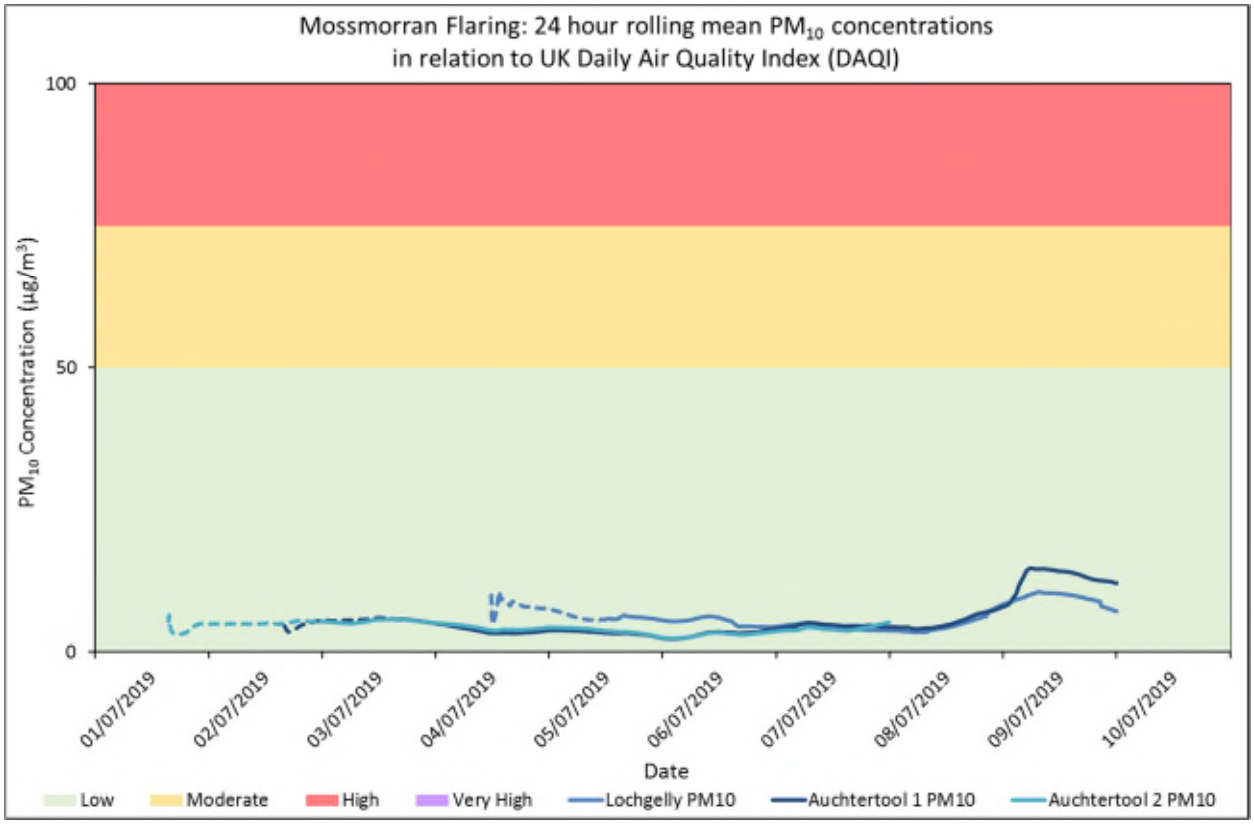

Figure 2: 24 Hour rolling means for PM_{10} for locations A, B and C. Line graphs with dotted lines represent mean values based on less than 24 hours of data collection.

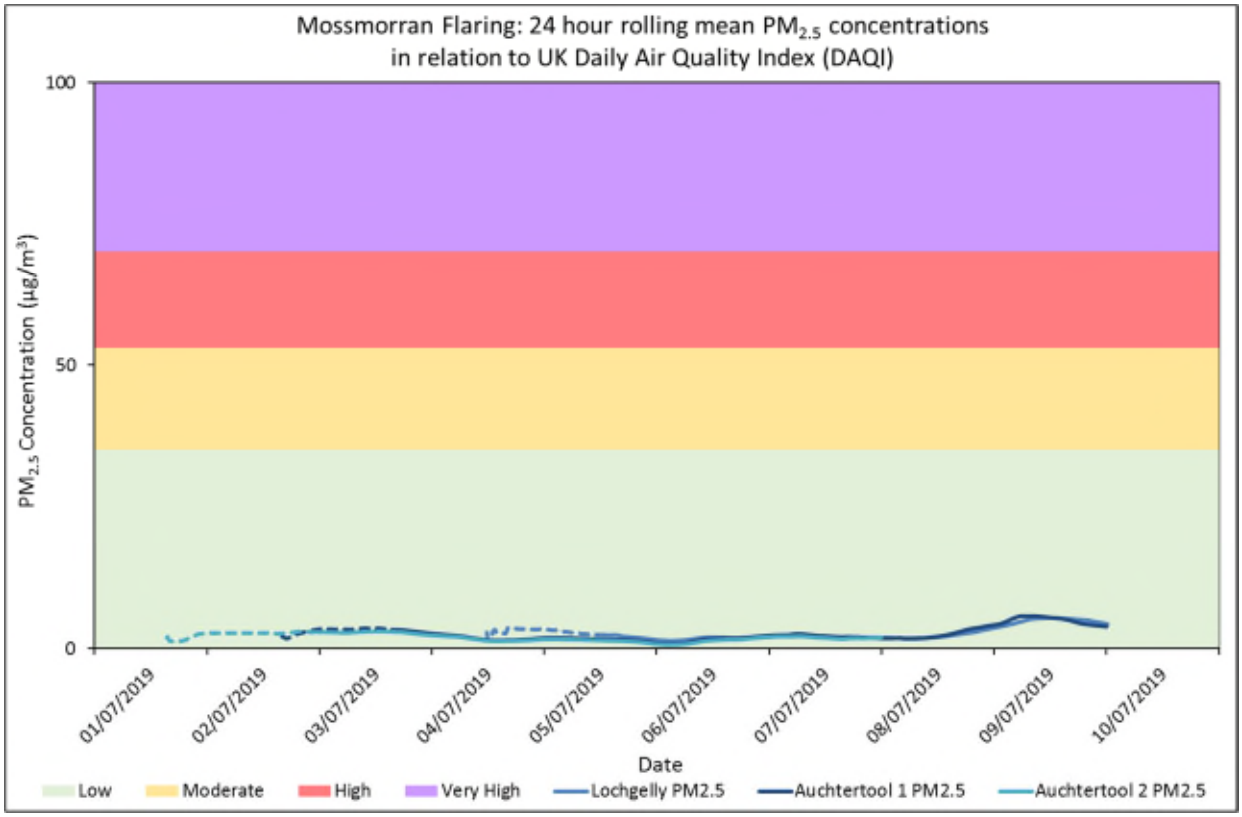

Figure 3: 24 Hour rolling means for $PM_{2.5}$ for locations A, B and C. Line graphs with dotted lines represent mean values based on less than 24 hours of data collection.

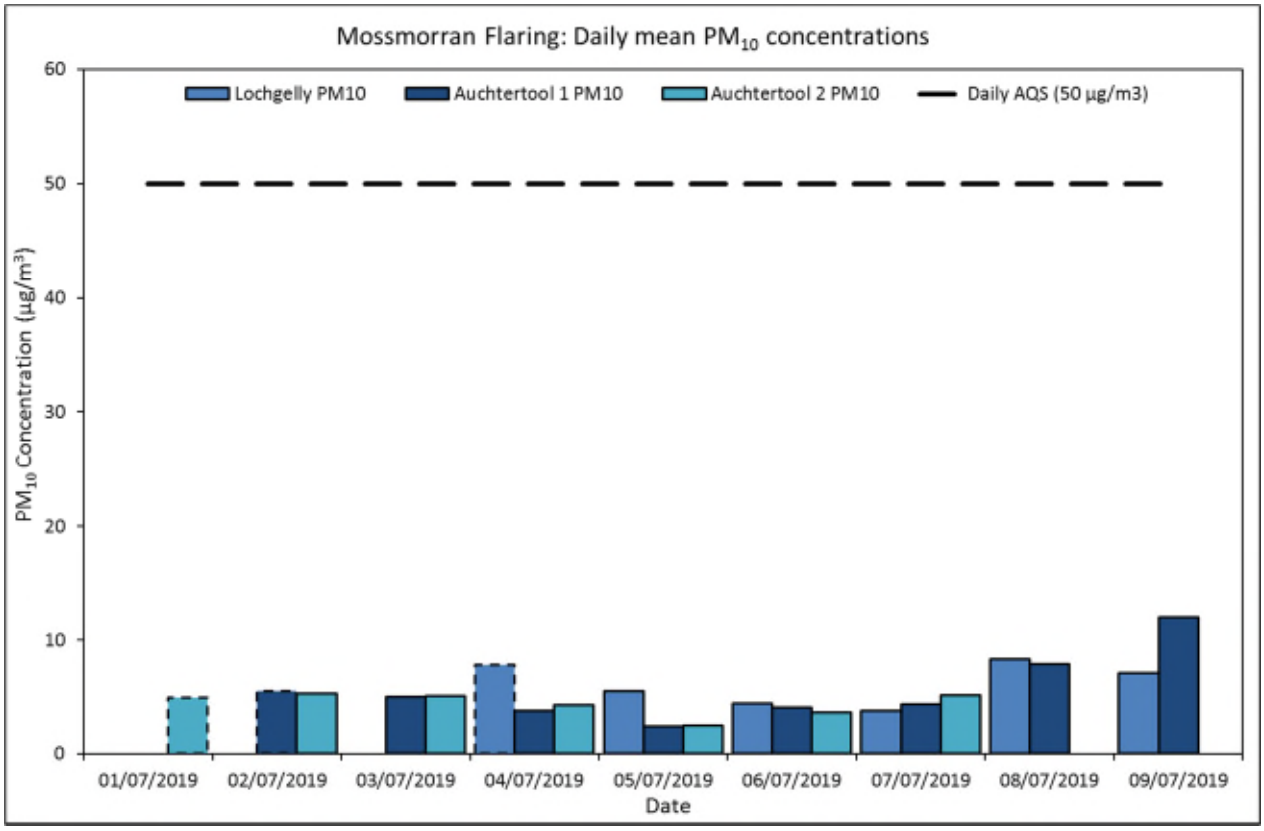

Figure 4: Daily rolling means for PM_{10} for locations A, B and C. Columns with dotted lines represent mean values based on less than 24 hours of data collection.

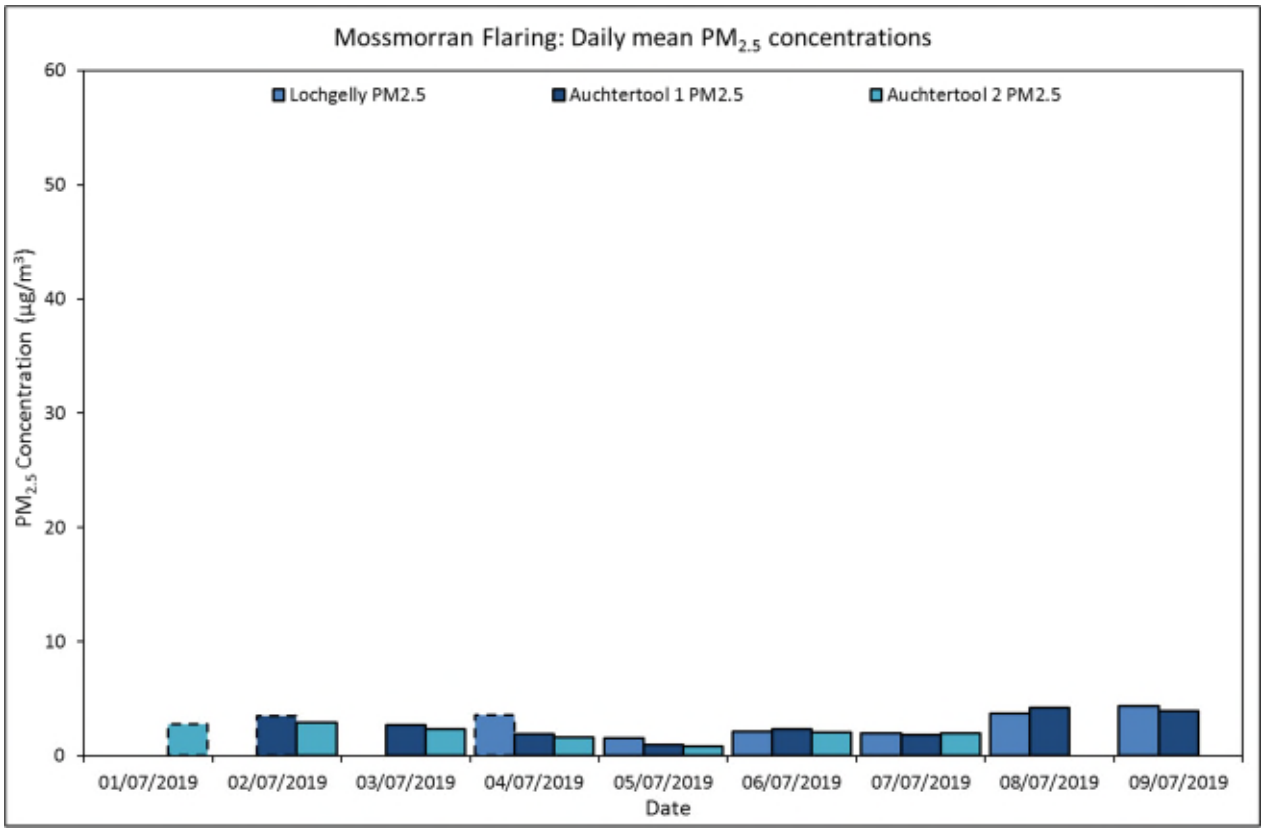

Figure 5: Daily rolling means $PM_{2.5}$ for locations A, B and C. Columns with dotted lines represent mean values based on less than 24 hours of data collection.

4. Conclusion

PM_{10} levels were within the daily (UK) Air Quality Standard of 50 µg/m^3 (micrometres per cubic metre) and the values recorded for both PM_{10} and $PM_{2.5}$ would be classified as “low” using the (UK) Daily Air Quality Index 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 10µm or smaller. The measurement of this figure includes $PM_{2.5}$.
- $PM_{2.5}$ 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/daqi.

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 $PM_{2.5}$. These tables are included to help put the levels detected by SEPA into context.

PM_{10} 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^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.

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^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 website.