SEPA Monitoring report for April 2019 flaring event at the Mossmorran Complex

Summary

This report provides more information about the monitoring SEPA carried out in response to flaring at the Mossmorran Complex during April and May 2019.

- Particulate matter results gave no cause for concern and were well below the UK 24 hour air quality standard for PM10.
- Detail on the other monitoring SEPA deployed is provided where our live investigation permits it.
- Background information on the three month extended monitoring carried out by SEPA to inform relevant public agencies is also included.
- The results from an initial response on 22 April 2019 were published on the Mossmorran Hub at sepa.org.uk/mossmorran

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.

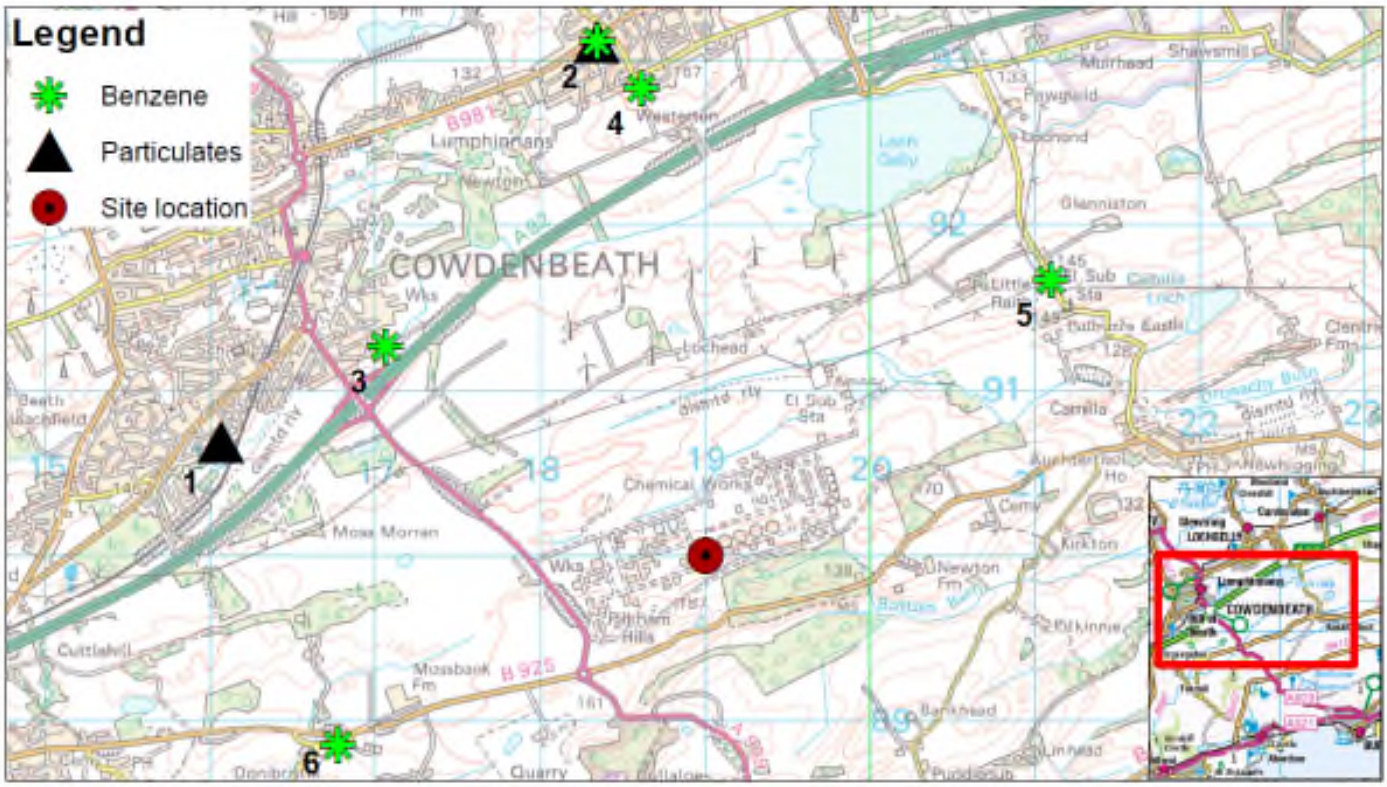
Particulate matter is not made up of one type of substance, it is a classification of particles by size. It is measured in micrometres (µm). A human hair is approximately 100 µm wide.

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.

- PM10 means the particles are 10µm or smaller. The measurement of this figure includes PM2.5.
- PM2.5 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.

Overview of event monitoring



The table below shows the details for what was monitored each at day at locations 1 and 3 in Cowdenbeath, 2 and 4 in Lochgelly, 5 near Little Raith and 6 in Donibristle.

Date	Location	Monitored	Time TBC
22 April	1	Particulates	11.00 – 15.00
25 April	2	Particulates	17.15 – ongoing
		Benzene	16.12 – 16.39
26 April	2	Particulates	ongoing
	3	Benzene	13.09 – 13.38
	4		13.54 – 14.26
27 April	2	Particulates	ongoing
	3	Benzene	12.13 – 12.52
	4		13.04 – 13.36
	5		14.00 – 14.37
	6		14.54 – 15.24
28 April	2	Particulates	ongoing
	3	Benzene	13.04 – 13.36
	4		15.49 – 16.20
	5		17.29 – 17.37
29 April to 2 May	2	Particulates	ongoing - 04:15

Noise and vibration monitoring

Noise monitoring began on 22 April. One of the causes of vibration is low-frequency noise, so will be included in the noise assessment. The nature of our live investigation means we cannot provide any more detail, in order to protect potential evidence.

Air quality monitoring

SEPA undertook air quality monitoring for PM10 and PM2.5 in response to concerns regarding the flaring event. Measurements were recorded between 25 April 2019 to 2 May, which included a period of flaring and a period of no flaring to determine if there were any measureable differences.

The monitoring location chosen was the Lochgelly Fire Station, which provided access to mains power and security of the equipment. In addition, with the forecast changes to wind direction provided by the Met Office, Lochgelly was a suitable location for where the plume may, potentially, reach ground level. Whilst it is someway from the Mossmorran site, this monitoring site was situated near to local communities.

The site used at Cowdenbeath on 22 April 2019 did not have mains power and was therefore not suitable for a more pro-longed deployment of monitoring equipment.

Benzene monitoring

Following public concern about benzene, SEPA scientists were deployed to measure levels of this particular compound.

The most appropriate way to do this at low levels is to deploy diffusion tubes for a fortnight. This provides a value that can be compared against the annual air quality standard. However, given the duration of the most recent flaring event, diffusion tube monitoring would not provide the information required by the public. To address this, SEPA scientists deployed alternative equipment in an attempt to assess levels.

Regrettably, checks carried out on the equipment have demonstrated the data gathered is not scientifically reliable. SEPA is investigating why this was the case.

Light

SEPA does not regulate emissions of light from PPC installations. Light sits under the remit of Fife Council.

Dust on cars and houses

The information below comes from:

- Scottish Air Quality website - www.scottishairquality.scot/news/index?id=595
- BBC News website - www.bbc.co.uk/news/uk-scotland-48037362
- You can also listen to the Met Office's 'Weather Snap' podcast from 24 April - https://soundcloud.com/metofficepodcasts/weather-snap-april-24-2019

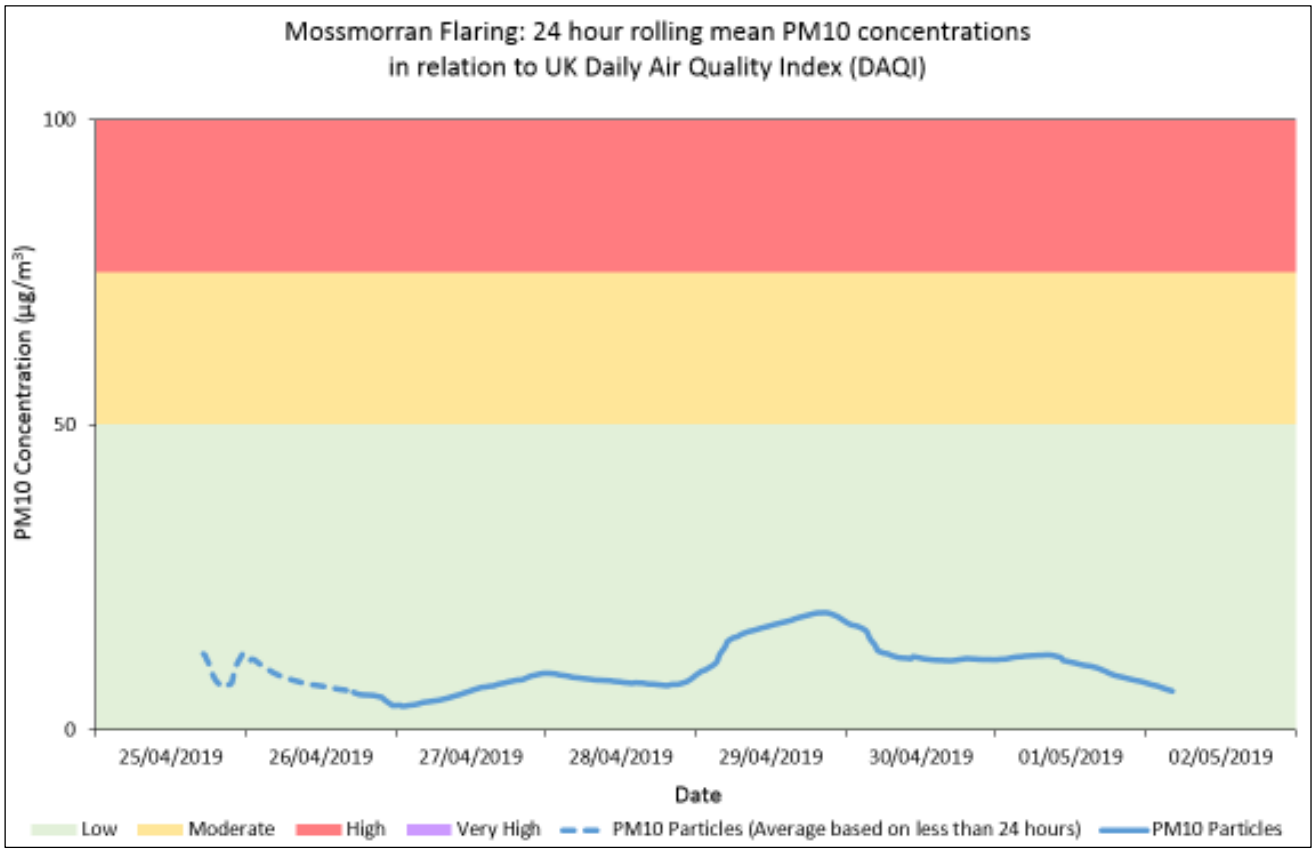
On Wednesday 24 April 2019 the majority of Scotland experienced a moderate air pollution episode with several locations on the east coast recording high levels of pollution. This was mainly Particulate Matter (PM10) however moderate ozone was also measured widely across Scotland.

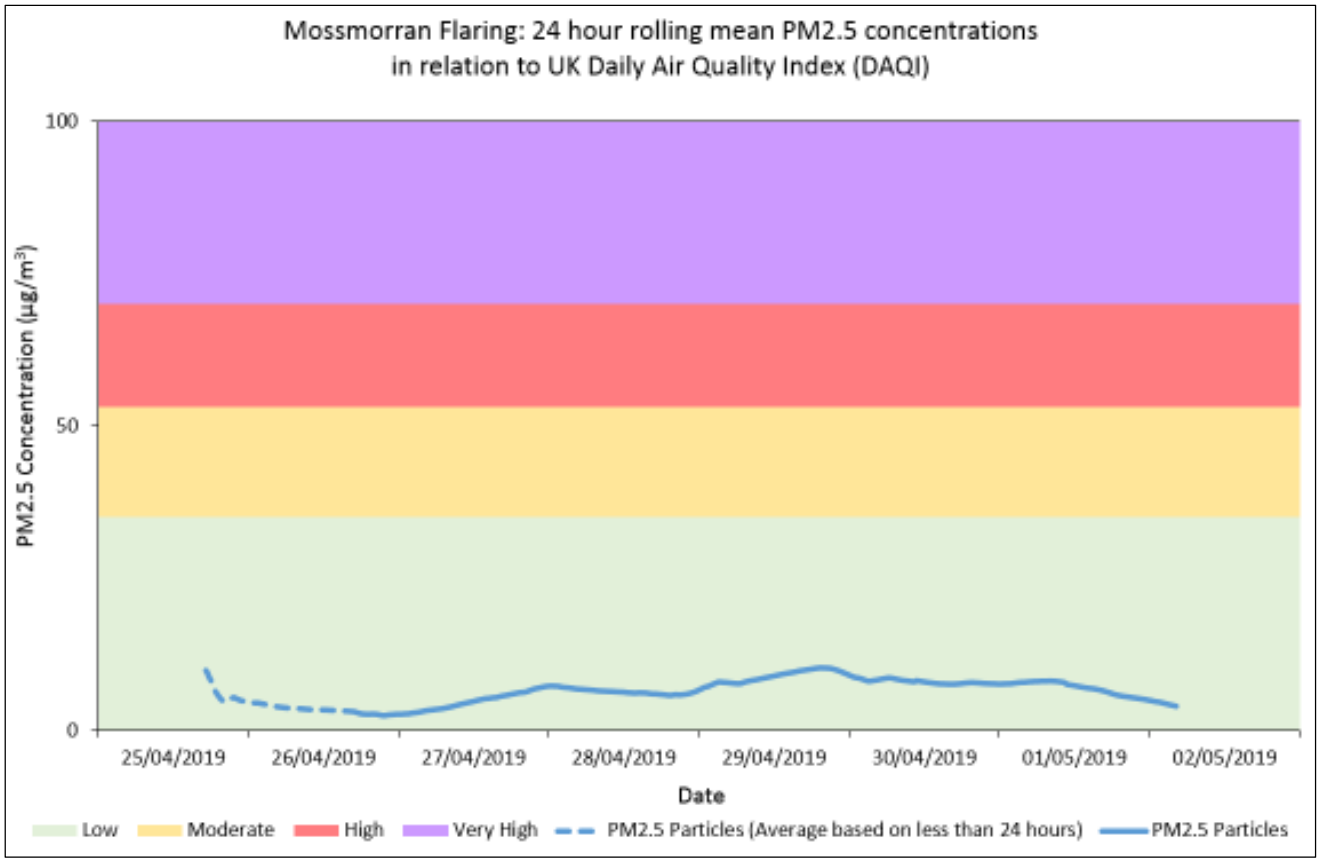
It was identified that air masses from the east, along with strong easterly winds affecting the country, were blowing air from the continent. This included smoke from large fires located in eastern Europe and Russia. There were also reports of sand being blown from the Sahara, which came down during showers over the UK.

Results of particulate monitoring

The graphs below show the measured data over the monitoring period for PM10 particles and PM2.5 particles. These are compared against the relevant UK Daily Air Quality Index. All measurements are within the 'Low' banding.

Further information on DAQI and bandings are available at the end of this report.





Conclusions

- The air quality particulate matter results gave no cause for concern and were well below the Daily Air Quality Index for PM10 (and PM2.5). Additionally, PM10 levels were below the daily air quality standards of 50 µm-3 (per cubic metre)

- The results of SEPA's air quality monitoring have demonstrated ongoing challenges experienced in getting 'real-time' information.

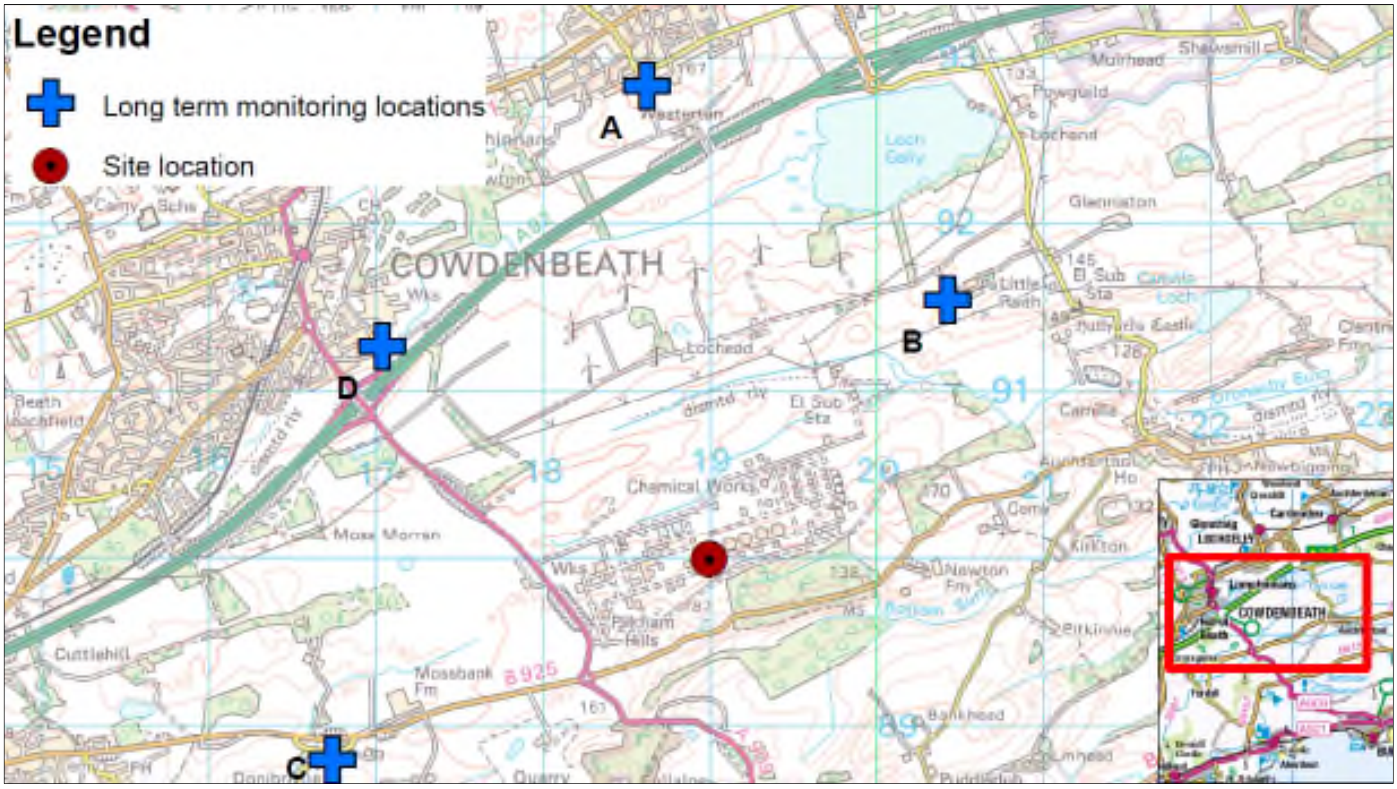
- We have reviewed our own scientific and regulatory response to elevated flaring events, and will continue to do so. We are working with partners to improve our respond across agencies. Further work with partner agencies around future monitoring is also underway.

Extended air quality monitoring

SEPA does not routinely monitor ambient air around any regulated premises. Our emphasis is on emissions made at the site and requiring monitoring by the operators that demonstrates they are within legal limits. However, in response to community concerns, SEPA offered to carry out a three month programme of enhanced air quality monitoring to inform relevant public agencies.

A monitoring trailer and diffusion tubes were located in a variety of community locations for three months. Locations were discussed and agreed with community representatives, the Mossmorran and Braefoot Bay Independent Air Quality Review Group and the Mossmorran Safety Liaison Group. The analysis of the data gathered will be reported as soon as possible.

The map shows the locations of the air quality monitors during SEPA's three months of monitoring.



In locations A (Lochgelly), B (a farm location to the North East of the complex), C (Donibristle) and D (Cowdenbeath) there were:

- Diffusion tubes for volatile organic compounds - benzene, 1,3-butadiene, butane, hexane, styrene, toluene.

- Palmes-type diffusion tubes used in the UK for indicative measurements of nitrogen dioxide for the purposes of LAQM

In location B there was also a trailer doing continuous monitoring for:

- Carbon monoxide (CO)
- Nitrogen oxides (NO2)
- Sulphur dioxide (SO2)
- PM10
- PM2.5

Details of the environmental monitoring proposals were also discussed with NHS Fife and Health Protection Scotland. Local air quality is led by Fife Council, with whom SEPA work with closely, and findings will be shared with representatives - as well as with the Mossmorran and Braefoot Bay Independent Air Quality Review Group.

The objective was to monitor air quality during routine operations and any unplanned flaring at Mossmorran. The three months of monitoring concluded, as planned, on 18 April and missed the start of the unplanned flaring by just three days. This decision was taken entirely independently by SEPA.

What does the UK Daily Air Quality Index mean?

The following information is taken from the Air Quality in Scotland website at 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 PM10 and PM2.5. 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.

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

PM2.5 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
µgm^{-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	Anyone experiencing discomfort such as sore eyes, cough or sore throat

Air Pollution Banding	Value	Accompanying health messages for at-risk individuals*	Accompanying health messages for the general population
		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.	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.