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Llywodraeth Cymru
Welsh Government

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RE: NOTIFICATION OF CHANGES TO THE AIR QUALITY INDEX

The Committee on the Medical Effects of Air Pollutants (COMEAP) was asked by Defra and the Devolved Administrations to review the Air Quality Index to ensure that it is fit for purpose given developments in the field of air quality. The current index has been in operation essentially unchanged for a period of around 12 years. COMEAP published the report *Review of the UK Air Quality Index* in June 2011. Defra and the Devolved Administrations have considered the report recommendations and will implement several changes, following consultation with index users. The new index, to be renamed the Daily Air Quality Index (DAQI) is documented below.

The changes to the index are:

1. Updated health advice to accompany the DAQI to provide more focused and clearer information. The new index comes in three parts and includes additional advice for susceptible individuals, alongside advice for the general population:
 - A. Instructions on how the index should be used;**
 - B. The short-term health effects of air pollution and action that can be taken to reduce impacts;**
 - C. Health advice linked to each band to accompany the air quality index.**
2. Changes to the index bands (Low, Moderate, High, Very High) for particulate matter (PM₁₀), nitrogen dioxide (NO₂), and ozone (O₃) to make them more stringent. See Table 1 for figures. Please note that the bands for ozone are slightly different to those recommended by COMEAP;
3. Inclusion of fine particulate matter (PM_{2.5}) in the DAQI;
4. Removal of carbon monoxide (CO) from the DAQI in view of the dramatic reductions in outdoor concentrations of CO;
5. Changes to the presentation of the index, to be a 10-point scale with four bands of Low, Moderate, High, and Very High, with colour coding to aid the interpretation of the DAQI, see Table 1;

6. Inclusion of trigger values to allow for the prediction of episodes of elevated air pollution in real time as they emerge. With the averaging times¹ of 24 hours for particulate matter and 8 hours for ozone it is not possible to provide public information about an unexpected pollution episode until it is well established. 'Triggers' have been derived to provide information to the public to warn of likely exposure before it occurs and as a 'Moderate', 'High', or 'Very High' episode progresses. These 'triggers' can be used by organisations that operate real-time public information services. Further information on trigger values will follow;
7. Links to the long-term health effects of air pollution will be provided with the index, noting that the DAQI itself only addresses the health effects of short term exposure to elevated levels.

We recommend that public information services that use the Daily Air Quality Index implement these changes. Defra and the Devolved Administrations will be implementing these changes to national air quality information services from 1st January 2012.

Actions on implementation for information providers:

- Update the thresholds and definition of statistical calculations for the existing banding pollutants (O₃, CO, SO₂, NO₂ and PM₁₀). In the case of ozone and PM₁₀ this will involve changing the averaging periods for the bandings as well as the thresholds.
- Add new bandings and statistical calculations for PM_{2.5}.
- Change the format and presentation of air quality bulletins and other information provision methods to include PM_{2.5} and drop CO.
- Update software for any data summaries and regional summaries where the index of "worst pollutant" is presented, so that PM_{2.5} is included and CO is removed.
- Update any tables and descriptive pages on your website which present the bandings information, in particular to update the health information provided.
- Add the calculations and presentation of "Trigger Values" (further information on trigger values will follow).

Further information on air quality, including current and forecast levels of air pollution can be found at www.welshairquality.co.uk and <http://uk-air.defra.gov.uk>. If you have any queries regarding the Daily Air Quality Index, please do not hesitate to contact me.

Yours sincerely,

Robert JT Williams
Head of Radioactivity and Pollution Prevention

¹ The averaging time is the period of time which is used to smooth short term variations in pollutant concentrations. These differ from pollutant to pollutant reflecting two aspects of the evidence on health effects; firstly, the timescale of exposure over which adverse health effects might be caused and, secondly, the averaging times used in the studies on which the assessment is based.

Daily Air Quality Index

The new bandings for the Daily Air quality Index are detailed in Table 1.

Band	Index	Ozone	Nitrogen Dioxide	Sulphur Dioxide	PM _{2.5} Particles	PM ₁₀ Particles
		Running 8 hourly mean	hourly mean	15 minute mean	24 hour mean	24 hour mean
		µgm ⁻³	µgm ⁻³	µgm ⁻³	µgm ⁻³	µgm ⁻³
LOW						
	1	0-33	0-66	0-88	0-11	0-16
	2	34-65	67-133	89-176	12-23	17-33
	3	66-99	134-199	177-265	24-34	34-49
MODERATE						
	4	100-120	200-267	266-354	35-41	50-58
	5	121-140	268-334	355-442	42-46	59-66
	6	141-159	335-399	443-531	47-52	67-74
HIGH						
	7	160-187	400-467	532-708	53-58	75-83
	8	188-213	468-534	709-886	59-64	84-91
	9	214-239	535-599	887-1063	65-69	92-99
VERY HIGH						
	10	240 or more	600 or more	1064 or more	70 or more	100 or more

Table 1: Daily Air Quality Index bands

The new daily air quality index comes in three parts and includes additional advice for susceptible individuals, alongside advice for the general population:

- A. Instructions on how the index should be used;**
- B. The short-term health effects of air pollution and action that can be taken to reduce impacts;**
- C. Health advice linked to each band to accompany the air quality index.**

These are detailed below:

A: HOW TO USE THE DAILY AIR QUALITY INDEX

Step 1: Determine whether you (or your children) are likely to be at-risk from air pollution. Information on groups who may be affected is on the 'Additional information on the effects of air pollution' page. Your doctor may also be able to give you advice.

Step 2: If you may be at-risk, and are planning strenuous activity outdoors, check the air pollution forecast.

Step 3: Use the health messages corresponding to the highest forecast level of pollution as a guide.

B: ADDITIONAL INFORMATION ON THE SHORT-TERM EFFECTS OF AIR POLLUTION

The daily air quality index (DAQI) has been developed to provide advice on expected levels of air pollution. In addition, information on the short-term effects on health that might be expected to occur at the different bands of the index (Low, Moderate, High, Very High) is provided. It is possible that very sensitive individuals may experience health effects even on Low air pollution days. This advice applies to anyone experiencing symptoms.

Short-term effects of air pollution on health

Air pollution has a range of effects on health. However, air pollution in the UK does not rise to levels at which people need to make major changes to their habits to avoid exposure; nobody need fear going outdoors.

Adults and Children with lung or heart conditions - It is known that, when levels of air pollutants rise, adults suffering from heart conditions, and adults and children with lung conditions, are at increased risk of becoming ill and needing treatment. Only a minority of those who suffer from these conditions are likely to be affected and it is not possible to predict in advance who will be affected. Some people are aware that air pollution affects their health: adults and children with asthma may notice that they need to increase their use of inhaled reliever medication on days when levels of air pollution are higher than average.

Older people are more likely to suffer from heart and lung conditions than young people and so it makes good sense for them to be aware of current air pollution conditions.

The general population - At Very High levels of air pollution, some people may experience a sore or dry throat, sore eyes or, in some cases, a tickly cough even in healthy individuals.

Children need not be kept from school or prevented from taking part in games. Children with asthma may notice that they need to increase their use of reliever medication on days when levels of air pollution are higher than average.

Action that can be taken

When levels of air pollution increase it would be sensible for those who have noticed that they are affected to limit their exposure to air pollutants. This does not mean staying indoors, but reducing levels of exercise outdoors would be reasonable.

Older people and those with heart and lung conditions might avoid exertion on High pollution days.

Adults and children with asthma should check that they are taking their medication as advised by their health practitioner and may notice that they need to increase their use of inhaled reliever medication.

Adults with heart and circulatory conditions should **not** modify their treatment schedules on the basis of advice provided by the air quality index: such modification should only be made on a health practitioner's advice.

Some athletes, even if they are not asthmatic, may notice that they find their performance less good than expected when levels of a certain air pollutant (ground level ozone) are High, and they may notice that they find deep breathing causes some discomfort in the chest: This might be expected in summer on days when ground level ozone levels are raised. This does not mean that they are in danger but it would be sensible for them to limit their activities on such days.

C: HEALTH ADVICE TO ACCOMPANY THE DAILY AIR QUALITY INDEX.

Air pollution banding	Value	Accompanying health messages for at-risk groups and the general population	
		At-risk individuals *	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 in section B.

Questions and answers on the Air Quality Index (AQI)

1. What is the Air Quality Index?

The air quality index (AQI) is used to communicate information about real-time and forecast levels of outdoor air pollution in the short-term. The AQI uses a 1-10 index divided into four bands ('Low', 'Moderate', 'High' and 'Very High') to provide more detail about air pollution levels in a simple way, similar to the sun index or pollen index. The key index pollutants are particulate matter, ozone, sulphur dioxide, nitrogen dioxide, and carbon monoxide.

2. What is the AQI used for?

Air quality information is communicated in terms of the AQI and provides warning of potentially health-damaging air pollution events in the short-term. With advanced warning of poor air quality, individuals who are susceptible to the effects of air pollution, such as those with respiratory or cardio-vascular conditions, have the opportunity to manage their condition and reduce the severity of their symptoms.

3. Who uses the AQI?

Individuals and organisations who want to know how good or bad air pollution is will look at air quality information which is described in terms of the AQI. Defra, local authorities, and Universities use the AQI to communicate air quality information, for example see:

- <http://uk-air.defra.gov.uk/air-pollution/bandings>
- <http://www.airtext.info/>
- <http://www.londonair.org.uk/london/asp/nowcast.asp>

The Welsh Government also uses the Welsh Air quality website www.welshairquality.co.uk which will be altered to reflect the changes in the health advice associated with this revision of the air quality index banding.

4. How was the AQI developed?

The AQI was developed by the Committee on the Medical Effects of Air Pollutants (COMEAP) and is based on the latest available health evidence. The 'Low' bands indicate air pollution levels where it is unlikely that anyone will suffer any adverse effects of short-term exposure, including people with lung or heart conditions who may be more susceptible to the effects of air pollution. The 'Moderate' band represents levels of air pollutants at which there are likely to be small effects that only affect susceptible people. Values for the 'High' bands are associated with significant effects in susceptible people. At 'Very High' levels of air pollution even healthy individuals may experience adverse effects of short-term exposure.

COMEAP reviewed the AQI and published a report *Review of the UK Air Quality Index* in June 2011. See <http://comeap.org.uk/documents/reports/130-review-of-the-uk-air-quality-index.html>

5. Why was the AQI reviewed?

The Committee on the Medical Effects of Air Pollutants (COMEAP) was asked by the Department of Environment, Food and Rural Affairs (Defra) to review the UK's air quality

index (AQI) to ensure that it is fit for purpose. The current UK air quality index has now been in operation essentially unchanged for a period of around 12 years. Therefore, it was appropriate to review the index to establish its suitability, given the developments in the field of air quality.

6. Why has Defra adopted the World Health Organization guidelines for ozone instead of the advice recommended by COMEAP?

COMEAP assessed the latest scientific evidence and provided Defra with their recommendations. Defra evaluated the recommendations in a wider context, taking other factors into consideration, including the purpose of the index and its users, to ensure that we are providing appropriate guidance to the public on daily levels of air pollution, and information on actions individuals can take to reduce the impacts on their health.

Defra will adopt a Low/Moderate breakpoint of $100 \mu\text{g m}^{-3}$ for ozone. COMEAP recommended the breakpoint between the Low and Moderate band for ozone be set at $80 \mu\text{g m}^{-3}$. WHO recommend a guideline of $100 \mu\text{g m}^{-3}$ but noted that some effects may be expected in susceptible individuals within the population at its recommended guideline of $100 \mu\text{g m}^{-3}$, and because of this COMEAP recommended the lower breakpoint of $80 \mu\text{g m}^{-3}$. However, the $80 \mu\text{g m}^{-3}$ value is close to the hemispheric background level of ozone and it is likely that this level will be exceeded on the majority of days in the UK (up to 80% of days in a year) and elsewhere, and air pollution would be described as Moderate on most days.

As part of the review, customer insight research was conducted to investigate how people interpret air quality information, and how the provision of air quality information could be improved. A recommendation of the research was that users would like to see more variation in the reported levels of air pollution. The WHO guidelines provide for greater variation in the number of Low and Moderate air pollution days.

If Moderate air pollution is reported on the majority of days then the importance of messages warning of elevated air pollution will be lost. This was demonstrated by Airtext (a service in London who provide air pollution information by text message, <http://www.airtext.info/>) during the High pollution episode in April 2011. Airtext lost subscribers to the service when they were constantly bombarded with messages.

Defra will continue to introduce measures to improve air quality. Reductions in the hemispheric background of ozone will require a global approach, as it is a trans-boundary pollutant.

7. When will the changes to the index be implemented?

The changes to the AQI will be implemented from 1st January 2012.

8. There will be more moderate and higher days of air pollution reported with the revised index, does this mean that air pollution is getting worse?

It may appear that air pollution is getting worse as more moderate days and higher will be reported. However, this not the case. The revised index reflects updated scientific evidence

and redresses the previous underestimation of the effects of short-term exposure to air pollution. The changes to the index will allow individuals who are susceptible to the effects of air pollution to manage their condition. This does not mean that levels of air pollutions are increasing.