



Department  
for Environment  
Food & Rural Affairs

# Report on measures for 2014 exceedance of the Target Value for Benzo[a]pyrene in South Wales non- agglomeration zone (UK0041)

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Any enquiries regarding this publication should be sent to us at

Air Quality  
Department for Environment, Food and Rural Affairs  
Area 2C  
Nobel House  
Smith Square  
London  
SW1P 3JR

Email: [air.quality@defra.gsi.gov.uk](mailto:air.quality@defra.gsi.gov.uk)

With technical input from Ricardo Energy & Environment

[www.gov.uk/defra](http://www.gov.uk/defra)

## Contents

1. Introduction .....	4
1.1 Context.....	4
1.2 Status of zone .....	4
2 Exceedance situation South Wales [B[a]P_UK0041_2014_1] related to industrial emissions.....	7
2.1 Description of exceedance .....	7
2.2 Source apportionment .....	9
2.3 A finer scale assessment .....	11
2.4 Measures .....	12
3 Exceedance situation South Wales [B[a]P_UK0041_2014_2] related to domestic emissions.....	22
3.1 Description of exceedance .....	22
3.2 Source apportionment .....	24
3.3 Measures .....	26

# 1. Introduction

## 1.1 Context

Under the EU Directive 2004/107/EC<sup>1</sup>, the target value (TV) for Benzo[a]pyrene (B[a]P) is an annual mean concentration of 1 nanogram (one billionth of a gram ( $10^{-9}$ ) per cubic metre ( $m^{-3}$ ) of ambient air or lower. The Directive requires Member States report on measures in place to address the exceedance of the TV and that all reasonable measures that do not entail disproportionate cost should be taken to ensure this target is not exceeded.

Exceedance of the TV was reported in 2013 in the South Wales non-agglomeration zone and a report on measures was published detailing the exceedance and the measures in place<sup>2</sup>.

This document reports the exceedance situation for 2014 reflecting the more recent assessment and updating the 2013 report on measures.

## 1.2 Status of zone

This is the report on measures required for exceedances of the TV for B[a]P within the South Wales zone identified within the 2014 UK air quality assessment. Exceedances within this zone were identified on the basis of model results on a 1 km x 1 km grid resolution providing supplementary information. This exceedance was reported via e-Reporting dataflow G<sup>3</sup> on attainment and Air Pollution in the UK<sup>4</sup>.

Table 1 summarises the spatial extent and associated resident population for the exceedances identified in this zone, as reported via e-Reporting.

**Table 1. Area exceeding B[a]P target value in 2014 and associated population for South Wales zone UK0041**

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<sup>1</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:023:0003:0016:EN:PDF>

<sup>2</sup> [https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/bap\\_southwales\\_UK0041\\_reportonmeasures\\_2013.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/bap_southwales_UK0041_reportonmeasures_2013.pdf)

<sup>3</sup> <http://cdr.eionet.europa.eu/gb/eu/aqd>

<sup>4</sup> <http://uk-air.defra.gov.uk/library/annualreport/index>

Zone code	Zone Name	Area exceeding TV (km <sup>2</sup> )	Population exceeding TV
UK0041	South Wales	8	1490

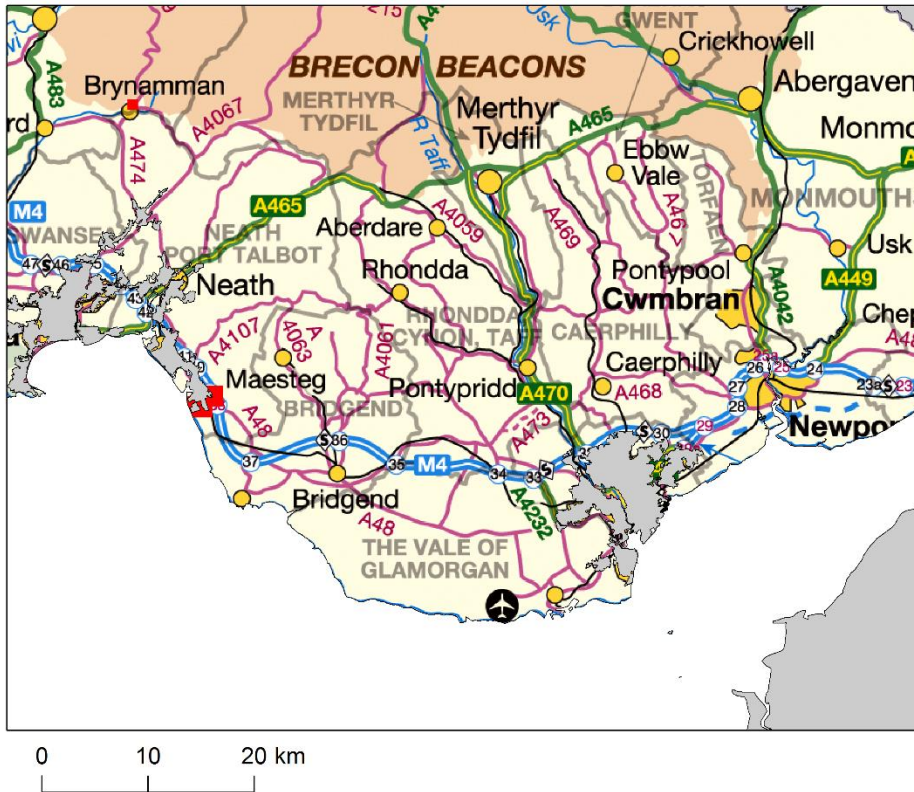
Figure 1a shows the locations of the exceedances in the context of the zone as a whole. Figure 1b shows the part of the zone including the exceedances in more detail.

**Figure 1. Location of exceedance of the B[a]P target value on 2013 in South Wales zone UK0041. Areas of the zone in exceeding grid squares are marked red.**

**a) The whole zone**



**b) The exceedance locations at higher spatial resolution**



An initial source apportionment was carried out and this analysis identified two distinct exceedance types within this zone: industrial and domestic.

- South Wales [B[a]P\_UK0041\_2013\_1] related to industrial emissions (area of exceedance 7 km<sup>2</sup>)
- South Wales [B[a]P\_UK0041\_2013\_2] related to domestic emissions in one location (area of exceedance 1 km<sup>2</sup>)

However a subsequent finer scale assessment, using additional local, data suggests that the industrial emissions are unlikely to have resulted in off-site concentrations of B[a]P exceeding the TV in 2014.

This report has a section for each exceedance situation in the zone. Each section includes a description of the exceedance situation, including maps, information on source apportionment and a list of measures already taken or to be taken. Information on measures is reported within e-Reporting dataflow K<sup>5</sup>.

<sup>5</sup> <http://cdr.eionet.europa.eu/gb/eu/aqd>

## 2 Exceedance situation South Wales [B[a]P\_UK0041\_2014\_1] related to industrial emissions

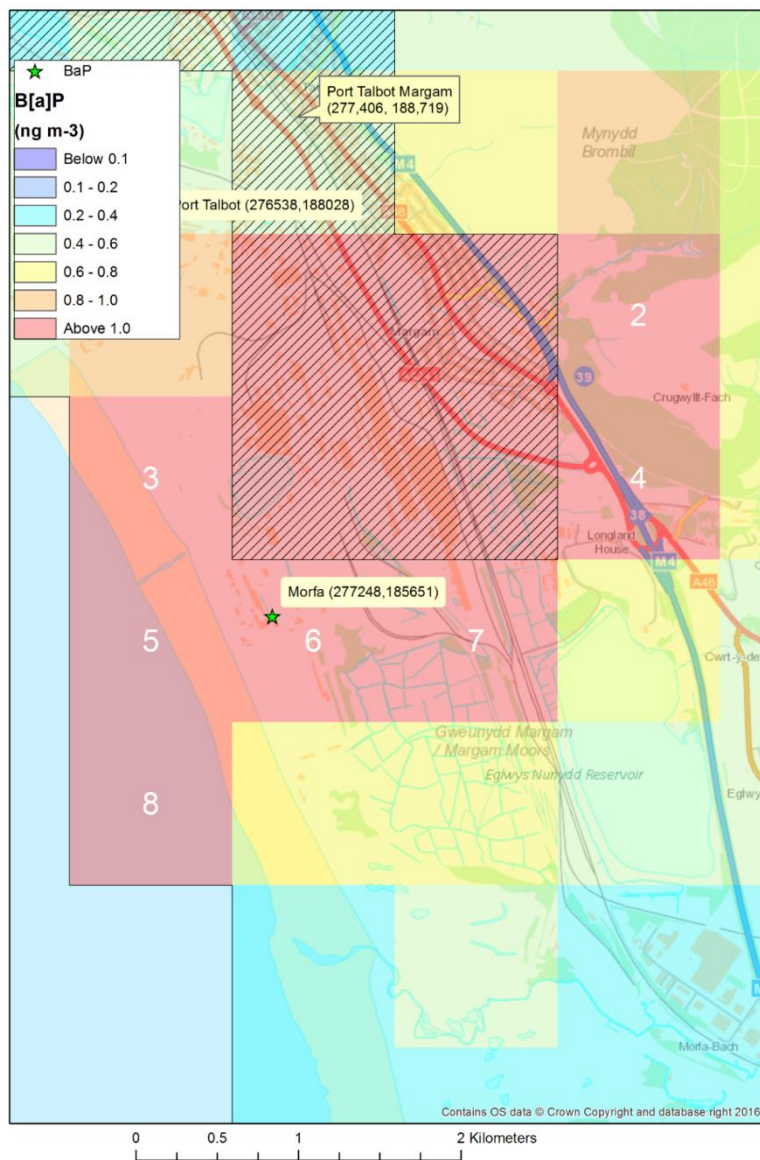
### 2.1 Description of exceedance

This exceedance situation has an area of exceedance of 7 km<sup>2</sup> in Margam in Neath Port Talbot. Figure 2 shows the location of the exceedance situation in detail. The exceeding grid squares are numbered in Figure 2 and in subsequent tables for easy reference. There is no resident population in five of the grid squares (exceeding grid squares 3, 5, 6, 7 and 8) that are all within the steelworks industrial complex area. The resident population in exceeding grid square 2 is 11 and in exceeding grid squares 4 is 71. Both of these grid squares also include part of Margam Country Park. This exceedance situation is adjacent to and shares common sources with the exceedance situation [Swansea Urban Area \[B\[a\]P\\_UK0027\\_2014\\_1\]](#).

Figure 2 also shows the locations of the monitoring site associated with the exceedance situation (Port Talbot Margam, which is in Swansea Urban Area zone UK0027) and the locations of the key industrial sources. The area shown on this map includes grid squares assigned to both the Swansea Urban Area (UK0027) and South Wales (UK0041) zones. The grid squares assigned to the Swansea Urban Area zone and exceedance Swansea Urban Area [B[a]P\_UK0027\_2014\_1]- are shown as hatched and the non-hatched red grid squares correspond to this exceedance situation, which is South Wales [B[a]P\_UK0041\_2014\_1].

It should be noted that the measurements at Port Talbot Margam were less than the TV. In modelling the spatial coverage of B[a]P concentrations, the national scale model predictions were rescaled to match these measurements at the monitoring site. The rescaled predictions were reported to exceed the target in the vicinity of the steelworks industrial complex in Port Talbot due to industrial emissions; hence this exceedance situation is included in this report on measures. However, subsequent finer scale modelling that included a more detailed assessment indicated that ambient off-site concentrations of B[a]P due to industrial emissions may not exceed the TV outside of the bounds of the industrial site and this assessment is discussed in more detail in section 2.3.

**Figure 2. Exceedance situation South Wales [B[a]P\_UK0041\_2014\_1].**  
**Exceeding grid squares are marked red. Locations of coke works at Morfa and sinter plant at Port Talbot are also shown. Non-hatched grid squares are those assigned to South Wales zone UK0041. Hatched grid squares are assigned to Swansea Urban Area zone UK0027 and do not form part of this exceedance situation.**





## 2.2 Source apportionment

Table 2 provides a breakdown of the main emission sources (source apportionment) that have contributed to the grid squares in this exceedance situation, highlighting the significant contribution from industrial sources. The penultimate column is the total from all emission sources. The values in this column have been rounded to 1 decimal place for consistency with the values used in the compliance assessment. The values in the other columns have not been rounded. The other shaded columns are the subtotals for the regional, urban background and local contributions. Table 3 gives a more detailed source apportionment indicating how the separate industrial processes contribute to the total industrial figure. This shows that the coke ovens at Morfa are the main sources associated with this exceedance situation.

**Table 2. Source apportionment for exceedance situation South Wales [B[a]P\_UK0041\_2014\_1]. Annual mean B[a]P concentration (ngm<sup>-3</sup>)**

Grid square number	OS easting (m)	OS Northing (m)	Zone	a) Regional background: Total	b) Urban background increment: Total	Urban background increment: Traffic	Urban background increment: Industry	Urban background increment: commercial	Urban background increment: Shipping	Urban background increment: Off road	Urban background increment: Other	c) Local increment: Total	Local increment: Industry including heat and power	Total for all emission sources (a+b+c)	Resident population
2	279500	187500	41	n/a	0.208	0.004	0.098	0.050	0.000	0.006	0.051	1.008	1.008	1.2	11
3	276500	186500	41	n/a	0.091	0.002	0.030	0.034	0.001	0.002	0.023	2.164	2.164	2.3	0
4	279500	186500	41	n/a	0.224	0.007	0.119	0.045	0.000	0.007	0.046	0.927	0.927	1.2	71
5	276500	185500	41	n/a	0.083	0.001	0.028	0.030	0.001	0.002	0.021	3.690	3.690	3.8	0
6	277500	185500	41	n/a	0.124	0.002	0.058	0.033	0.000	0.004	0.027	4.392	4.392	4.5	0
7	278500	185500	41	n/a	0.149	0.003	0.072	0.036	0.000	0.004	0.034	1.127	1.127	1.3	0
8	276500	184500	41	n/a	0.073	0.001	0.023	0.028	0.001	0.001	0.019	1.155	1.155	1.2	0

**Table 3. Detailed source apportionment for industrial sources only for exceedance situation South Wales [B[a]P\_UK0041\_2014\_1]. Annual mean B[a]P concentration (ngm<sup>-3</sup>)**

Grid square number	OS easting (m)	OS Northing (m)	Zone	Morfa coke ovens	Port Talbot sinter plant	Local increment: Industry including heat and power production
2	279500	187500	41	1.002	0.005	1.008
3	276500	186500	41	2.162	0.002	2.164
4	279500	186500	41	0.924	0.003	0.927
5	276500	185500	41	3.688	0.002	3.690
6	277500	185500	41	4.389	0.003	4.392
7	278500	185500	41	1.124	0.003	1.127
8	276500	184500	41	1.153	0.002	1.155

## 2.3 A finer scale assessment

In order to assess this exceedance in more detail a finer scale dispersion modelling assessment was undertaken, making use of additional local data. This assessment suggests that off-site concentrations of B[a]P did not exceed the TV in 2014. Figure 4 plots the sum of the process contribution, due to emissions from the steelworks complex, and the ambient B[a]P background, derived from the measurement at the Port Talbot Margam site. The blue contour indicates the predicted environmental concentration of 1ng/m<sup>3</sup> and shows that it would be unlikely that the TV would have been exceeded beyond the industrial site boundary.

As indicated in section 2.2 of the overview report on BaP, further work is being undertaken to incorporate the fine scale modelling into national reporting. A revised approach has been adopted for the 2015 compliance assessment for B[a]P

**Figure 3. Predicted environmental concentration of B[a]P (ng/m<sup>3</sup>) for 2014.**



## 2.4 Measures

The main overview report contains more information on how industrial sites are regulated. There are no specific Best Available Techniques (BAT) conclusions designed to reduce B[a]P under the Industrial Emissions Directive (EU Directive 2010/75/EU), in either the Coke Ovens or Sinter plant which are the main sources of

this pollutant. BAT looks to control emissions in general and the techniques required will also affect B[a]P concentrations. The iron and steel BREF<sup>6</sup> contains stringent requirements for iron and steel works to significantly reduce their fugitive emissions, including Polycyclic Aromatic Hydrocarbons (PAH) (B[a]P is a pollutant from this chemical group). The reduction of emissions of polychlorinated dibenzodioxins/furans (PCDD/F) and polychlorinated biphenyls (PCB) by utilising lignite injection at the sinter plant will also result in a reduction of B[a]P. Monitoring and further modelling as the techniques are employed will demonstrate the scale of the reduction. The regulator is of the view that Tata will be at BAT within the timescales required by the Industrial Emissions Directive or within the periods of any agreed derogations for the Sinter Plant and the Coke Ovens.

Table 5 shows the measures taken or to be taken at the Port Talbot industrial site.

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<sup>6</sup> [http://eippcb.jrc.ec.europa.eu/reference/BREF/IS\\_Adopted\\_03\\_2012.pdf](http://eippcb.jrc.ec.europa.eu/reference/BREF/IS_Adopted_03_2012.pdf)

**Table 5. Table of measures taken or to be taken at Port Talbot industrial site**

Measure code	Description	Classification	Implementation dates	Other information		Comment
Coke Ovens 1	Measures to meet new fugitive BAT emission limits (BATELs)	Permit systems and economic instruments: IPPC permits	Start: 2015 Expected end: 2016 Status: Implementation	Source affected:	Industry including heat and power production	Tata has adopted a modified US EPA method for fugitive release assessment. This uses a binary 'leak-no leak' assessment. This method directly compares to the BATc.  Compliance with the new limits has been summarised below for tops, doors and charging emissions.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Emissions estimate	
				Target	Not available	

					emissions reduction:	Where compliance has not been achieved, NRW will respond according to its CCS compliance scheme and work with Tata to achieve the new limits.
Coke Ovens 2	Spigot improvements. The spigot is the joint between the oven and the gas main. Fitting of new collars, change of sealing material to silicon, shortening of ascension pipes and	Permit systems and economic instruments: IPPC permits	Start: 2015 Expected end: 2016 Status: Implementation	Source affected:	Industry including heat and power production	Control of fugitive emissions from coke ovens will result in lower B[a]P emissions.  The 1% BAT-AEL for tops is very challenging. Current leakage rate is 7% (or 93%
				Spatial scale:	Local	

	new seals fitted.			<p>Cost: Not available</p> <p>Indicator: Percentage leak rate reduced to target of 1%</p> <p>Target emissions reduction: Not available</p>	<p>leak free)</p> <p>A programme of works is ongoing to reduce leakage, but the rate of spigot renewal is difficult to change due to the complexities of working on a live coke ovens. The work must be sequenced to avoid affecting oven integrity (ovens are usually in continuous operation).</p> <p>It is unlikely that Tata will be able to comply with this BAT-AEL for a number of months.</p>
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						NRW will address non-compliance during this period in accordance with its CCS scheme.
Coke Ovens 3	Coke Oven door improvements	Permit systems and economic instruments: IPPC permits	Start: 2015 Expected end: 2016 Status: Implementation	Source affected:	Industry including heat and power production	Control of fugitive emissions from coke ovens will result in lower B[a]P emissions.  BAT-AEL for doors is 10% leakage or 90% non-leaking doors. Tata have been close to achieving this limit but are not yet in full compliance.
				Spatial scale:	Local	As a result of changing shift practices and standardising door
				Cost:	Not available	
				Indicator:	Percentage leak rate reduced to target of 10%	

					Target emissions reduction:	Not available	<p>cleaning methods, the door leakage rate has dropped noticeably across both batteries.</p> <p>Tata may be able to comply with the BAT-AEL for doors by quarter 3 (Jul-Sep) of 2016.</p> <p>NRW will address any non-compliance in accordance with its CCS scheme.</p>
Coke Ovens 4	Reduction of emissions during charging	Permit systems and economic instruments:	<p>Start: 2015</p> <p>Expected end: 2016</p>	Source affected:	Industry including heat and power production	Control of fugitive emissions from coke ovens will result in lower B[a]P emissions.	

		IPPC permits	Status:	Implementation						<p>BAT-AEL for charging emissions is 30 seconds as a monthly mean.</p> <p>During quarter 2 (Apr-Jun) 2016 Tata have improved charging performance and are currently achieving around 40 seconds. However the easy interventions have now been taken. Meeting the 30 second target may prove more challenging.</p> <p>Tata may be able to comply with the BAT-AEL for</p>
					Spatial scale:	Local				
					Cost:	Not available				
					Indicator:	Duration of release reduced to 30 seconds as a monthly mean				
					Target emissions reduction:	Not available				

						<p>charging emissions by quarter 4 (Oct-Dec) of 2016.</p> <p>NRW will address any non-compliance in accordance with its CCS scheme.</p>
Sinter Plant	Improvements to Lignite Injection	Permit systems and economic instruments: IPPC permits	<p>Start: 2015</p> <p>Expected end: 2016</p> <p>Status: Implementation</p>	<p>Source affected: Industry including heat and power production</p> <p>Spatial scale: Local</p> <p>Cost: Not available</p>	<p>Lignite-lime injection forms part of a number of projects to ensure that the sinter plant complies with the new tighter EU (IED) standards.</p> <p>There are no specific BATc or BAT-AELs designed to reduce</p>	

				<p>Indicator: We expect the monitored B[a]P results in Port Talbot to start to drop in 2016.</p> <p>Target emissions reduction: Not available</p>	<p>B[a]P from sinter plant emissions. However reducing overall emissions will result in lower B[a]P emissions.</p> <p>Lignite-lime injection has already been approved by Tata and is still progressing. A number of preparatory works must be completed over two sinter plant stops before the system can be brought online. The projected 'go live' date is April 2017.</p>
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## **3 Exceedance situation South Wales [B[a]P\_UK0041\_2014\_2] related to domestic emissions**

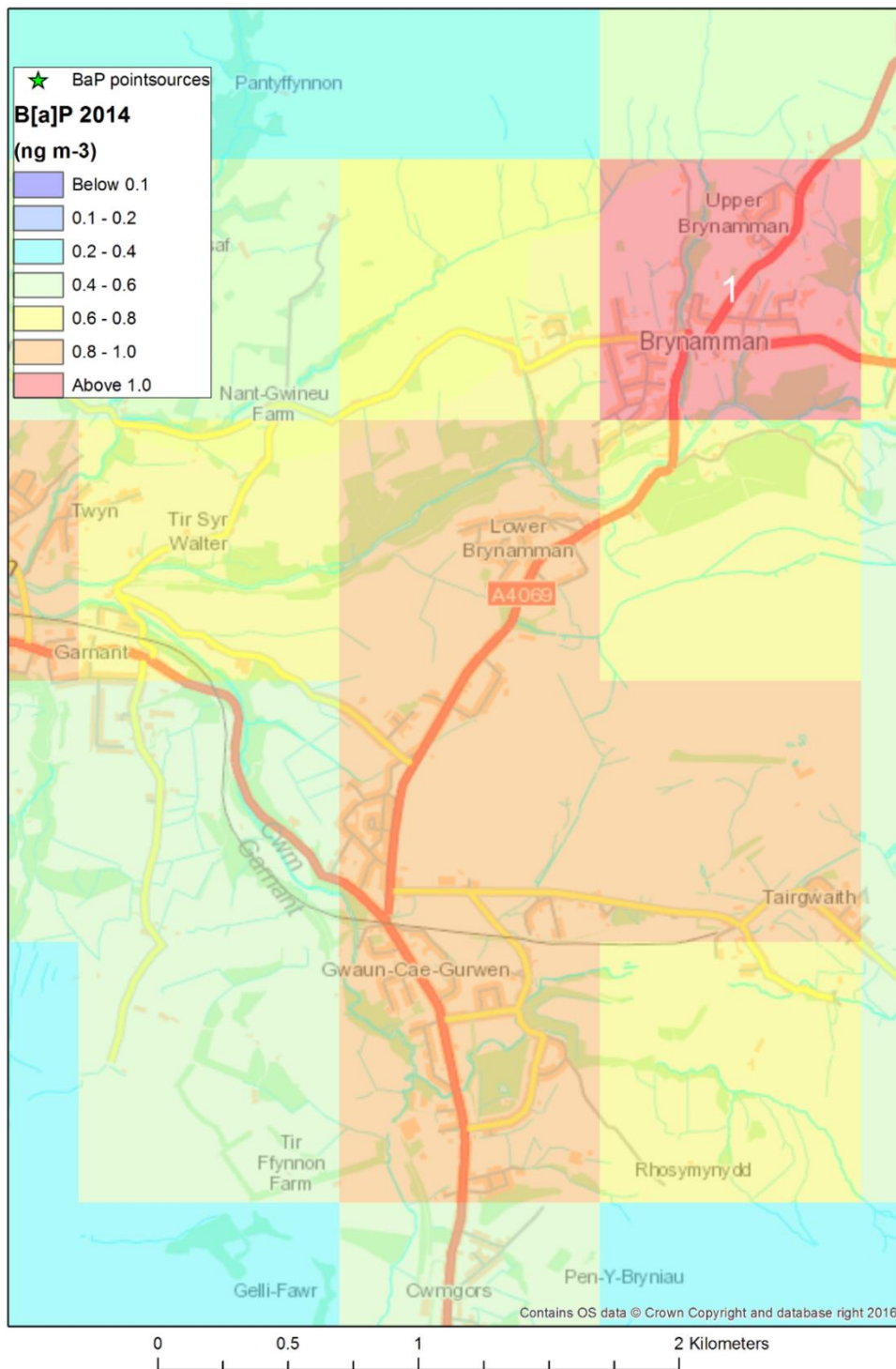
### **3.1 Description of exceedance**

In 2013 there were three grid squares exceeding, Cwmbach: not exceeding in 2014  
Mountain Ash: not exceeding in 2014, Lower Brynamman: not exceeding in 2014 but  
grid square in Brynamman (diagonally adjacent) exceeds in 2014.

This exceedance situation has an area of 1 km<sup>2</sup> and has a resident population of  
1,408 in Brynamman in Carmarthenshire (exceeding grid square 1).

This exceedance location was modelled and Figure 4 shows the location of the  
exceedance situation in detail.

Figure 4 Exceedance situation South Wales [B[a]P\_UK0041\_2014\_2] at Brynamman. Exceeding grid squares are marked red.



## 3.2 Source apportionment

Table 6 shows source apportionment for the grid squares in this exceedance situation highlighting the significant contribution from commercial and residential sources. The penultimate column is the total from all emission sources. The values in this column have been rounded to 1 decimal place for consistency with the values used in the compliance assessment. The values in the other columns have not been rounded. The other shaded columns are the subtotals for the regional, urban background and local contributions. Detailed source apportionment analysis shows that domestic coal and domestic wood combustion are the main sources contributing, sources regulated by local authorities.



**Table 6. Source apportionment for exceedance situation South Wales [B[a]P\_UK0041\_2013\_2]. Annual mean B[a]P concentration (ngm<sup>-3</sup>)**

Grid square number	OS easting (m)	OS Northing (m)	Zone	<b>a) Regional background: Total</b>	<b>b) Urban background increment: Total</b>	Urban background increment: Traffic	Urban background increment: Industry	Urban background increment: commercial and	Urban background increment: Shipping	Urban background increment: Off road mobile	Urban background increment: Other	<b>c) Local increment: Total</b>	Local increment: Industry including heat and power	<b>Total for all emission sources (a+b+c)</b>	Resident population
1	271500	214500	41	n/a	<b>1.099</b>	0.002	0.004	1.017	0.000	0.001	0.075	0.001	0.001	1.1	1408

### 3.3 Measures

**Brynamman** is within the boundaries of Carmarthenshire County Council (C.C.C). A marginal exceedance of the TV is predicted in Brynamman (and Upper Brynamman). The national inventory is based on questions posed in the 2011 national census. Since then householders in Brynamman area will have been able to receive support to make energy efficiency improvements to their homes through the schemes in Wales described in section 3.1 of the B[a]P overview document. For example, the Welsh Government's Warm Homes (Arbed) scheme has recently provided mains gas to parts of Upper Brynamman. This has resulted in 233 properties being connected to gas in addition to benefiting from a number of energy efficiency measures aimed at reducing fuel use. Data collected by Melin Homes Housing Association suggests that approximately 25% of homes previously used coal for heating before being converted to mains gas under the scheme. The gas utility company will work with the residents to make further connections to the remaining unconnected properties.

Further measures are planned. As the areas of non-compliance in the South Wales and Swansea urban agglomeration are predicted by modelling, the collection of more detailed local information by the Welsh Government and local authority regulator will strengthen the evidence base and confidence in the assumptions made. This will help to improve the confidence in the likely levels of exposure to excess levels of B[a]P, the source apportionment and identification of the predominant sources.

In addition to the provision of the fuel poverty and energy efficiency measures described in section 3.1 of the overview document, the Welsh Government is working with local authorities in strengthening the evidence base for the modelling of domestic emissions and their impacts and in identifying further potential mitigation options. However, given the additional interventions taken by the Welsh Government in these areas reporting in future years may show no exceedances in these areas.

Updated information on the locations of SCA across the UK and a revised method for assigning solid fuel use to homes without central heating were included in the NAEI emissions maps for 2014 that were used for the 2015 compliance assessment for B[a]P. This assessment confirmed that there was no exceedance in this area in 2015.