Department for Environment Food & Rural Affairs

www.gov.uk/defra

Report on measures for 2013 exceedance of the Target Value for B[a]P in South Wales non-agglomeration zone (UK0041)

November 2015

Llywodraeth Cymru
Welsh Government

This publication is available at www.gov.uk/government/publications

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

With technical input from Ricardo Energy & Environment

Contents

1. Introduction

1.1 Context

Under the EU Directive 2004/107/EC[1], the target value (TV) for 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 that all reasonable measures that do not entail disproportionate cost should be taken to ensure this target is not exceeded. This is the report on measures required for exceedances of the TV for B[a]P within the South Wales zone (UK0041) identified within the 2013 UK air quality assessment.

1.2 Status of zone

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[2] on attainment and Air Pollution in the UK[3].

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 2013 and associated population for South Wales zone UK0041

Zone code	Zone Name	Area exceeding TV (km^2)	Population exceeding TV
UK0041	South Wales	7	6029

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.

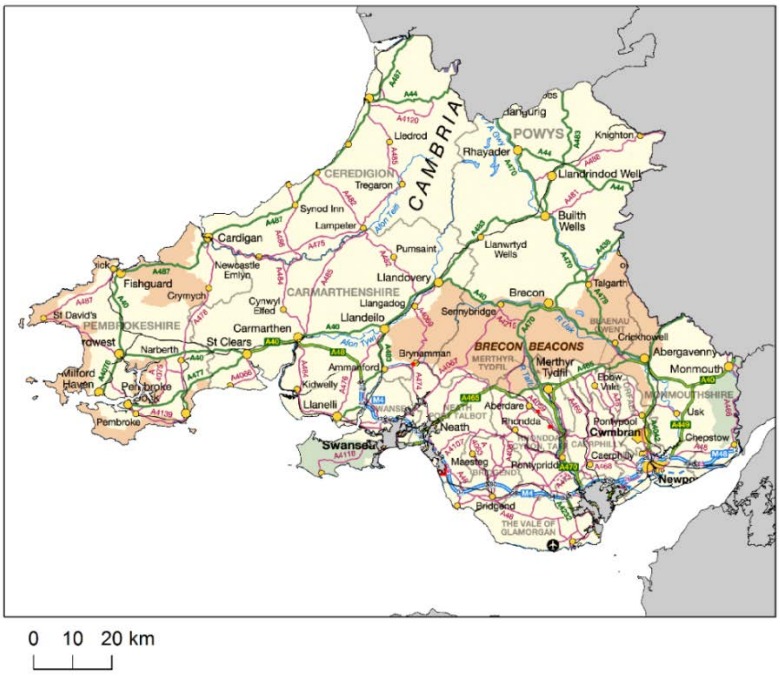
[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:023:0003:0016:EN:PDF

[2] http://cdr.eionet.europa.eu/gb/eu/aqd

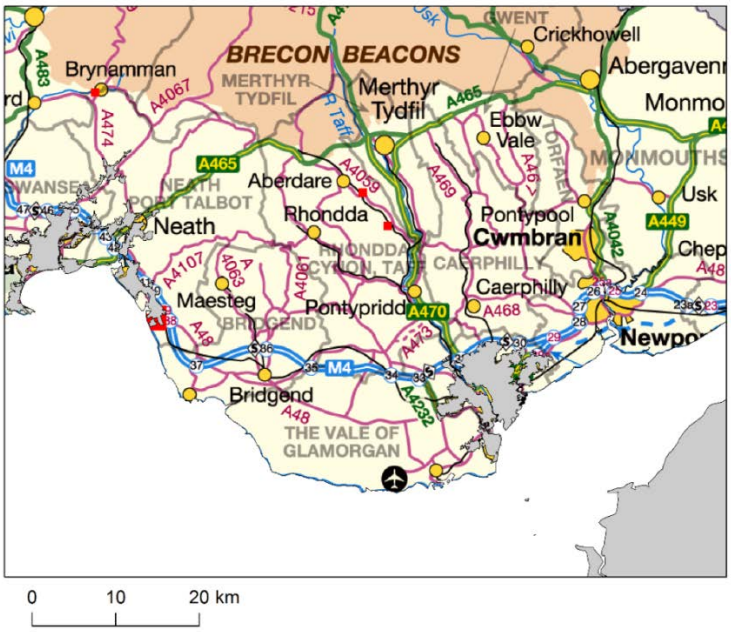
[3] http://uk-air.defra.gov.uk/library/annualreport/index

Figure 1. Location of exceedance of the B[a]P target value in 2013 within the South Wales zone UK0041. 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 4 km^2)
- South Wales [B[a]P_UK0041_2013_2] related to domestic emissions from three locations (total area of exceedance 3 km^2)

However a subsequent finer scale assessment carried out by Natural Resources Wasles (NRW), the Welsh national regulator, using additional local data suggests that it is unlikely that the industrial emissions resulted in off-site concentrations of B[a]P exceeding the TV in 2013. Further work is underway to fully evaluate this work and consideration is being given to how best it may inform future compliance assessment.

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[4].

2 Exceedance situation South Wales [B[a]P_UK0041_2013_1] related to industrial emissions

2.1 Description of exceedance

This exceedance situation has an area of exceedance of 4 km^2 in Margam in Neath Port Talbot. There is no resident population in any of the grid squares, which are all within the steelworks industrial complex area. This exceedance situation is adjacent to and shares common sources with the exceedance situation Swansea Urban Area [B[a]P_UK0027_2013_1].

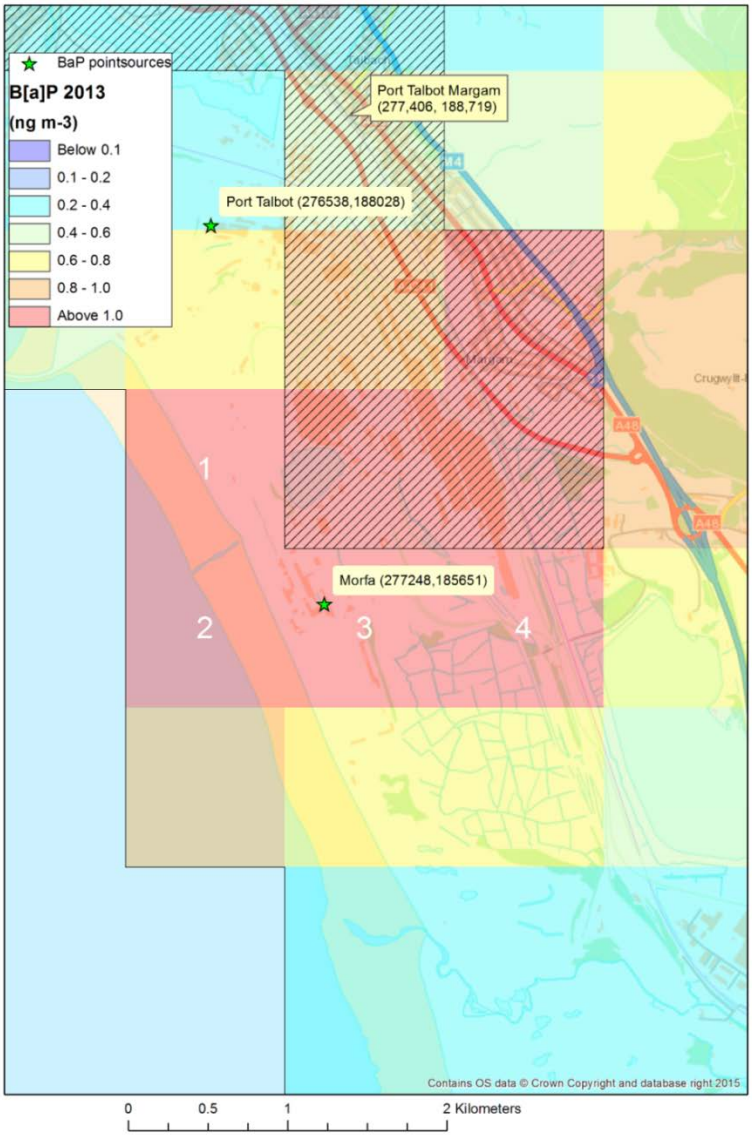
Figure 2 shows the location of the exceedance situation in detail. This map also shows the locations of the monitoring sites associated with the exceedance situation (Port Talbot Margam, which is in Swansea Urban Area zone UK0027) and the locations of the key industrial sources. The area shown on this 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_2013_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_2013_1].

It should be noted that the measurements at Port Talbot Margam were less than the target value. In modelling the spatial coverage of B[a]P concentrations, the national scale model predictions were

[4] http://cdr.eionet.europa.eu/gb/eu/aqd

rescaled to ensure consistency with the 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 are unlikely to have exceeded the target value outside of the bounds of the industrial site and this assessment is discussed in more detail in section 2.3. Further work is underway to fully evaluate these findings.

Figure 2 Exceedance situation South Wales [B[a]P_UK0041_2013_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 final 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_2013_1]. Annual mean B[a]P concentration (ngm^{-3})

Grid square number	OS easting (m)	OS Northing (m)	Zone	Regional background: Total	Urban background increment: Total	Urban background increment: Traffic	Urban background increment: Industry including heat and power production	Urban background increment: commercial and residential	Urban background increment: Shipping	Urban background increment: Off road mobile machinery	Urban background increment: Other	Local increment: Total	Local increment: Industry including heat and power production	Total for all emission sources
1	276500	186500	41	n/a	0.055	0.002	0.004	0.030	0.001	0.002	0.018	1.266	1.266	1.3
2	276500	185500	41	n/a	0.049	0.001	0.003	0.026	0.001	0.002	0.016	3.617	3.617	3.7
3	277500	185500	41	n/a	0.061	0.002	0.004	0.030	0.000	0.003	0.022	5.064	5.064	5.1
4	278500	185500	41	n/a	0.072	0.002	0.004	0.035	0.000	0.004	0.026	1.190	1.190	1.3

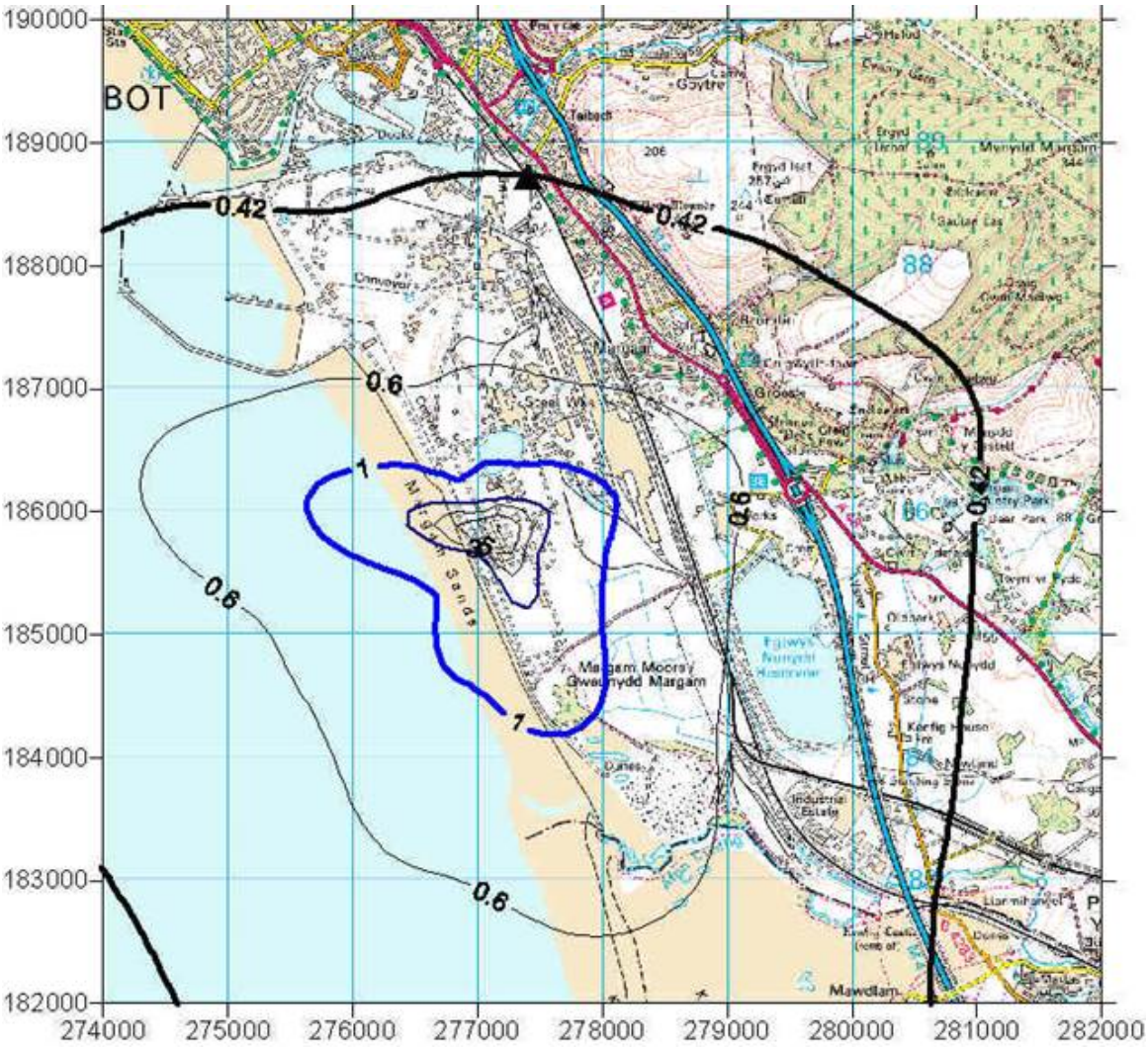
Table 3. Detailed source apportionment for industrial sources only for exceedance situation South Wales [B[a]P_UK0041_2013_1]. Annual mean B[a]P concentration (ngm^{-3})

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
1	276500	186500	41	1.263	0.002	1.266
2	276500	185500	41	3.614	0.003	3.617
3	277500	185500	41	5.059	0.005	5.064
4	278500	185500	41	1.186	0.005	1.190

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 shows that off-site concentrations of B[a]P did not exceed the TV in 2013. 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 (this differs to how the national scale model derives the background). The blue contour indicates the predicted environmental concentration of 1ng/m3 and shows that it would be unlikely that the target value would have been exceeded beyond the industrial site boundary. As indicated in section 2.2 of the overview report on B[a]P, further work is being undertaken to understand these conclusions and consider whether they can be incorporated into the national modelling.

Figure 3. Predicted environmental concentration of B[a]P (ng/m^3) for 2013.



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[5] contains stringent requirements for iron and steel works to significantly reduce their fugitive emissions,

[5] http://eippcb.jrc.ec.europa.eu/reference/BREF/IS_Adopted_03_2012.pdf

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.

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 adopted a modified US EPA approach to fugitive release assessment. The measures outlined should enable Tata to meet the new fugitive BATELs by March 2016
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Emissions estimate	
				Target emissions reduction:	Not available	
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 new seals fitted.	Permit systems and economic instruments: IPPC permits	Start: 2015 Expected end: 2016 Status: Implementation	Source affected:	Industry including heat and power production	The B[a]P releases from the tops are not a major contributor to the coke ovens' B[a]P releases. They are currently at approx. 6% leakage rate for the tops and they expect to comply with the 1% BAT-AEL for the tops fugitive releases by the March 2016 deadline by the use of these collars and the gradual replacement of the spigots
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Percentage leak rate reduced to target of 1%	
				Target emissions reduction:	Not available	
Coke Ovens 3	Coke Oven door improvements	Permit systems and economic	Start: 2015 Expected end: 2016	Source affected:	Industry including heat and power	Tata have previously provided evidence, to

		instruments: IPPC permits	Status: Implementation		production	the satisfaction of NRW (the regulator) that showed that they only have a few percentage points to make up before they can attain the doors 10% limit value.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Percentage leak rate reduced to target of 10%	
				Target emissions reduction:	Not available	
Coke Ovens 4	Reduction of emissions during charging	Permit systems and economic instruments: IPPC permits	Start: 2015 Expected end: 2016 Status: Implementation	Source affected:	Industry including heat and power production	Based on the current view of their coke ovens, Tata will be able to comply with the charging BAT-AELs by the March 2016 deadline
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Duration of release reduced to 30 seconds as a monthly mean	
				Target emissions reduction:	Not available	
Sinter Plant	Improvements to Lignite Injection	Permit systems and economic instruments: IPPC permits	Start: 2015 Expected end: 2016 Status: Implementation	Source affected:	Industry including heat and power production	This forms part of a number of projects to ensure that the sinter plant complies with the new tighter EU Industrial Emissions Directive (IED).
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	We expect the monitored B[a]P	

					results in Port Talbot to start to drop in 2016.	
				Target emissions reduction:	Not available	

3 Exceedance situation South Wales [B[a]P_UK0041_2013_2] related to domestic emissions

3.1 Description of exceedance

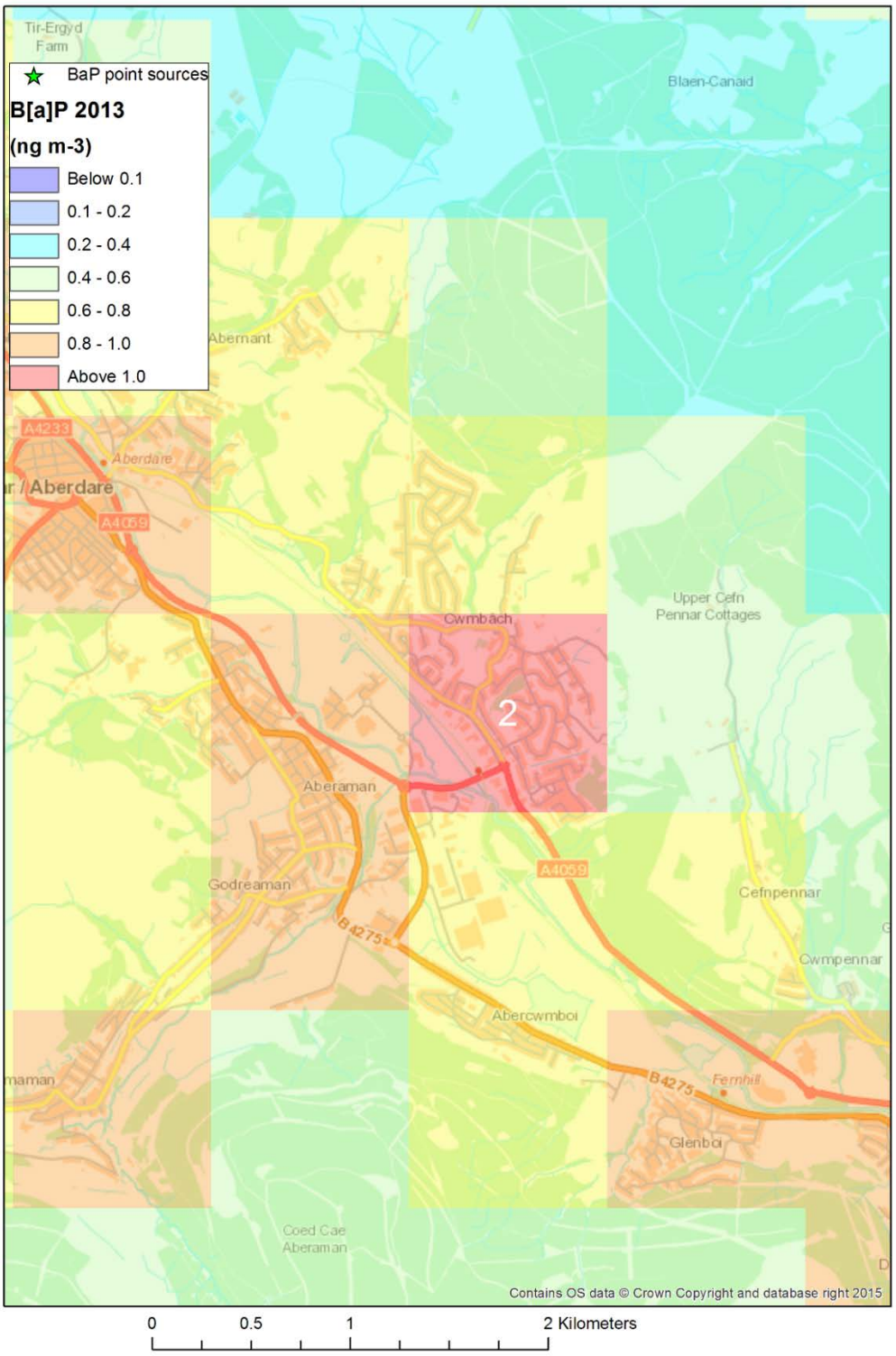
This exceedance situation has an area of 3 km^2 and has a resident population of 6,029 and consists of three individual grid squares:

- 1 km^2 in Cwmbach, near Aberdare, in Rhondda Cynon Taff (302500, 201500, exceeding grid square 2 in figures and tables below) with a resident population of 2,396
- 1 km^2 in Mountain Ash, near Aberdare in Rhondda Cynon Taff (305500, 197500, exceeding grid square 3) with a resident population of 2,909
- 1 km^2 in Lower Brynamman in Carmarthenshire (270500, 213500, exceeding grid square 1) with a resident population of 724.

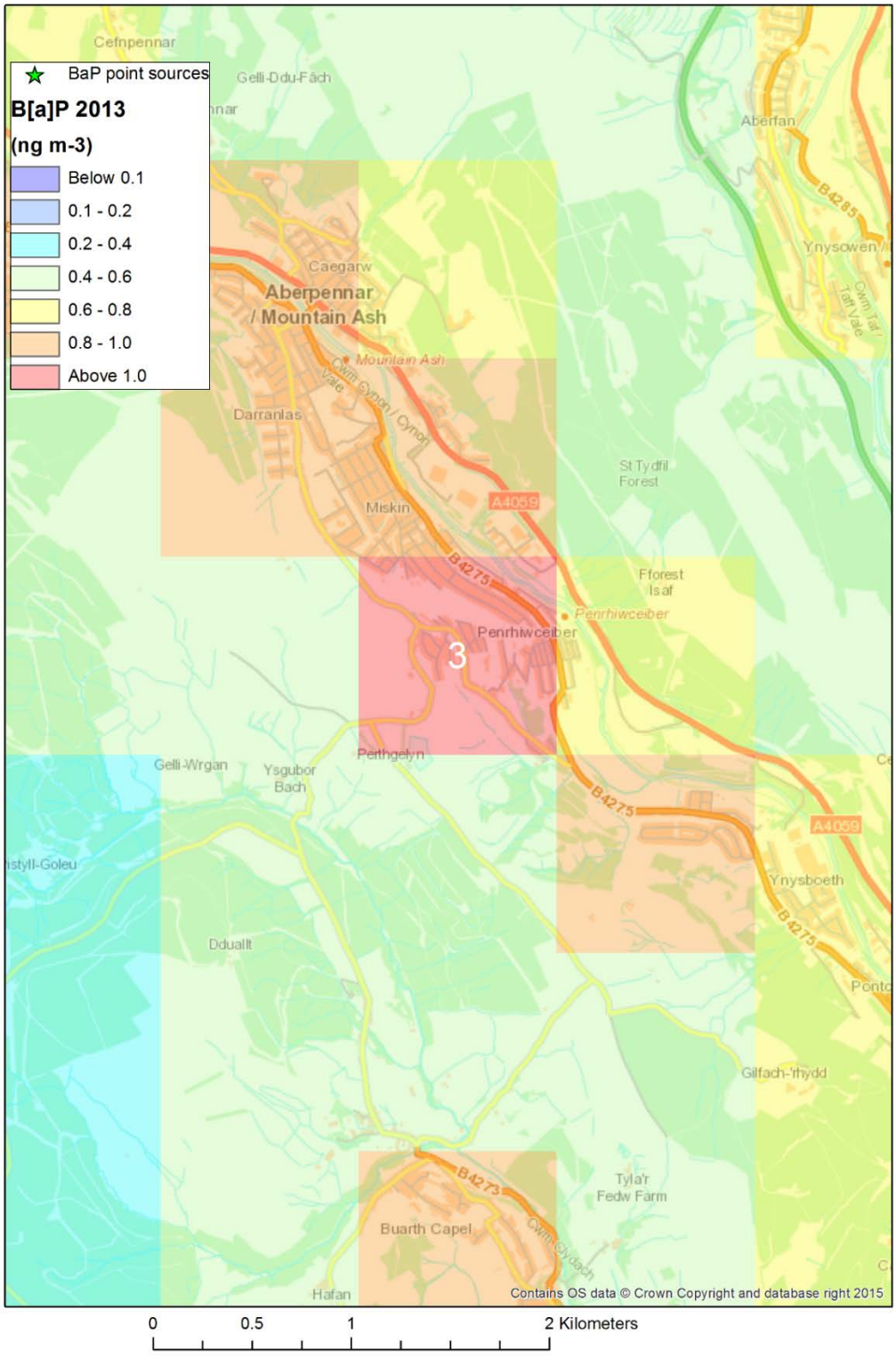
Each of the three exceedance locations was modelled and Figure 4 shows the location of the exceedance situation in detail.

Figure 4. Exceedance situation South Wales [B[a]P_UK0041_2013_2]. Exceeding grid squares are marked red.

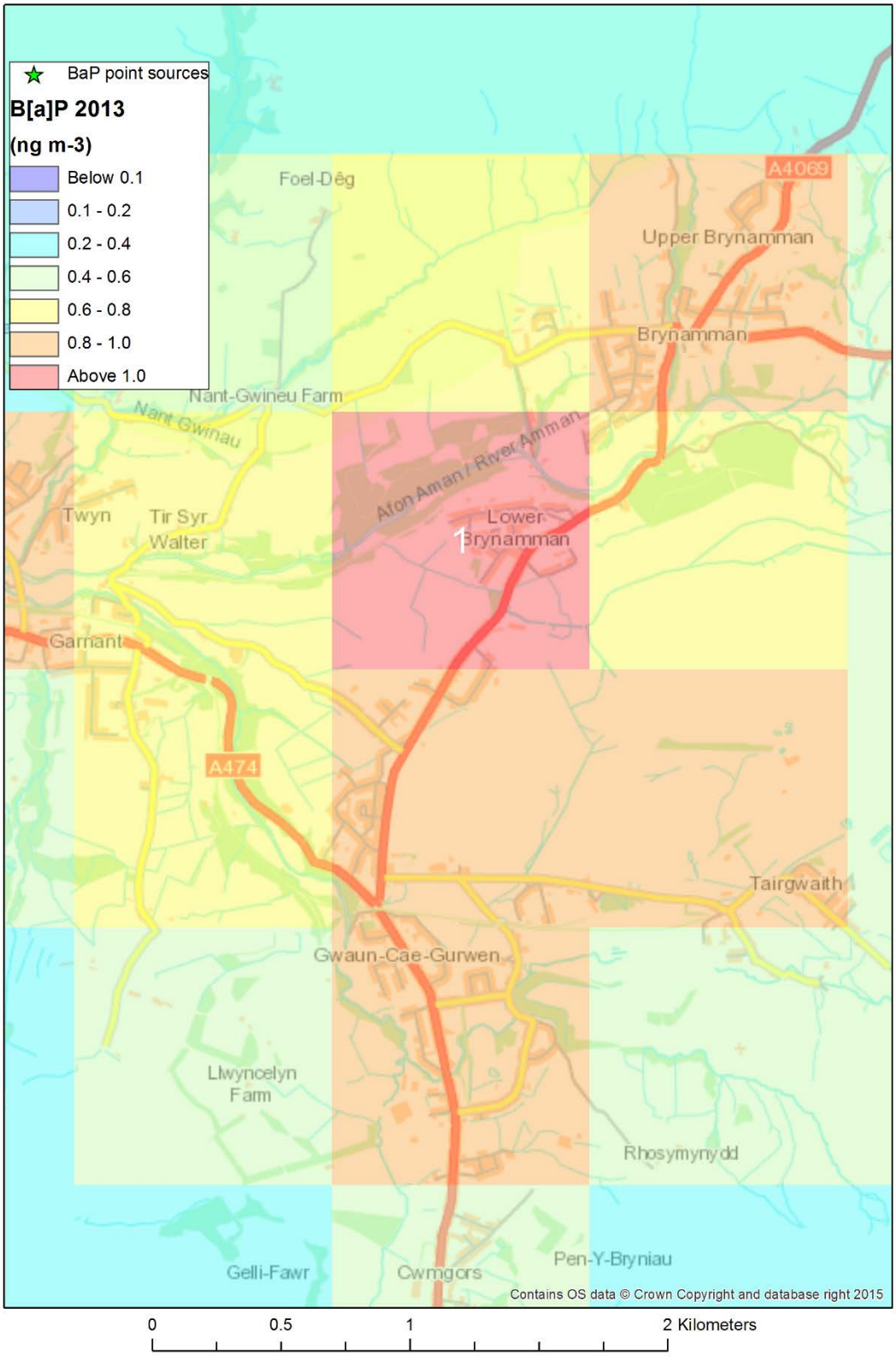
a) Cwmbach



b) Mountain Ash



c) Lower Brynamman



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 final 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^{-3})

Grid square number	OS easting (m)	OS Northing (m)	Zone	Regional background: Total	Urban background increment: Total	Urban background increment: Traffic	Urban background increment: Industry including heat and power production	Urban background increment: commercial and residential	Urban background increment: Shipping	Urban background increment: Off road mobile machinery	Urban background increment: Other	Local increment: Total	Local increment: Industry including heat and power production	Total for all emission sources
1	270500	213500	41	n/a	1.059	0.001	0.001	0.996	0.000	0.001	0.060	0.001	0.001	1.1
2	302500	201500	41	n/a	1.076	0.004	0.007	1.003	0.000	0.002	0.061	0.003	0.003	1.1
3	305500	197500	41	n/a	1.055	0.003	0.008	0.978	0.000	0.001	0.064	0.003	0.003	1.1

3.3 Measures

Cwmbach and **Mountain Ash** are areas within the boundaries of Rhondda Cynon Taf County Borough Council (RCTCBC). Although no measured exceedances of the target value have been recorded in Wales, marginal exceedances of the target value have been predicted by modelling in both areas. They are not covered by a smoke control area (see section 3.1 of B[a]P overview report) and have traditionally been associated with pockets of domestic solid fuel burning due to their close working links with historic local coal mining activities. RCTCBC expect that the users of concessionary coal will naturally reduce and the use of coal as a domestic fuel would diminish within Rhondda Cynon Taf. The national inventory is based on questions posed in the 2011 national census. Since then householders in Cwmbach and Mountain Ash 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, in Mountain Ash 118 properties have recently received external wall insulation to improve their energy efficiency. RCTCBC will also work with the local coal merchants to understand the rate of reduction in concessionary coal use.

Lower Brynamman is within the boundaries of Neath Port Talbot County Borough Council (NPTCBC). A marginal exceedance of the target value is also predicted in Lower 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 has recently provided mains gas supply, sufficient in capacity, to feed all properties in the area. 212 properties in this area received either fuel poverty or energy efficiency measures as a result, including 168 properties receiving full gas central heating and being connected to gas mains. 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.