Department
for Environment
Food & Rural Affairs

Report on measures for 2021 exceedance of the Target Value for Benzo[a]pyrene in Swansea Urban Area agglomeration zone (UK0027)

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1. Introduction

1.1 Context

Under the Air Quality Standards Regulations 2010[1], 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 regulation requires the UK to 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, 2014, 2015, 2016, 2017, 2018, 2019 and 2020 in the Swansea Urban Area. A report on measures was published detailing the exceedance and the measures in place[2].

This document reports the exceedance situation for 2021 reflecting the more recent assessment and updating the 2013, 2014, 2015, 2016, 2017, 2018, 2019 and 2020 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 Swansea Urban Area zone identified within the 2021 UK air quality assessment. Exceedances within this zone were identified on the basis of model results providing supplementary information for the assessment in addition to the results from fixed monitoring stations. This exceedance was reported via e-Reporting dataflow G[3] on attainment for the compliance assessment in 2021 and Air Pollution in the UK[4].

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

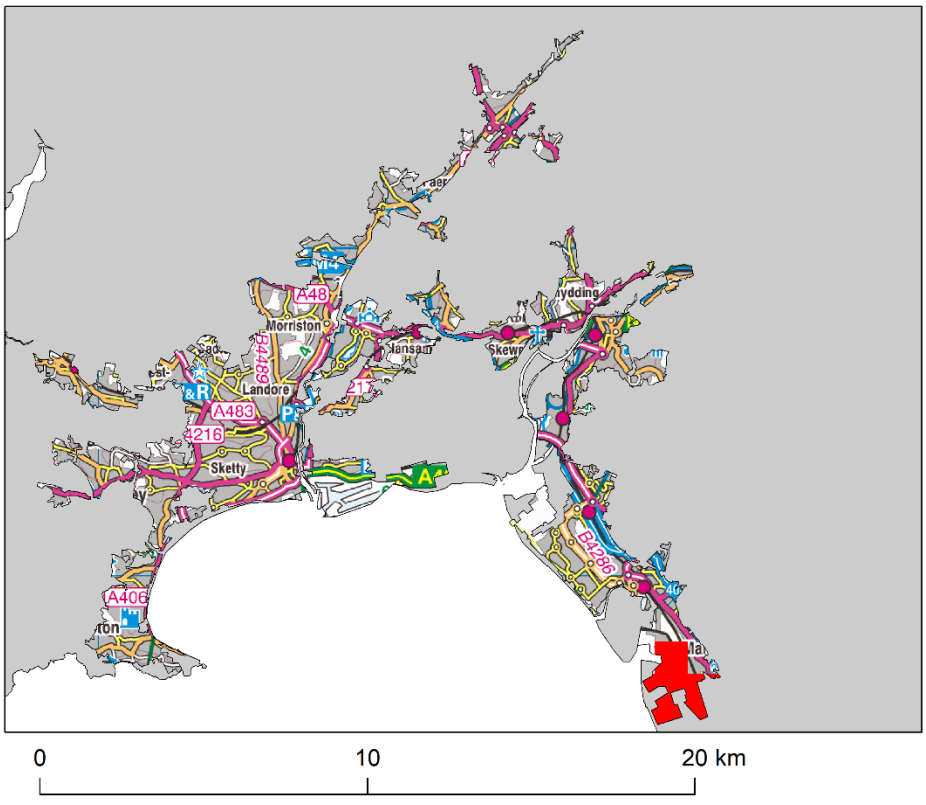
[1] The Air Quality Standards Regulations 2010 (legislation.gov.uk)
[2] https://uk-air.defra.gov.uk/library/bap-nickel-measures
[3] https://uk-air.defra.gov.uk/data/compliance-xml-files
[4] http://uk-air.defra.gov.uk/library/annualreport/index

Table 1. Area exceeding B[a]P target value in 2021 and associated population for Swansea Urban Area zone UK0027

Zone code	Zone Name	Area exceeding TV (km^2)	Population exceeding TV
UK0027	Swansea Urban Area	3	236

Figure 1 shows the locations of the exceedances in the context of the zone as a whole.

Figure 1. Location of exceedance of the B[a]P target value during 2021 in Swansea Urban Area zone UK0027. Areas of the zone in exceeding grid squares are marked red.



An initial source apportionment was carried out and this analysis has identified a single exceedance situation in this zone:

- Swansea Urban Area [B[a]P_UK0027_2021_1] related to industrial emissions (area of exceedance 3 km^2)

Following the approach developed for the previous report on measures for 2014, a subsequent more detailed modelling assessment was carried out for 2015, 2016, 2017, 2018, 2019 and 2020 using additional local data. Whereas the 2014 assessment concluded that there was unlikely to be exceedance of the TV outside the boundary of the industrial site in 2014, the more recent assessments indicate that it was likely that there was an exceedance of the TV at locations close to the industrial site in 2015, 2016, 2017, 2018, 2019 and 2020. This change has been linked to the adoption of an improved assessment method for fugitive emissions, which has led to a significant increase in reported coke ovens emission in recent years and is discussed later in this report. The following section details the exceedance situation in the zone including a description of the exceedance situation, maps, information on source apportionment and a list of measures already taken or to be taken.

2 Exceedance situation Swansea Urban Area [B[a]P_UK0027_2021_1] related to industrial emissions

2.1 Description of exceedance

This exceedance situation has an area of exceedance of 3 km^2 in Margam in Neath Port Talbot. Figure 2 shows the location of the exceedance situation, as predicted by the national model. The exceeding grid squares are numbered in Figure 2 and in subsequent tables for easy reference. The resident population associated with this exceedance situation is 236, being in the exceeding grid square numbered 1 and 3. This exceedance situation is adjacent to and shares common sources with the exceedance situation South Wales [B[a]P_UK0041_2021_1].

The fixed monitoring station at Port Talbot Margam is close to but is not within the exceedance situation. Table 2 lists the measured concentrations of B[a]P in this zone since 2008. The measured and modelled concentrations at this station were below the TV in 2020, 2021 and 2022.

Table 2. Measured annual mean B[a]P concentrations in Swansea Urban Area agglomeration zone UK0027 from 2008 to 2022 (ngm^{-3}). (Percentage data capture is shown in brackets).

Station (EoI code)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Port Talbot Margam (GB0906A)	0.53 (99)	0.39 (95)	0.38 (88)	0.40 (95)	0.40 (95)	0.44 (93)	0.60 (100)	0.79 (100)	0.93 (95)	0.64 (93)	0.70 (98)	0.32 (99)	0.34 (100)	0.51 (100)	0.63 (95)
Swansea Cwm Level Park (GB0943A)	0.32 (90)	0.24 (89)	0.29 (84)	0.27 (93)	0.28 (96)	0.27 (92)	0.33 (100)	0.35 (100)	0.39 (100)	0.33 (97)	0.28 (99)	0.23 (96)	0.19 (96)	0.31 (100)	0.36 (99)

Table 3 lists the exceeding grid squares and the resident population.

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 calibrated to match the measurements. The calibrated predictions exceeded the target in the vicinity of the steelworks industrial complex in Port Talbot due to industrial emissions. 1 km grid squares have been classified as exceeding the TV if at least nine 100 m grid squares exceed the TV or at least one 100 m grid square exceeds and there is residential population in the exceeding 100 m grid squares. A concentration value was defined for each 1 km grid square from the fine scale modelling as the mean of the 100 m grid squares exceeding the TV within that 1 km grid square. Additional modelling that included a more detailed assessment also predicted exceedances of the TV at locations close to the industrial site in 2015, 2016, 2017, 2018 and 2019. Additional modelling was not undertaken for 2020 or 2021.

Figure 2 shows 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 this exceedance situation - Swansea Urban Area [B[a]P_UK0027_2021_1] are shown as hatched (in this report) and the non-hatched red grid squares correspond to exceedance situation South Wales [B[a]P_UK0041_2021_1] (discussed in the South Wales zone UK0041 report).

Figure 2. Exceedance situation Swansea Urban Area [B[a]P_UK0027_2021_1]. Exceeding grid squares are marked red. Locations of coke works at Morfa and sinter plant at Port Talbot are also shown. Hatched grid squares are those assigned to Swansea Urban Area zone UK0027 (this report). Non-hatched grid squares are assigned to South Wales zone UK0041 and do not form part of this exceedance situation (see UK0041 report).

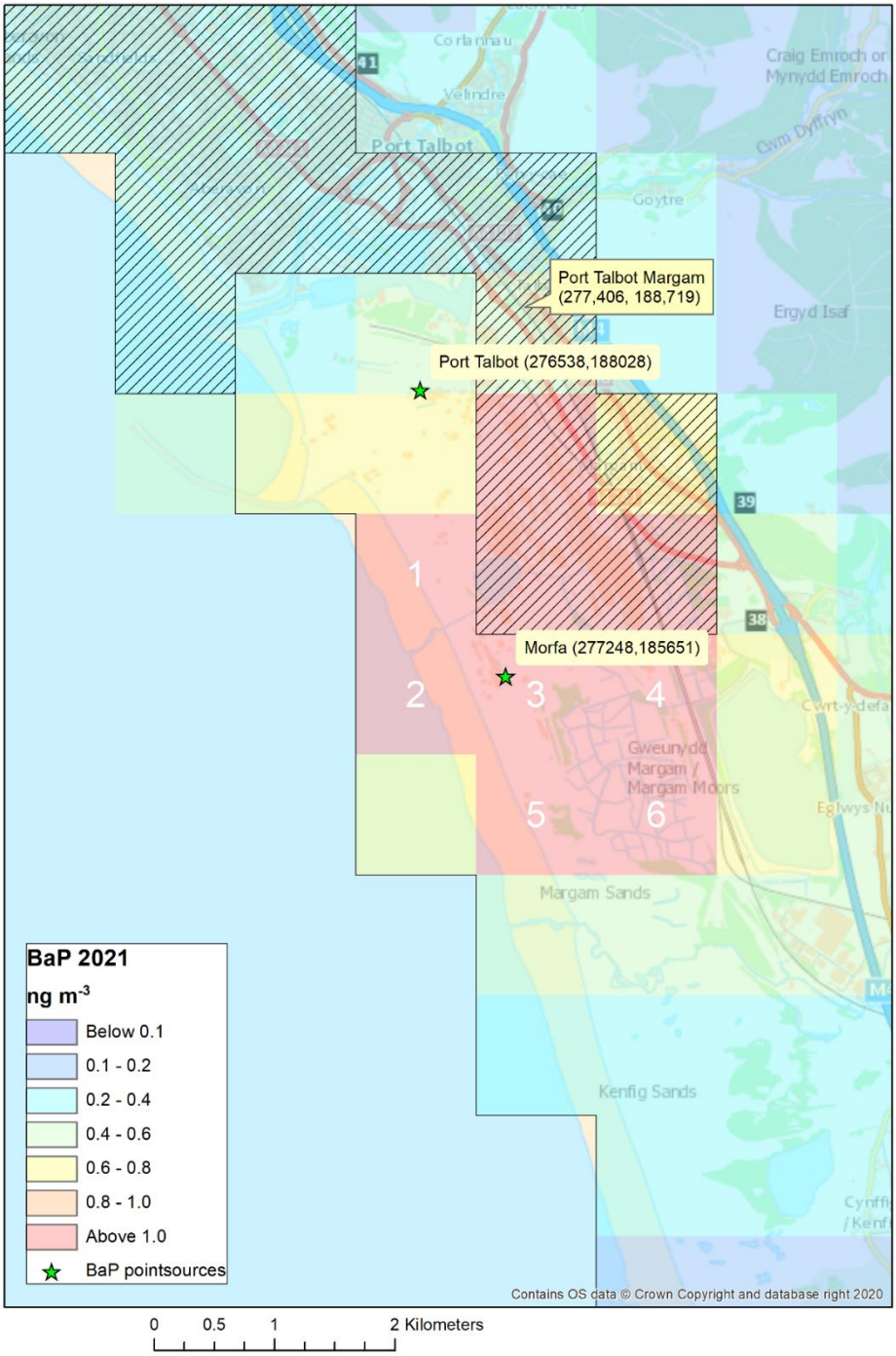


Table 3. Exceeding grid squares for exceedance situation BaP_UK0027_2021_1.

Grid square number	Resident population	Notes
1	135	Mostly steelworks industrial complex, Margam
2	0	Partly steelworks industrial complex
3	102	Steelworks industrial complex

2.2 Source apportionment

Table 4 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 5 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 4. Source apportionment for exceedance situation Swansea Urban Area [B[a]P_UK0027_2021_1]. Annual mean B[a]P concentration (ngm^{-3}).

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 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	**c) Local increment: Total**	Local increment: Industry including heat and power production	**Total for all emission sources (a+b+c)**	Resident population
1	277500	187500	27	n/a	0.221	0.002	0.167	0.041	0.000	0.001	0.009	1.018	1.018	1.2	134
2	277500	186500	27	n/a	0.082	0.002	0.042	0.029	0.000	0.002	0.008	3.218	3.218	3.3	0
3	278500	186500	27	n/a	0.096	0.002	0.042	0.032	0.000	0.009	0.010	1.255	1.255	1.4	102

Table 5. Detailed source apportionment for industrial sources only for exceedance situation Swansea Urban Area [B[a]P_UK0027_2021_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	277500	187500	27	1.018	0.000	1.018
2	277500	186500	27	3.218	0.000	3.218
3	278500	186500	27	1.254	0.001	1.255

2.4 Measures

The main overview report contains more information on how industrial sites are regulated. The Industrial Emissions Directive (IED) (2010/75/EU) sets out control emissions within specific industrial sectors like iron & steel. There are no specific Best Available Techniques (BAT) conclusions within the IED Iron and Steel (IS) BAT Reference Document (BREF), specifically setting out any BAT Associated Emissions Limits or direct techniques or measures to prevent or minimise B[a]P emissions. However, there are some narrative and specific BAT Conclusions to indirectly prevent or minimise B[a]P emissions by reducing fugitive or point source particulate emissions. Following the 2016 sector permit review to adopt the IS BAT Conclusions, permit conditions relevant to Polycyclic Aromatic Hydrocarbons (PAH) emissions, transposed these with a focus on the Coke Ovens and the Sinter Plant that are the main sources and mass release of B[a]P pollutant. The IS BREF contains stringent requirements for iron and steel works to significantly reduce their fugitive emissions (especially particulate matter), indirectly including PAH and subsequently B[a]P emissions.

Reason for increases in reported coke oven emissions and next steps

In 2015 the implementation of the BREF for Iron and Steel production, resulted in the need to improve the monitoring of fugitive emissions from the coke ovens.

The method employed prior to 2015 (BCRA method) required an estimate to be carried out every three months relied on a subjective assessment of leak severity. The industrial operator agreed a new method with the regulator (NRW) which was adapted from the US EPA methodology. This methodology requires the leaks be monitored and recorded daily and does not attribute a severity to the leaks, all leaks are treated as a priority. When both methods were assessed side by side it was clear that the BCRA method gave a favourable estimation of the fugitive emission resulting in a low estimation factor per tonne of coke. The new methodology has resulted in an increase in the estimation of B[a]P released from the coke ovens in 2015, however the actual release is likely to be similar to previous years.

The change in the methodology has meant that the operator has a better understanding of the precise sources of fugitive emissions and enabled a targeted improvement programme to be established. This improvement programme was expected to show a decrease in results in 2017 and 2018. Monitoring has shown a decrease in 2017 but a slight increase in 2018 caused by a high result in May, with subsequent months showing a return to a lowering trend that continues into 2019 and 2020. The site regulator will continue to focus on better performance through regulatory work and will review the interventions following analysis of the 2018, 2019 and 2020 data. Table 6 shows the measures taken or to be taken at the Port Talbot industrial site.

Table 6. Table of measures taken or to be taken at Port Talbot industrial site

Measure code	Description	Classification	Implementation dates	Other information	Comment	Future work
Coke Ovens 1	Measures to meet new fugitive BAT emission limits BAT-Associated Emission Levels (BAT-AELs) BAT-Associated Emission Performance Levels (BAT-AEPLs)	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: 2027 (tied to lifespan of asset). Status: Implementation	Source affected: Industry including heat and power production Spatial scale: Local Cost: > £60 million Indicator: Emissions estimate Target emissions reduction: Not available	TATA Steel utilises a modified US EPA method for fugitive release assessment. This method uses a binary 'leak-no leak' assessment and directly compares to the BATc. The battery life extension (BLE) project has entered its 3rd stage. Approximately £10.5m is planned for investment throughout FY2021 - FY2022. Costs have increased throughout the project as the remedial works become more intrusive and venture further into the ovens. The broad aim of the BLE project is to extend the working life of MCO to at least 2025.The project consists of a mixture of refractory (intrusive and non-intrusive) and mechanical remedial works. Where compliance has not been achieved, NRW has responded in	Fugitive releases from Morfa Coke Ovens (MCO) are affected by the internal operating pressure of the ovens. This pressure is at its highest when ovens are initially charged with coal and there is the maximum production of coke oven gas (COG). The rate of COG production gradually decreases as the contents of the oven are carbonised. TATA has optimised the gas pressure controls on individual ovens to improve the overall control system and therefore minimise fugitive releases of B[a]P from its coke oven batteries. MCO's operational lifespan is projected to be the mid-2020s thanks to the BLE project. As the coke oven batteries age, the likelihood of permit non-

					accordance with its Non-Compliance Scoring System and has worked with TATA to achieve compliance with the BAT-AELs and AEPLs. NRW continues to apply non-compliance scores in response to any notifiable emission limit breaches. An EPR Regulation 61 Notice was served on the operator in 2018; TATA's response included an action plan with timescales outlining a pathway towards compliance. NRW withdrew the Regulation 61 Notice in October 2021 as TATA had achieved the requirements. Compliance with the relevant emission limits (BAT-AEPLs) for coke oven doors, tops and charging emissions has been sustained throughout 2021. MCO remains an important part of NRW's compliance inspection programme for Port Talbot steelworks and we continue to	compliances and elevated emissions may increase despite the life extension measures. As MCO progresses towards the end of its extended campaign life, TATA should outline its strategy for this key asset and clarify its preferred method of iron & steelmaking going forwards. Other critical assets necessary for integrated iron & steelmaking (using Blast Furnace technology) are also approaching the end of their projected design life e.g., sinter plant. Replacement coke ovens may require significant planning (~5yrs design & construction) and capital expenditure (>£500m). Further notices will be considered by NRW if environmental performance deteriorates, and repeated non-compliance scores are incurred for emission limit breaches at MCO.

					apply regulatory effort to ensure the permit requirements are met.	
Coke Ovens 2	Spigot improvements. The spigot is the joint between the oven and the gas main. Measures include fitting of new collars, 'repacking' existing spigot seals, fitting new seals and shortening of ascension pipes.	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: 2019 Status: Achieved Ongoing maintenance required to sustain compliance	Source affected: Industry including heat and power production Spatial scale: Local Cost: Not available Indicator: Percentage leak rate reduced to target of 1% Target emissions reduction: Not available	Control of fugitive emissions from coke ovens will result in lower B[a]P emissions. The BAT-AEPL (Associated Emission Performance Level) for coke oven tops is 1% leakage rate (99% leak free). A sequential programme of work has been ongoing to progressively reduce leakage. This has been balanced against the complexities of working on live coke oven batteries (ovens are kept in continuous operation). TATA has applied significant effort to reduce fugitive emissions from coke oven tops. Improved performance has coincided with secured capital expenditure (BLE Project) and an optimised maintenance regime involving rolling replacement of ascension pipes and repair/re-sealing of spigots. TATA has also overhauled its COG collector main control	It should be noted that as the ovens age, the likelihood of permit non-compliances and elevated emissions may increase despite the life extension measures. At Morfa Coke Ovens (MCO) there are two COG collection mains for each oven and four charge holes. TATA has completed a feasibility study for converting MCO to a single COG collection main. A single main would significantly reduce the number of emission points along the coke oven battery tops; however, TATA's feasibility study and cost-benefit analysis does not support a viable single COG main conversion. The overhauled and renewed COG pressure control systems at MCO should – with sufficient maintenance – allow effective control of emissions from coke oven tops. This work has been combined with control improvements at the MCO

					systems and renewed its gas pressure monitoring capability, allowing faster response to COG pressure imbalances and greater protection for spigot components. NRW has responded to any identified permit non-compliance in accordance with its Non-Compliance Scoring System. NRW's response to identified non-compliance has included the use of an EPR Regulation 61 Notice (see Measure Code 1 above). Considerable progress has been made with 99% leak free performance sustained throughout 2021. **Target achieved (<1% leakage) but ongoing maintenance is necessary to sustain compliance.** Coke Ovens performance is discussed regularly with TATA. Sustained compliance may become more challenging as	Exhauster unit which draws COG from the coke oven batteries. TATA has trialled mechanical spigots on some ovens but has concluded that its current programme of prioritising and (manually) repairing/re-sealing spigot joints is sufficient to maintain performance. More generally, TATA should outline its future strategy for MCO and clarify its preferred method of iron & steelmaking going forwards, within a wider context of developing low-carbon steelmaking technology.

					MCO approaches the end of its (extended) campaign life.	
Coke Ovens 3	Coke Oven door improvements Each coke oven has two sets of doors at either end. Hot coke is pushed from the 'ram side' doors through the 'coke side' doors into waiting rail cars. Doors and door frames require regular maintenance and periodic replacement to minimise fugitive emissions.	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: 2019 Status: Achieved Ongoing maintenance required to sustain compliance.	Source affected: Industry including heat and power production Spatial scale: Local Cost: Not available Indicator: Percentage leak rate reduced to target of 10% Target emissions reduction: Not available	Control of fugitive emissions from coke ovens will result in lower B[a]P emissions. The BAT-AEPL (Associated Emission Performance Level) for coke oven doors is 10% leakage rate (90% leak free). A sequential programme of work has progressively reduced door leakage. This has been balanced against the complexities of working on live coke oven batteries (ovens are kept in continuous operation). An optimised coke oven door cleaning, maintenance and repair programme is in place at MCO. TATA has standardised its door cleaning methods and invested in new jetting equipment. TATA also periodically replaces degraded doors and door seals. The door leakage rate has dropped noticeably across both batteries. Improved performance	It should be noted that as the ovens age, the likelihood of permit non-compliances and elevated emissions may increase despite the life extension measures. Leaks from coke oven doors occur when hot gases penetrate the seals between the door and its frame. Doors and frames are routinely cleaned to ensure a tight seal. At Morfa Coke Ovens (MCO), a 'knife-edge' door seal design is employed. Previously TATA considered a remotely controlled cleaning device for the small 'leveller' doors which are difficult to clean. This has been abandoned for technical reasons. TATA's door cleaning programme targets leveller doors and seals to provide equivalent cleaning. TATA has trialled a new type of coke oven door (with tighter 'z' seals). However, increased

					has coincided with secured capital expenditure (BLE Project) and refinement of maintenance plans and procedures. NRW has responded to any identified permit non-compliance in accordance with its Non-Compliance Scoring System. NRW's response to identified non-compliance has included the use of an EPR Regulation 61 Notice (see Measure Code 1 above). Considerable progress has been made with 90% leak free performance sustained throughout 2021. **Target achieved (<10% leakage) but ongoing maintenance is necessary to sustain compliance.** Coke Ovens performance is discussed regularly with TATA. Sustained compliance may become more challenging as	cleaning efficiency, improved knife-edge seal design and optimised maintenance has resulted in better door sealing. Door frame cleaning functionality also exists on MCO's ram and guide machines. The scope of TATA's door trial has evolved and is now part of its continuous improvement initiatives at MCO. The Original Equipment Manufacturer (OEM) is examining the existing door design to minimise and potentially eliminate manual intervention. More generally, TATA should outline its future strategy for MCO and clarify its preferred method of iron & steelmaking going forwards, within a wider context of developing low-carbon steelmaking technology.

					MCO approaches the end of its (extended) campaign life.	
Coke Ovens 4	Reduction of emissions during charging Coke ovens are 'charged' with coal through charge holes in the top of each oven. The charging nozzles, oscillators, holes and lids all require regular maintenance and periodic replacement to minimise fugitive emissions.	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: 2019 Status: Achieved Ongoing maintenance required to sustain compliance.	Source affected: Industry including heat and power production Spatial Scale: Local Cost: Not available Indicator: Duration of release reduced to 30 seconds as a monthly mean. Target emissions: Not available	Control of fugitive emissions from coke ovens will result in lower B[a]P emissions. BAT-AEPL for visible emissions from charging is <30 seconds per charge expressed as a monthly mean. A sequential programme of work has progressively reduced charging emissions. This has been balanced against the complexities of working on live coke oven batteries (ovens are kept in continuous operation). Key items of equipment (charge holes and the coal charging apparatus) have now all been refurbished and/or replaced. Charging emissions have dropped noticeably across both batteries, often achieving around 20 seconds visible emissions per charge as a monthly average. Improved performance has coincided with secured capital	It should be noted that as the ovens age, the likelihood of permit non-compliances and elevated emissions may increase despite the life extension measures. TATA continues to follow a rolling maintenance programme for its coke oven charging equipment. This includes surveying charge holes and correcting mis-aligned charge hole frames. Automatic systems to seal charge hole lids and clean carbon residues from holes and frames have been considered with technical input from the Original Equipment Manufacturer (OEM). TATA has determined that its current programme of manual sealing and cleaning provides an equivalent level of performance. TATA has indicated that it will retain a dedicated resource going

					expenditure (BLE Project) and refinement of maintenance plans and procedures. NRW has responded to any identified permit non-compliance in accordance with its Non-Compliance Scoring System. NRW's response to identified non-compliance has included the use of an EPR Regulation 61 Notice (see Measure Code 1 above). Considerable progress has been made and charging emissions have been compliant with the BAT-AEPL since February 2019. This compliance has been sustained throughout 2021. **Target achieved (<30 seconds visible emissions per charge) but ongoing maintenance is necessary to sustain compliance.** Coke Ovens performance is discussed regularly with TATA. Sustained compliance may become more challenging as	forwards for charge hole lid sealing and carbon cleaning. More generally, TATA should outline its future strategy for Morfa Coke Ovens (MCO) and clarify its preferred method of iron & steelmaking going forwards, within a wider context of developing low-carbon steelmaking technology.

					MCO approaches the end of its (extended) campaign life.	
Coke Ovens 5	Reduction of emissions during coke pushing Finished coke is pushed from each oven into specially designed rail cars. A mobile guide car and fume extraction system (also known as a coke-side fume arrestment system) is used at Port Talbot to capture fugitive (dust)	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: 2020 Status: Achieved Ongoing maintenance required to sustain compliance.	Source affected: Industry including heat and power production Spatial Scale: Local Cost: Not available Indicator: Compliance with 20 mg/m^3 BAT-AEL Indicator: Reduced numbers of black pushes Target emissions: Not available	Control of fugitive emissions from coke ovens will result in lower B[a]P emissions. The BAT-AEL for coke pushing (dust) emissions is 10mg/m^3 for bag filters and 20mg/m^3 in all other cases, measured using discontinuous monitoring (spot sampling) A venturi scrubber system is used at MCO; therefore, the applicable emission limit is 20mg/m^3. This has been reflected in TATA's permit since 2015. Oven heating issues can result in poorly carbonised batches of coke. When pushed, visible fugitive emissions increase ('black pushes') and can overwhelm the fume extraction system. Activities associated with the BLE project are expected to reduce fugitive emissions by improving the performance of offending ovens.	Discontinuous sampling has been retained for monitored emissions from coke pushing at Morfa Coke Ovens (MCO). TATA has progressed its repair programme for coke oven flues and regenerators. This ongoing work involves targeting ovens with damaged/degraded flues and regenerators, but also developing a better understanding of how this influences black push emissions. Some oven walls (with embedded flues) are also being repaired. TATA's capital expenditure (BLE Project) is allowing delivery of this work. A refurbished and enhanced coke-side fume arrestment and guide car system was commissioned in April 2021. The original system had become increasingly unreliable and prone to stoppages. The refurbished system fulfils an important BAT requirement, and its

	emissions from coke pushing.				MCO now has a refurbished and redesigned guide car and fume extraction system (the original system dated from the 1980s). The refurbished system has enhanced fume capture capability and comprises a replacement hood, extraction system, guide car and ducting. During periods of unavailability e.g., essential maintenance, water sprays can be used to 'knock down' fugitive emissions from coke pushing. There is a rolling programme of repair & refurbishment for the oven gas (heating) flues. Coke oven temperature profiles and coke yields are positively affected by keeping gas flues in working order. This becomes more difficult as the coke oven batteries age. NRW has introduced a reporting metric for the number of black pushes at the coke ovens. This data is now reported quarterly and	performance and availability will be reviewed periodically by NRW. The incidence of black pushes will be monitored by NRW to: i) assess if TATA's interventions are positively influencing MCO's environmental performance ii) evaluate coke oven heating and combustion control. Black pushes are an indicator of incomplete or inefficient coking. Permit compliance interventions will be considered in the event of escalating black push numbers and/or repeated emission limit breaches. More generally, TATA should outline its future strategy for MCO and clarify its preferred method of iron & steelmaking going forwards, within a wider context of developing low-carbon steelmaking technology.

					is harmonised with other similar reporting requirements. A programme of works aimed at reducing the number of black pushes was launched throughout 2021. Linked to the BLE Project, the number of recorded black pushes dropped significantly between FY20/21 and FY21/22. **Target achieved for captured emissions from coke pushing (20mg/m^3 for particulates) but ongoing maintenance is necessary to sustain compliance.** Coke Ovens performance is discussed regularly with TATA. Sustained compliance may become more challenging as MCO approaches the end of its (extended) campaign life. An automatic night detection system has been commissioned throughout 2021 to aid with the identification of black pushes.	

Sinter Plant	Improvements to Lignite Injection. Lignite is used in combination with lime to trap and neutralise certain pollutants present in hot flue gases. These additives are injected directly into the hot flue gases. The integrity of the flues and the emissions abatement systems must be sound for lignite-lime injection to be used safely.	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: estimated 2025 Status: Implementation	Source affected: Industry including heat and power production	Lignite-lime injection forms part of several projects to ensure that the sinter plant complies with tighter EU (IED) standards. There are no specific BATc or BAT-AELs designed to reduce B[a]P from sinter plant emissions. However, reducing overall emissions will result in lower B[a]P emissions. Associated work and regulatory interventions by NRW to address persistent particulate emission limit (BAT-AEL) breaches from the sinter plant main stack should indirectly reduce B[a]P emissions from this source. Main stack particulate emissions: TATA responded to an EPR Regulation 61 Information Notice in August 2018. The company's response included an action plan with timescales outlining a pathway towards compliance. The notice currently remains open. The lignite-lime injection system at Port Talbot has not yet been	The interior of each ESP and the (waste gas) wind main system are subject to high temperatures and continual physical abrasion by entrained dust, which progressively wears away exposed surfaces and parts. Managing this degradation and maintaining an 'air-tight' system is critical to safe commissioning of lignite-lime injection. Tata Steel has adjusted its maintenance strategy to allow shorter stops to be taken more frequently within a quarterly maintenance framework, enabling worn parts to be replaced before they degrade completely. The engineering challenges and associated unavailability of lignite-lime injection may increase as the sinter plant ages. Tata continues to explore a contingency solely involving the use of lime products i.e. no lignite. There are customised lime compounds available that may deliver similar levels of waste gas

					commissioned. To allow use of this technology at the sinter plant, some important preparatory steps must be completed first: • Air ingress issues within the main stack waste gas system must be resolved. A key performance indicator is 17% oxygen within the waste gas stream - sensors are now in place to monitor this. • Upgraded valves at the base of each ESP (dust) collection hopper are subject to a rolling maintenance programme. Previously the valve seals were degrading too quickly, allowing air into the system. • Sinter process instability has contributed to elevated stack emissions and degraded ESP performance. TATA has several ongoing projects to address process instability. TATA continues to pursue these steps at the time of writing. A plan	reagent performance and are also capable of removing micro-pollutants. These compounds present a much lower risk of combustion compared to lignite and the impact of air (O2) ingress becomes less pronounced. Use of customised lime products as waste gas reagents is Tata's contingency plan should the air ingress issues prove insurmountable. The lignite-lime system is unlikely to be commissioned until the preparatory works outlined in this table have been completed and TATA's senior management authorise the scheme. No timescale has been agreed with NRW yet. As the Sinter Plant ages, TATA should outline its strategy for this key asset and clarify its preferred method of iron & steelmaking going forwards. A replacement sinter plant (incorporating lignite-lime injection) may require significant planning and capital expenditure.

					has been developed to replace each wind main by September 2023. Bringing lignite-lime online prematurely can result in fires starting within the main stack Electrostatic Precipitators (ESPs) as a result of lignite (fuel) + heat + oxygen. The Sinter Plant remains an important part of NRW's compliance inspection programme for Port Talbot steelworks and we continue to apply regulatory effort to ensure the permit requirements are met.	Other critical assets necessary for integrated iron & steelmaking (Blast Furnace technology) are also ageing e.g., Morfa Coke Ovens. TATA should present its strategy within a wider context of developing low-carbon steelmaking technology.