



Department  
for Environment  
Food & Rural Affairs

# Report on measures for 2020 exceedance of the Target Value for Benzo[a]pyrene in Yorkshire and Humberside non-agglomeration zone (UK0034)

December 2022



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## Contents

1. Introduction .....	4
1.1 Context.....	4
1.2 Status of zone .....	5
2 Exceedance situation Yorkshire and Humberside [B[a]P_UK0034_2020_1] related to industrial emissions .....	7
2.1 Description of exceedance .....	7
2.2 Source apportionment.....	11
2.3 Measures .....	14

# 1. Introduction

## 1.1 Context

Under the Air Quality Standards Regulations 2010<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 ( $\text{ng.m}^{-3}$ ) 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.

Emissions of B[a]P fell significantly from 1990 to 2001, after which the reported emissions have either reached a plateau or fallen steadily depending on the location, reflecting the effect of environmental regulation and Best Available Techniques (BAT) for pollution control. In 2020 for the UK, data shows that there is a continuing, downward trend in emissions of B[a]P, which is reflected by ambient-air measurements both nationally and locally (see Table 2 of this report). However, in the Yorkshire and Humberside region, there was a modelled exceedance in 2020 in this zone. A more recent air quality assessment for 2021<sup>2</sup> has shown compliance in this zone for both measurements and modelling.

After reviewing the monitoring data, followed by targeted monitoring and modelling to apportion the sources of the exceedances. The Environment Agency identified the processes that were significantly contributing to the target exceedances. These processes were from the Appleby Coke Ovens which produces metallurgical coke with mainly fugitive emissions from the coke producing Batteries. Additionally, the safety pressure relief system has a significant contribution when the flaring system is not initiated. The other plant source is the Sinter plant for agglomerating Iron ore, coke, and iron-rich process residues where emissions are highly dispersed by the 107m high stack.

Exceedance of the TV were reported in 2013, 2014, 2015, 2016, 2017, 2018 and 2019 in the Yorkshire and Humberside non-agglomeration zone and a report on measures was published detailing the exceedance and the measures in place<sup>3</sup>.

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<sup>1</sup> [The Air Quality Standards Regulations 2010 \(legislation.gov.uk\)](https://www.legislation.gov.uk)

<sup>2</sup> <https://uk-air.defra.gov.uk/data/compliance-xml-files>

<sup>3</sup> <https://uk-air.defra.gov.uk/library/bap-nickel-measures>

This document reports the progress in reducing emissions, together with exceedances for 2020, reflecting the more recent assessment and updating the 2013, 2014, 2015, 2016, 2017, 2018 and 2019 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 Yorkshire & Humberside zone identified within the 2020 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<sup>4</sup> on attainment for the compliance assessment in 2020 and Air Pollution in the UK<sup>5</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 2020 and associated population for zone UK0034**

Zone code	Zone Name	Area exceeding TV (km <sup>2</sup> )	Population exceeding TV
UK0034	Yorkshire & Humberside	3	8

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.

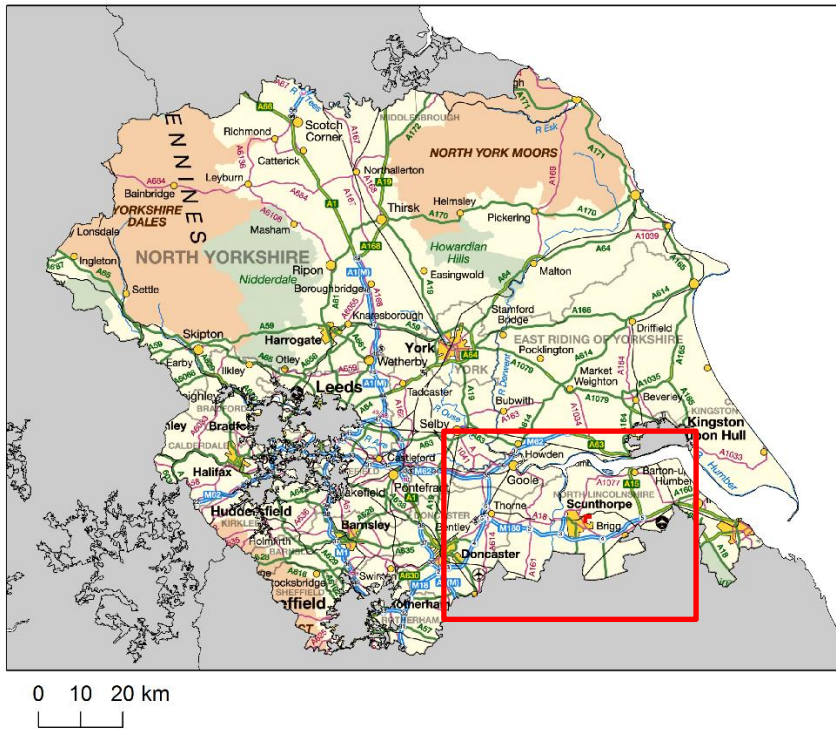
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<sup>4</sup> <https://uk-air.defra.gov.uk/data/compliance-xml-files>

<sup>5</sup> <http://uk-air.defra.gov.uk/library/annualreport/index>

**Figure 1. Location of exceedance of the B[a]P target value during 2020 in zone UK0034 Yorkshire & Humberside. 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 one exceedance situation within this zone

- Yorkshire and Humberside [B[a]P\_UK0034\_2020\_1] related to industrial emissions (area of exceedance 3 km<sup>2</sup>)

This 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, ongoing or to be taken.

## **2 Exceedance situation Yorkshire and Humberside [B[a]P\_UK0034\_2020\_1] related to industrial emissions**

### **2.1 Description of exceedance**

This exceedance situation is an area of exceedance 3 km<sup>2</sup> to the northeast of Scunthorpe in Lincolnshire. 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. The resident population associated with this exceedance situation is 8. All of this population is in the grid cell labelled 2. The other two squares have no resident population and are largely or wholly within the steelworks industrial complex area.

Table 2 lists the measured concentrations of B[a]P in this zone since 2008. The fixed monitoring station at Scunthorpe Low Santon is within the exceedance situation and the fixed monitoring station at Scunthorpe Town is just outside the exceedance situation. The measured concentrations at both Scunthorpe Low and Santon Scunthorpe Town were below the TV in 2020 and in 2021.

**Table 2. Measured annual mean B[a]P concentrations in Yorkshire and Humberside zone UK0034 from 2008 to 2021 (ngm<sup>-3</sup>). (Percentage data capture is shown in brackets).**

<b>Station (Eol code)</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>
High Muffles (GB0014R)	0.14 (95)	0.09 (62)	0.07 (94)	0.06 (87)	0.07 (91)	0.07 (87)	0.07 (98)	0.07 (98)	0.05 (100)	0.04 (100)	0.04 (99)	0.04 (97)	0.03 (95)	0.02 (99)
Royston (GB0940A)	2.6 (95)	1.0 (95)	1.1 (84)	0.84 (96)	0.89 (99)	0.85 (100)	0.92 (100)	0.41 (100)	0.52 (100)	0.34 (99)	0.38 (99)	0.38 (98)	0.28 (95)	0.39 (99)
Scunthorpe Low Santon (GB1004A)	6.0 (95)	2.4 (99)	1.8 (94)	3.0 (91)	2.9 (100)	3.4 (100)	3.6 (92)	3.5 (99)	1.1 (99)	0.83 (100)	0.78 (100)	0.75 (84)	0.84 (99)	0.52 (100)
Scunthorpe Town (GB0841A)	3.2 (99)	1.8 (99)	1.3 (80)	1.3 (86)	1.4 (98)	3.9 (98)	3.5 (90)	1.3 (92)	1.1 (100)	0.80 (99)	1.7 (100)	1.9 (96)	0.64 (97)	0.72 (100)
South Hiendley (GB0942A)	1.3 (97)	0.89 (94)	0.63 (91)	0.68 (83)	0.54 (100)	0.35 (91)	0.44 (99)	0.26 (95)	0.31 (100)	0.19 (100)	0.23 (100)	0.31 (94)	0.2 (95)	0.23 (62)

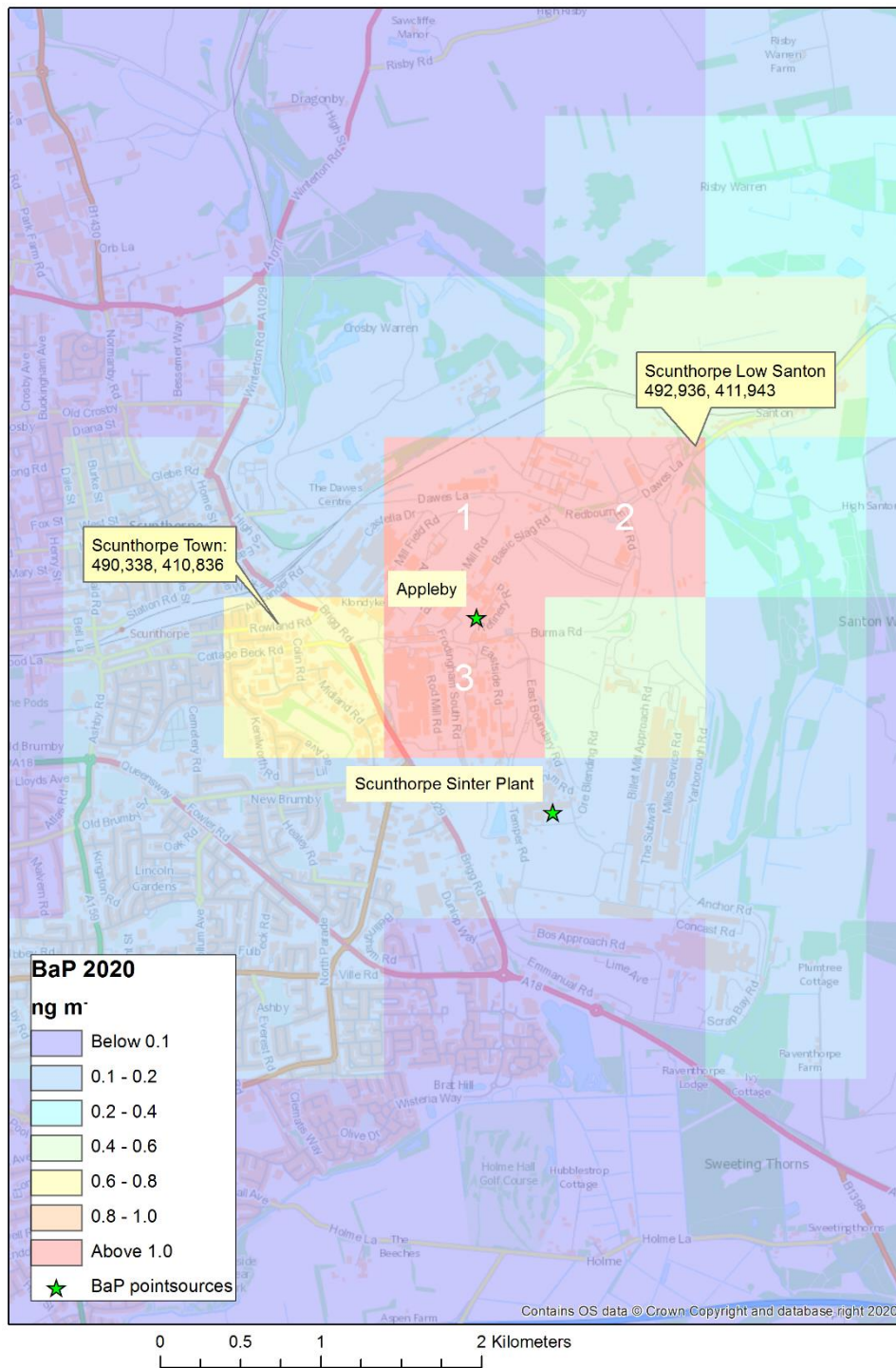


Figure 2 also shows the locations of the monitoring sites associated with the exceedance situation and the locations of the key industrial sources.

The Scunthorpe Steel works operator has also invested in and operated their own PaH B[a]P ambient monitoring as equivalent to the national monitoring network. However, as they are not part of the national network, these monitors do not impact the compliance assessment. The same equipment is operated to the same standards with accredited laboratory analysis at an Iron & Steel Research and Technology centre at Rotherham. Following a review of locations (originally 3), this is now reduced to High Santon village location, northeast of the works. British Steel fund this monitoring with typical running costs of ~£80k p.a. In contrast to the national network, which measures daily samples to form a monthly composite as a monthly mean data value, their monitor measures 3-day sample composites to report mean data values. British Steel's objective was to provide more dynamic emission trends and higher emissions resolution as an investigational tool for the Operator, downwind (prevailing NW) of the site. Emissions are no longer dominated by the closed Dawes Lane coke oven (March 2016). Using wind sector analysis, plant emission sources and BaP spikes are being assessed.

The exceeding grid squares within this exceedance situation are numbered and the numbers correspond to those in subsequent tables. Table 3 lists the exceeding grid squares and the resident population.

**Figure 2. Exceedance situation Yorkshire and Humberside [B[a]P\_UK0034\_2020\_1]. Exceeding grid squares are marked red. Locations of coke works at Appleby and sinter plant at Scunthorpe are also shown as well as the two monitoring sites at Scunthorpe Town and Scunthorpe Low Santon.**



**Table 3. Exceeding grid squares for exceedance situation BaP\_UK0034\_2020\_1.**

Grid square number	Resident population	Notes
1	0	Steelworks industrial complex
2	8	Mostly steelworks industrial complex, 3 houses in Low Santon
3	0	Mostly 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 Appleby is the main source associated with this exceedance situation (note Dawes Lane coke ovens closed in March 2016). As the modelling is getting closer to the monitoring values, there is scope to further investigate refining the source terms for input into the modelling. The Appleby Coke Ovens has a mixture of fugitive emissions from the process and point source emissions from occasional unflared releases from the safety pressure relief system bleeders.

A specific contribution from releases from bleeders was included in the modelling for 2019 for the first time following the identification of these emissions as the source of a specific spike in measured concentrations at Scunthorpe Town during November 2019. In contrast to the other emission sources associated with the coke ovens, the bleeder release only takes place on very few hours during the year and the detailed timing of the releases has been taken into account in the modelling. The highest monthly measured B[a]P concentration at Scunthorpe Low Santon in 2020 was in February 2020.

The concentration of B[a]P in the unflared bleeder releases of coke oven gas is highly uncertain. The concentration in the releases in 2020 was therefore set in order to provide good agreement with the concentration measured during February 2020. The modelling carried out for 2020 indicates relative contribution from the bleeders was lower in 2020 than indicated in the 2019 assessment.

**Table 4. Source apportionment for exceedance situation Yorkshire and Humberside [B[a]P\_UK0034\_2020\_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 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	491500	411500	34	n/a	0.046	0.001	0.019	0.019	0.000	0.001	0.006	4.615	4.615	4.7	0
2	492500	411500	34	n/a	0.036	0.001	0.014	0.014	0.000	0.000	0.006	1.776	1.776	1.8	8
3	491500	410500	34	n/a	0.052	0.001	0.022	0.022	0.000	0.001	0.006	3.268	3.268	3.3	0

**Table 5. Detailed source apportionment for industrial sources only, for exceedance situation Yorkshire and Humberside [B[a]P\_UK0034\_2020\_1]. Annual mean B[a]P concentration (ngm<sup>-3</sup>)**

Grid square number	OS easting (m)	OS Northing (m)	Zone	Appleby coke ovens	Scunthorpe, other plant	Scunthorpe bleeders	Local increment: Industry including heat and power production
1	491500	411500	34	3.937	0.005	0.673	4.615
2	492500	411500	34	1.198	0.009	0.568	1.776
3	491500	410500	34	3.045	0.003	0.221	3.268

A revised modelling methodology incorporating a finer spatial scale for dispersion modelling of all coke ovens in the UK and revision to the emissions rate for the coke ovens at Scunthorpe have been adopted for the 2016, 2017, 2018, 2019 and 2020 compliance assessment for B[a]P. A specific treatment of bleeder releases was included in 2019 and 2020.

## 2.3 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 Iron and Steel (IS) BAT Reference Document (BREF)<sup>6</sup> specifically setting out any BAT Associated Emission 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 to a focus on the Coke Ovens and the Sinter Plant, that are the main sources and mass release of B[a]P. The IS BREF contains stringent

<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)

requirements for iron and steel works to significantly reduce their fugitive emissions (especially particulate matter).

Before 2016, the two coke ovens at Appleby and Dawes Lane were the main sources (fugitive) associated with the BaP exceedances in this regional zone. Although the Sinter Plant has a point source with a significant mass release, it is highly dispersed by its 107m stack, mitigating any potential impact. The Environment Agency completed the review of the permit in 2016, then named Longs Steel UK Ltd trading as British Steel Ltd. Following an operational strategic review, they announced in October 2015 their intention to shut down the Dawes Lane Coke Oven (DLCO). DLCO subsequently closed on the first compliance day for implementing IED requirements (8<sup>th</sup> of March 2016) with an associated substantial reduction in B[a]P emissions.

During 2015, the fugitive emissions performance of both coke oven plants was poor at the then Longs Steel UK Ltd installation. Following regulatory pressure to improve, the business operational strategic review concluded that alongside the closure of DLCO Plant there would be a focused investment in the Appleby Coke Ovens (ACO). During 2016, the steelworks worked through a significant capital and revenue project on ACO since DLCO was closed. The ACO Recovery Project was to improve operational performance by renewing damaged and dated Coke Oven plant infrastructure that would minimise particulate emissions and PAH B[a]P reductions on the coke-producing batteries (4). Initially this work was a rebuild of battery 3, operated on hot idle (no coke production) from December 2015 to August 2016. Refurbishment of Batteries 1, 2 and 4 was planned to follow including the associated by-products plant that affects Batteries gas pressure management control.

British Steel Ltd entered company liquidation on 22 May 2019, an Official Receiver (OR) was appointed which led to some projects being prioritised and others being delayed. ACO continued to commit to battery and by-products improvements. Work continued to stabilise coke oven operations and activities during 2019. A comprehensive and substantial investment programme of improvements / refurbishment to Battery 1 was carried out in 2019. Further investments and improvements on the By-products plant including further replacement of specific primary coolers, building an extra new saturator (ammonia reactor) and refurbishment of one of the current saturators is ongoing (to prevent process-gas back-pressure that cause battery over pressurisation and leakage). British Steel have consistently stated plant management are always actively looking to improve the plant operating parameters to further improve performance.

Following this company liquidation period, the OR was seeking a new owner. The Environmental Permit EPR-HP3736AW for the operation of the Scunthorpe

Integrated Iron and Steel works was transferred to Jingye Steel (UK) Ltd, latterly renamed British Steel Ltd (company number 12303256) on 9 March 2020 as permit EPR-RP3206BE.

The following information has been adapted from the permit *British Steel Scunthorpe Annual Performance Report 2021*.

## Appleby Coke Oven

For the year 2021, this saw an improvement in environmental management performance at Appleby Coke Ovens. The EPR permit sets out fugitive Emission Limits for various emission sources on the coke oven batteries, doors and battery top leakages have more relevant for BaP PAH emissions. However there were 4 permit limit exceedances during the calendar year 2021 relating to door and top leakage, this compared with 10 in 2020 and 14 in 2019.

Doors and tops leakage, together with other fugitive releases of coke oven gas, are considered to be important sources of Polyaromatic Hydrocarbons (PAHs), which are measured as benzo(a)pyrene at the Santon Farm monitor.

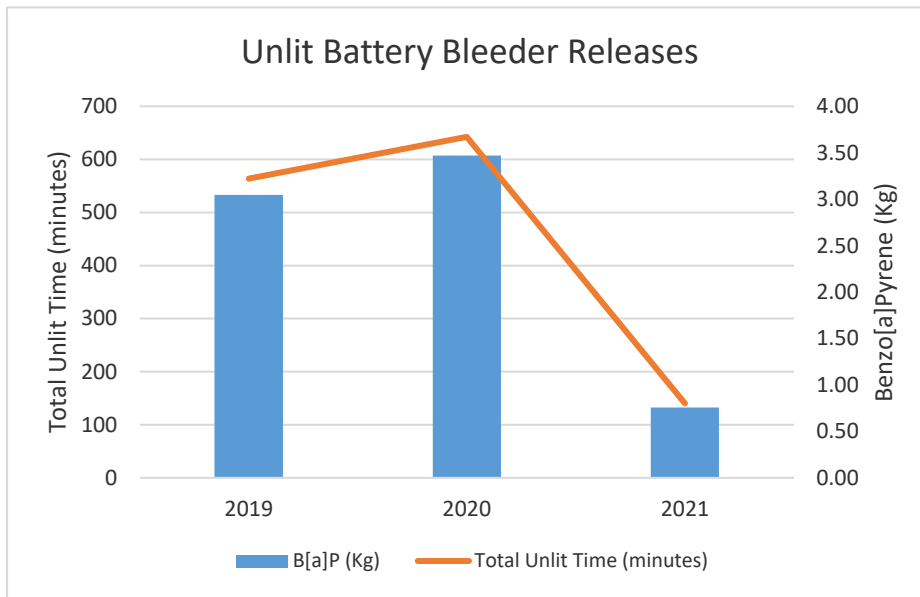
In 2021 the annual running average measured at the British Steel Santon Farm monitor was 1.05 ng/m<sup>3</sup>. Unfortunately, due to other priorities and COVID-19 absence, this average only covers January to May 2021. June to December data is expected during 2022.

During the latter half of 2020 and in to 2021 a focus area for coke ovens was the prevention and reduction of instances of flaring from the battery bleeders that provide a safety critical pressure relief function for the coke oven batteries. Figure 3 shows the reduction in unlit coke oven gas during 2021 compared to 2019 and 2020.

The Appleby coke oven facility has 4 distinct batteries each comprising multiple ovens. In October 2021 Battery 4 went in to hot idle as part of British Steel continued multi-year and multi-million-pound investment program to maintain the coke oven batteries and associated equipment, in an appropriate condition. As such the figures below do not include data for battery 4 from October – December as battery 4 was non-operational.

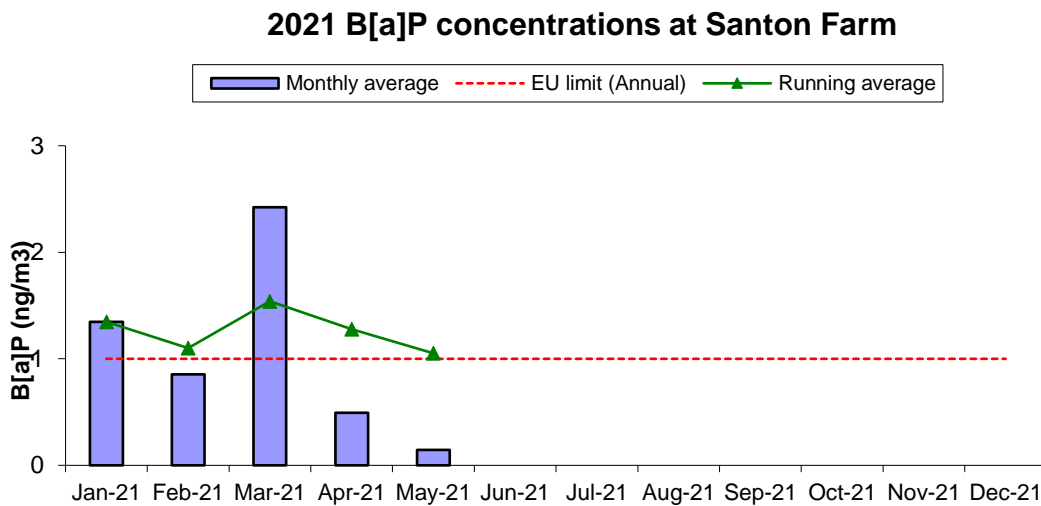


**Figure 3: Unlit Battery Bleeder Releases from Appleby Coke Ovens**



In Figure 4, the British Steel Digital PAH monitor near High Santon village is shown but unfortunately there been issues with the recording of data that means the filter papers can't be date matched. The former steelworks owner who owns the equipment, have been asked to investigate. However, there is no data for the second half of 2021.

**Figure 4: Benzo(a)pyrene concentrations recorded at Santon Farm monitor located NW of the site**



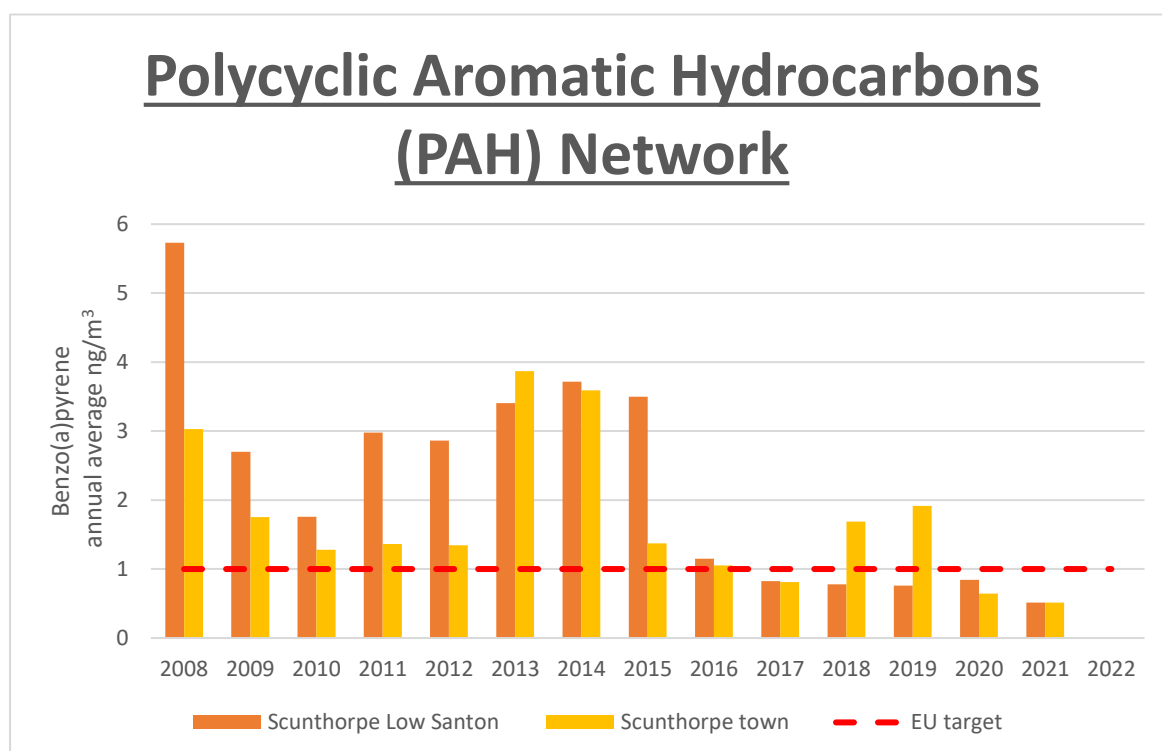
In Figure 5, the arial photograph shows the location of the Santon Farm monitor at Grid Reference SE 93330 12894

**Figure 5: Santon Farm Benzo(a)pyrene monitor (December 2011 – current):**



Data from the Defra non-automatic monitoring network at the Scunthorpe Town and Low Santon locations are presented below in Figure 6 and show that during 2020 and 2021, these two locations were below the target value for Benzo[a]pyrene (B[a]P).

**Figure 6: Defra non-automatic monitoring network at the Scunthorpe Town and Low Santon**

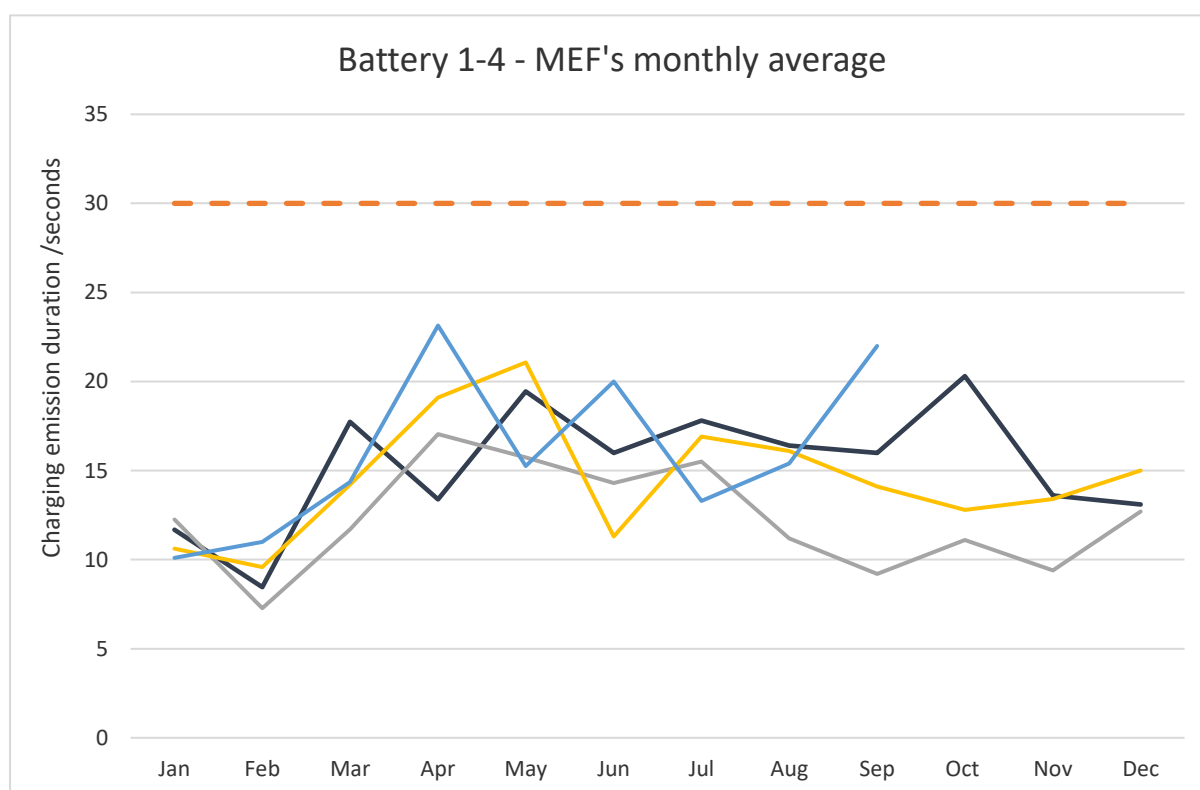


## Summary: Fugitives Battery Doors, Battery Tops and coal charging Emission Limits performance

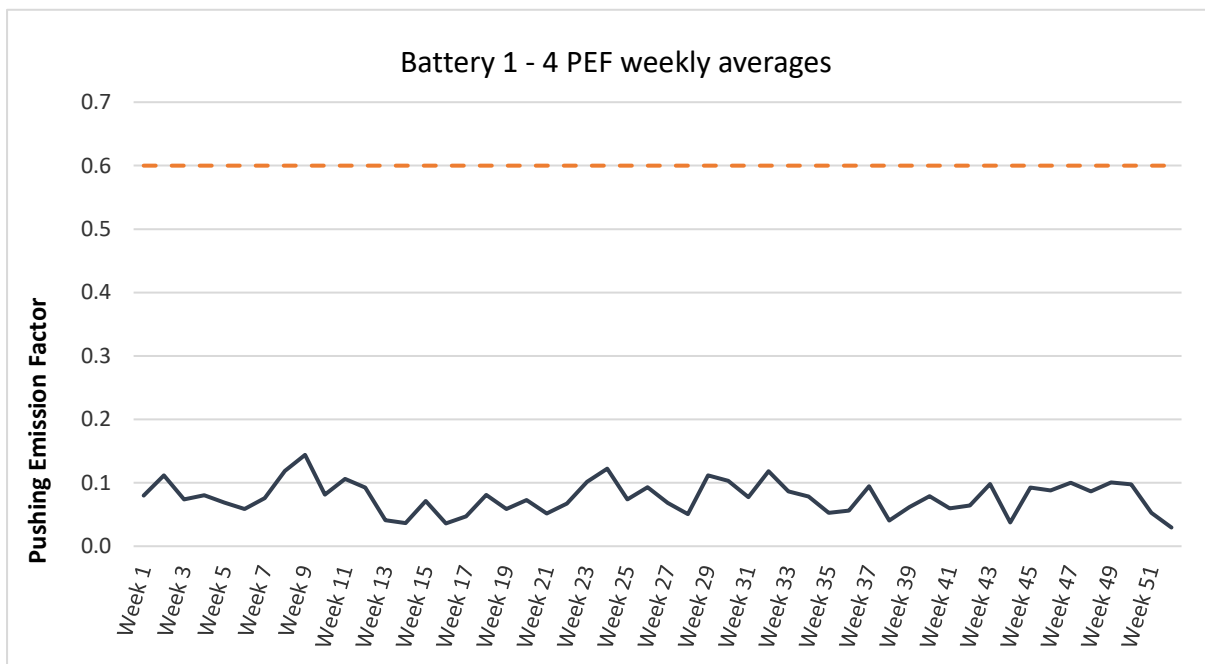
Charging and pushing emissions factors (referred to in the permit as MEFs and PEFs) have remained within the compliance limit throughout 2021. This continues a trend of good performance in this area and is an improvement on emissions from 2020. These are illustrated in Figure 7 and Figure 8.

On battery 2, door leakage had exceedances during 2021 however there were no exceedances recorded from June onwards and as noted earlier the number of overall exceedances was lower than 2020. Battery top leakage remained in compliance throughout most of 2021 with a single exceedance in January 2021 on battery 1. Figure 9 and Figure 10 show door and top leakage monthly results for 2021.

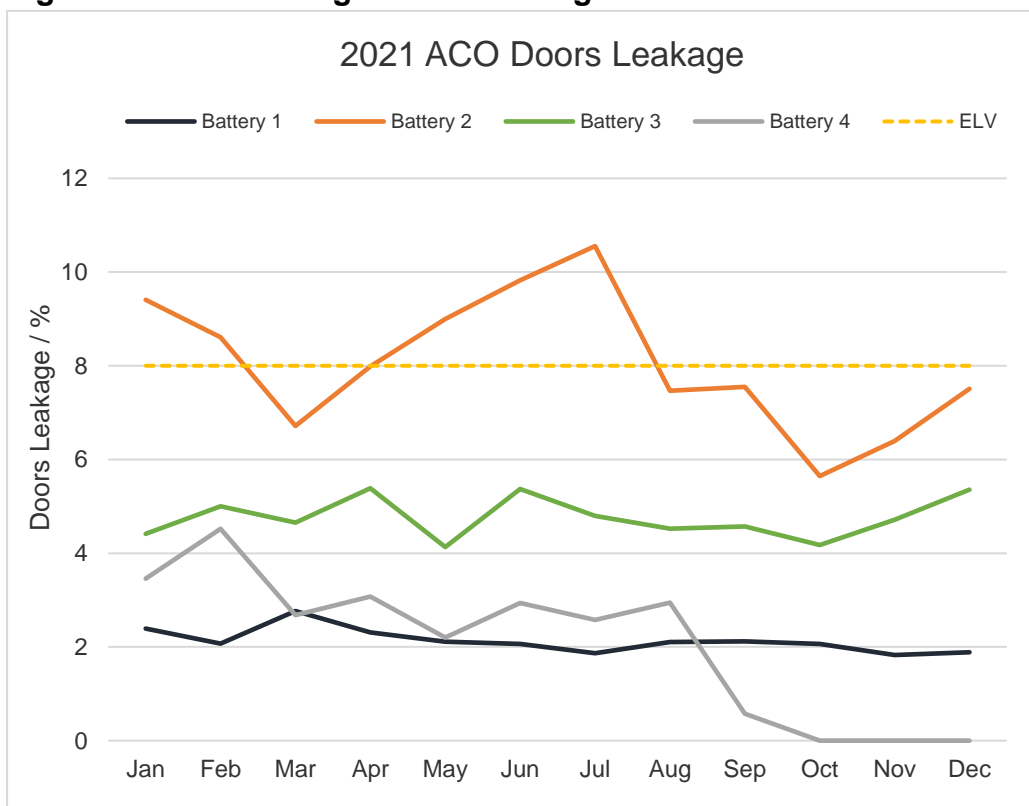
**Figure 7: MEFs performance during 2021**



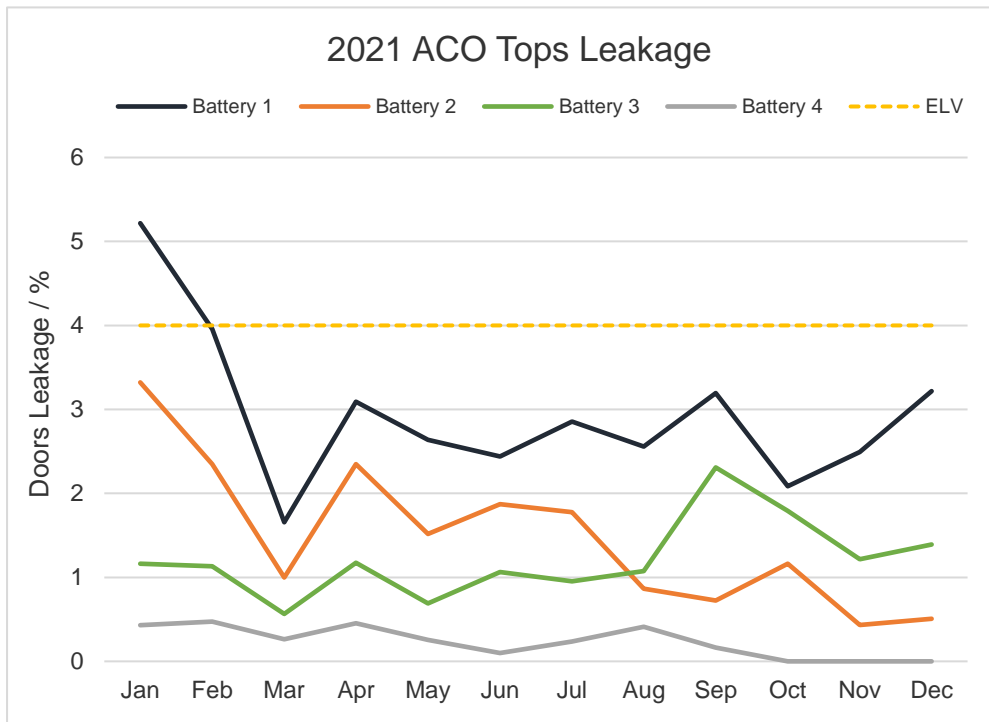
**Figure 8: PEFs performance during 2021**



**Figure 9: Doors leakage results during 2021**



**Figure 10: Top leakage results during 2021**



Coke making Plant Improvements & Investment with Battery 4 Hot Idle (no coke making maintained at ~850C) ~£10.8M Project. This was put into the hot idle state 7th Sept. 2021, currently the project is on plan with aim completion end Mid 2022.

**Figure 11: Battery 4 coke side steelwork and refractory refurbishment and the new gas collecting gas main being installed at Appleby Coke Ovens**





## Sinter Plant

The Sinter Plant stack has an annual B[a]P emission that contributes approximately 15% of the total emission from the integrated works. It is a point source release, though emissions are highly dispersed by the 107m stack over a wide area.

**Table 6: Extractive monitoring summary for the sinter plant during 2021 Plan year**

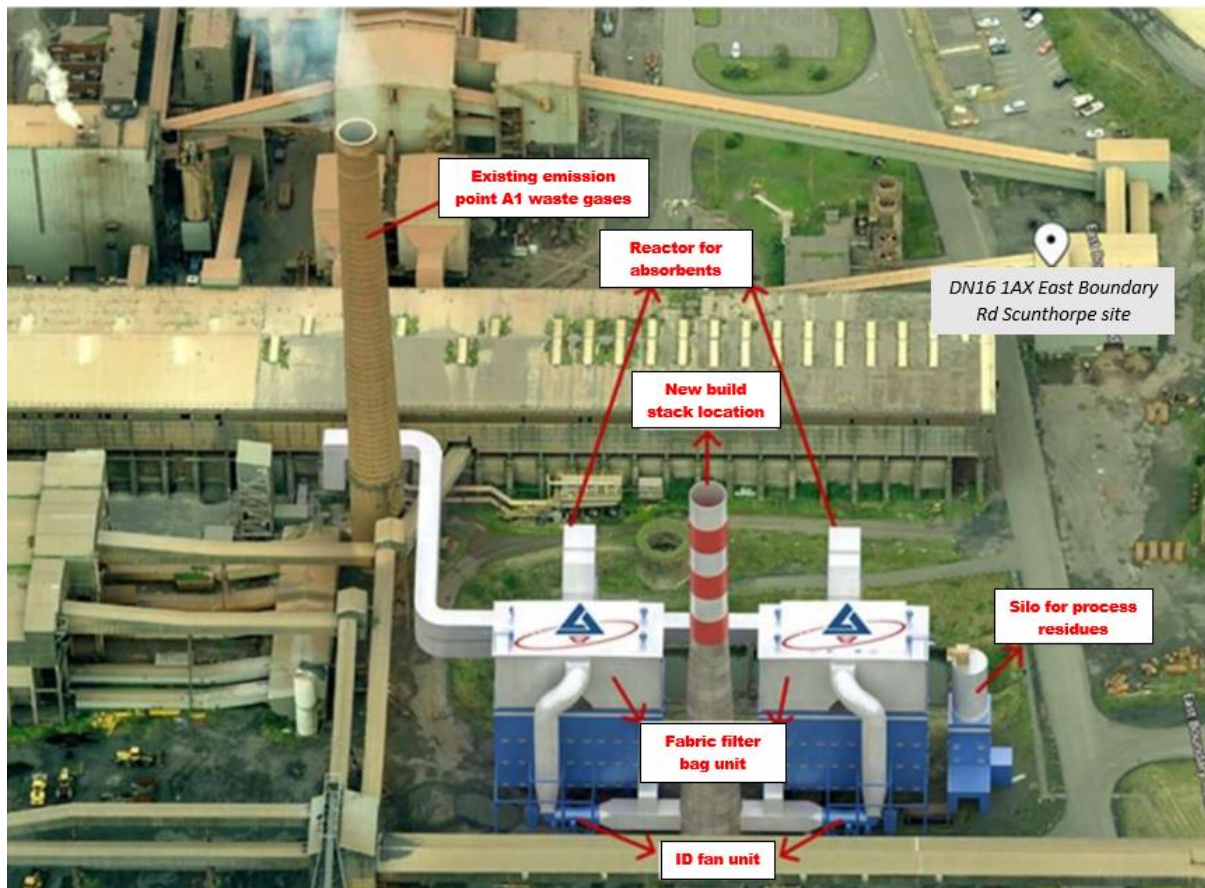
Emission point	Substance/parameter	ELV	Result	Unit	Month
Sinter Plant Main Stack A1	PAH to air	N/A	263	µg/m <sup>3</sup>	April
			163	µg/m <sup>3</sup>	November

Some specific Best Available Techniques (BAT) Conclusions apply to meet reduced particulate matter and dioxin/furan emission limits that have some potential to reduce B[a]P and PAH emissions.

For particulate matter related to B[a]P emissions, the current Advanced Electrostatic Precipitator technique has significant limitations to meet the lower IED Emission

Limits particulate matter in the permit. British Steel has committed to the installation of a fabric filter bag filter by September 2024 that would significantly reduce the emissions of particulate matter, and consequently reduce B[a]P emissions.

**Figure 12: Sinter Plant Bag Filter Project projection overlaid on the current plant area**



Bag filter abatement allows Lignite injection as a carbonaceous material absorbent has the potential to also reduce B[a]P emissions as an abatement technique for Dioxin/furan emissions by adsorbing hydrocarbons. Emissions are normally minimised by monitoring to evaluate process inputs, limiting air ingress and controlling chloride content of raw material. Lignite injections are to minimise the formation of dioxins/furans, and the effectiveness of this approach is assessed against the measured concentrations of dioxins/furans. Process safety considerations currently prevent implementation of injection due to the potential to create glow fires and an explosive environment, so air ingress management is critical in addressing these emissions. However, as a contingency measure to reduce elevated concentrations of dioxins/furans, the lignite injection system may indirectly

reduce any emissions of B[a]P in combination with a fabric bag filter. Monitoring will provide evidence of this technique.

Table 7 sets out measures as the 2020 update and 2021 plan that are being taken or are to be taken, some of which are subject continuous improvement. Measures in previous annual reports on “Measures for Dawes Lane Coke Ovens” can now be discounted.



**Table 7. Table of measures taken or to be taken at Scunthorpe industrial site**

Measure code	Description	Classification	Implementation dates	Other information		Comment
01	<p>The Environment Agency originally set a permit condition on the 8 Feb 2016 issued EPR IED permit HP3736AW to review and report on measures to prevent and minimise PAH emissions and provide a PAH AQ Management plan.</p> <p>Now superseded by AQMP Condition 3.7 in the 8 Feb 2016 issued EPR permit HP3736AW variation for IED, summarised as:</p> <p>Condition 3.7.1: The Operator shall submit a written Air Quality Management Plan (AQMP) to the Environment Agency. The plan must contain appropriate measures aimed at addressing emissions of</p>	Permit systems and economic instruments: IED permits	<p>Start: 2016</p> <p>Expected end: Ongoing</p> <p>Status: Implementation</p>	<p>Source affected:</p> <p>Spatial scale:</p> <p>Cost:</p> <p>Indicator:</p> <p>Target emissions reduction:</p>	<p>Industry including heat and power production</p> <p>Local</p> <p>Unknown, Operator information</p> <p>Reduction in ambient B[a]P concentration</p> <p>Not available</p>	<p><b>ON-GOING:</b></p> <p><b>2020 Updated</b></p> <p>During 2019, British Steel Ltd entered company liquidation. On the 22 May 2019 an Official Receiver was appointed.</p> <p>On 30 January 2020, British Steel Ltd, company number 09438207, submitted the Air Quality Management Plan (AQMP) for Scunthorpe for the financial year 2019/20 under the Environmental Permit EPR-HP3736AW. The permit was transferred to Jingye Steel (UK) Ltd, latterly renamed British Steel Ltd (company number</p>

	<p>Particulate Matter (PM10) and Polycyclic Aromatic Hydrocarbons (PAHs) from both significant point sources and diffuse sources on site.</p> <p>Condition 3.7.2: The AQMP should be updated and reported annually in writing on the first anniversary of the approval taking account of any new knowledge, evidence, and information.</p> <p>3.7.3: Any revised AQMP should be implemented in place of the original in accordance with the Environment Agency's written approval unless otherwise agreed in writing.</p>					<p>12303256) on 9 March 2020.</p> <p>As a new company, this was treated as transitional reporting as a new legal entity. On this regulatory basis, no permit breaches could be given for non-compliance. On 12 Dec 2020, the Agency issued a Compliance Assessment Report following a detailed assessment that had found several deficiencies.</p> <p>However, this PAH Improvement Plan forms part of a wider Coke Oven Battery Recovery Project.</p> <p><b>2021 Plan</b></p> <p>The Agency will assess the AQMP report submission.</p>
02			Start: 2012			<b>ON-GOING:</b> Monitoring

	<p>PAH measurement and analysis; The operator undertakes B[a]P monitoring to AURN monitoring location standards with time resolution as low as 1 day. PAH measurements at two locations, using pollution rose analysis to identify key sources. Emission factors to be calculated.</p>	<p>Permit systems and economic instruments: IED permits</p>	<p>Expected end:</p> <p>Status:</p>	<p>Monitoring ongoing</p> <p>Implementation</p>	<p>Source affected:</p> <p>Spatial scale:</p> <p>Cost:</p> <p>Indicator:</p> <p>Target emissions reduction:</p>	<p>Industry including heat and power production</p> <p>Local</p> <p>Unknown, Operator information</p> <p>Not available</p> <p>Not available</p>	<p>Implementation completed 2012</p> <p><b>2020 Update</b></p> <p>Continued measuring ambient PAH as B[a]P at one location (High Santon Farm area), with time resolution now at 3-day composite analysis (averaging period).</p> <p>Measurements and analysis indicate that the coke ovens at Appleby (and previously Dawes Lane), are the key sources for this exceedance situation. Emission factors calculated for each plant by reverse modelling methodology (Measure No. 4).</p> <p>DLCO closed in March 16. Coke production has reduced which has impacted emission levels.</p>
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						<p><b>2021 Plan</b></p> <p>British steel will continue to monitor PAH B[a]P at High Santon Farm area and review the data with coke oven management and the EA during BS/EA biannual ironworks meeting.</p>
03	Emission measurements; Direct emissions measurements using flameproof blanket fixed over oven doors to create a chimney. Bespoke monitoring to establish improved emission factors.	Permit systems and economic instruments: IED permits	<p>Start: 2007</p> <p>Expected end: 2008</p> <p>Status: Complete</p>	<p>Source affected:</p> <p>Spatial scale:</p> <p>Cost:</p> <p>Indicator:</p>	<p>Industry including heat and power production</p> <p>Local</p> <p>Unknown, Operator information</p> <p>Not available</p>	<p><b>COMPLETED</b></p> <p>Analysis indicates that B[a]P emission dominated by door leakage (&gt;98% of total). Emission rates consistent with estimates at other similar plants across Europe</p>

				Target emissions reduction:	Not available	
04	Reverse Dispersion Modelling; To provide an independent estimate of emission rates, based on ambient measurements	Permit systems and economic instruments: IED permits	Start: 2014 Expected end: 2015 Status: Complete	Source affected:	Industry including heat and power production	<b>COMPLETED</b> Results reasonably consistent with emissions estimates from direct measurements. Indicates that coke ovens are the main source.
				Spatial scale:	Local	
				Cost:	Unknown, Operator information	
				Indicator:	Not available	

				Target emissions reduction:	Not available	
05	<p>Environment Agency Regulation</p> <p>Annual programme of compliance audits and inspections, with Biannual Iron works meetings with Senior Operations Managers.</p>	<p>Permit systems and economic instruments: IED permits</p>	<p>Start: 2016</p> <p>Expected end: Ongoing</p> <p>Status: Implementation</p>	<p>Source affected:</p>	<p>Industry including heat and power production</p>	<p><b>ON-GOING</b></p> <p><b>2020 Update</b></p> <p>An annual programme of compliance audits and inspections. Biannual Iron works meetings with Senior Operations Managers, undertaken at British Steel Ltd's Appleby Coke Ovens and Sinter Plant, to assess the company's compliance with their permit. This is including Emission Limits, the application of BAT and to confirm the implementation of the</p>
				<p>Spatial scale:</p>	<p>Local</p>	
				<p>Cost:</p>	<p>Unknown</p>	
				<p>Indicator:</p>	<p>Reduction in ambient B[a]P concentration</p>	

					Target emissions reduction:	Not available	improvement measures described in this document.  <b>2021 Plan</b>  Continue with an annual programme of compliance audits and inspections, with Biannual Iron works meetings with Senior Operations Managers.
06	Environment Agency Regulation - permitting  The permit was transferred to Jingye Steel (UK) Ltd, latterly renamed British Steel Ltd (company number 12303256) on 9 March 2020.  A substantial environmental permitting variation application was submitted	Permit systems and economic instruments: IED permits	Start: 2021  Expected end: 2022  Status: Implementation	Source affected:	Industry including heat and power production	<b>COMPLETED: 2020 Update</b>  Pre-application work constrained as the company was in liquidation.  <b>2021 Plan</b>  Pre-application work ongoing. Variation application submitted 10 Feb 2021.	
				Spatial scale:	Local		
				Cost:	Unknown		
				Indicator:	Reduction in ambient		

	<p>on 10 February 2021 and was duly made.</p> <p>Application reference: EPR/RP3206BE/V004</p> <p>Applicant: British Steel Limited</p> <p>Facility: Scunthorpe Integrated Iron &amp; Steel Works</p> <p>The application was duly made as of 28 May 2021. 'Duly made' means that we have all the information we need to start determination. Determination is where we assess and make a decision on your application.</p>	

Start: 2012

	B[a]P concentration	<p>As part of the determination, the Agency to review parts of the permit and assess if permit conditions are fit for purpose in regulating PAH and B[a]P emissions and reporting requirements to support measures to prevent and minimise pollution.</p> <p>Permit planned to issue 2022, issued 15<sup>th</sup> September 2022.</p> <p>Further variation application expected early 2023.</p>
Target emissions reduction:	Not available	
		<b>ON-GOING</b>



Appleby Coke Ovens 01	Replacement of Door seals; Regular door maintenance is necessary to ensure the maintenance of good seals and a programme to overhaul doors on a daily basis is ongoing.	Permit systems and economic instrument s: IED permits	Expected end: Ongoing  Status: Implementation	Source affected:	Industry including heat and power production	<b>2020 Update</b>  A programme of repairing/replacing door jettors and hoists was completed.  <b>2021 Plan</b>  ACO to continue to replace and repair doors as and when necessary, under the maintenance regime.
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Appleby Coke Ovens 02	Door extractor adjustments; New door extractor as a trial to increase flexibility in door adjustments. Once the optimum position for each door has been ascertained then sealing each individual	Permit systems and economic instrument	Start: 2013  Expected end: 2018	Source affected:	Industry including heat and power production	<b>2020 Update</b>  Pusher 4 SE bogey repaired/replaced. Some slippage occurred due to covid.

	door will become easier and more consistent	s: IED permits	Status: Implementation			<b>2021 Plan</b> Plan to carry out structural repairs to Pusher 1 and 3.
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Appleby Coke Ovens 03	Machine alignments; The development of a cross-battery interlock system, using lasers to accurately line up pusher and coke machines, is under consideration.	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: 2018 Status: Implementation	Source affected:	Industry including heat and power production	<b>ON-GOING</b> <b>2020 Update</b> Pushers and coke car are working with anti-collision and laser positioning but need to work with guides to complete the task.
				Spatial scale:	Local	

					Cost:	Operator information	Issues with guides due to equipment failures and working environment.  <b>2021 Plan</b>  Look at alternatives with a feasibility study into a system that will work on the guides.
					Indicator:	Not available	
					Target emissions reduction:	Not available	
Appleby Coke Ovens 04	Access to carry out door maintenance; There are issues with working at height on the battery bench level to manually plug leaks. Very constrained in meeting Health and Safety requirements as the design is a shallow concrete foundation bench.	Permit systems and economic instruments: IED permits	Start: 2012  Expected end: 2018  Status: Complete		Source affected:	Industry including heat and power production	<b>COMPLETED</b>  EZ line installed of B4. New Heras fencing installed in floors on all batteries to enable safe access.  This issue has now been resolved and will not be progressed further.
					Spatial scale:	Local	
					Cost:	Not available	
					Indicator:	Not available	

					Target emissions reduction:	Not available	
Appleby Coke Ovens 05	New Doors and Frames; Where damage to doors and frames is such that repairs cannot be affected in-situ then a programme of replacement is required. Develop a schedule for door and frame replacement as required at Appleby, subject to the outcome of the capital expenditure plan.	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: Ongoing Status: Implementation		Source affected:	Industry including heat and power production	<b>ON-GOING</b>  Included in the PAH / coke oven recovery capital expenditure plan.  <b>2020 Update</b>  Battery 4 rebuild plan approved. Work commenced ordering materials with aim start date of July 2021  <b>2021 Plan</b>
					Spatial scale:	Local	
					Cost:	Unknown, Operator information	
					Indicator:	Not available	

				Target emissions reduction:	Not available	Complete phase 3 rebuilds on battery 3 (ovens 77 – 81). Start battery 4 hot idle repairs including 4 end flue rebuilds on coke side, new door frames and backstays, fit new gas collecting main, replace battery coke side and pusher benches.
Appleby Coke Ovens 06	New inspection hatch door seals; Inspection hatches are provided in the oven top to allow temperature and visual checks to be made. The hatch seals can become degraded owing to repeated movement and require replacement. A programme of replacements is ongoing, 132 seals are to be replaced.	Permit systems and economic instruments: IED permits	Start: 2013 Expected end: 2015 Status: Complete	Source affected:	Industry including heat and power production	132 hatches fitted, all <b>COMPLETED</b>
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	

				Target emissions reduction:	Not available	
Appleby Coke Ovens 07	Replacement spigot jointing compound; A seal is provided around the ascension pipe spigot to allow emission-free collection of coke oven gas from each oven.	Permit systems and economic instruments: IED permits	Start: 2013 Expected end: 2014 Status: Complete	Source affected:	Industry including heat and power production	<b>COMPLETED</b> The replacement spigot compound is now being used. Although it is not as reliable as the previously used compound (in terms of deterioration), it is better quality, and it is the best available on the market. No further options.
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
			Start: 2009			<b>2020 Update</b>

Appleby Coke Ovens 08	Pullman valve replacements; A programme of valve replacements, to combat a design issue, is ongoing.	Permit systems and economic instruments: IED permits	<p>Expected end: Ongoing</p> <p>Status: Implementation</p>	Source affected:	Industry including heat and power production	<p>During 2020 a further 5 ascension pipes and 3 pullman valves were changed</p> <p><b>2021 Plan</b></p> <p>Routine maintenance of the Pullman valves is ongoing. This will continue as "Business as Usual". There is no longer a significant issue related to these valves. Battery 4 pullman valves will be refurbished/changed as part of the hot idle.</p>
Appleby Coke Ovens 09	Tie-rod replacements; Periodical surveys are carried out to inspect tie-rod integrity and a programme of replacement has commenced and is	Permit systems and economic instrument	<p>Start: 2013</p> <p>Expected end: Ongoing</p> <p>Status: Implementation</p>	Source affected:	Industry including heat and power production	<p><b>ON-GOING</b></p> <p><b>2020 Update</b></p> <p>During 2020 45 tie bars were replaced</p>





					Indicator:	Not available	flue rebuilds on coke side, new door frames and backstays, fit new gas collecting main, replace battery coke side and pusher benches. Begin trials of new casting compound on battery tops and trial of new material for quoin end repairs.
					Target emissions reduction:	Not available	
Appleby Coke Ovens 11	Replacement of battery refractories; Where repairs to battery refractories are ineffectual or not practically possible, and where the continued operation of the oven will cause excessive emissions, the oven in question is taken out of operation, minimising pollution.	Permit systems and economic instruments: IED permits	Start: 2013 Expected end: 2024 Status: Implementation	Source affected:	Industry including heat and power production	<b>ON-GOING</b> <b>2020 Update</b> 199 coke side and pusher side silica welding repairs have been made to oven walls.	
				Spatial scale:	Local	<b>2021 Plan</b> Business as usual maintenance ongoing on all other batteries.	
				Cost:	Subject to Capital plan proposal		

				Indicator:	Not available	
				Target emissions reduction:	Not available	
Appleby Coke Ovens 12	Pressure stabilisation system; A linkage pipe has been placed on either side of the gas booster station, providing a pressure feedback loop.	Permit systems and economic instruments: IED permits	Start: 2012 Expected end: 2013 Status: Complete	Source affected:	Industry including heat and power production	<b>COMPLETED</b>
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Appleby Coke Ovens 13	New Gas Holder to improve pressure control. Beneficial effects in reducing pressure fluctuations and hence emissions from the batteries caused by high positive pressure.	Permit systems and economic instruments: IED permits	Start:	2015	Source affected:	Industry including heat and power production	<b>COMPLETED</b>  The new gas holder was commissioned in September 2018.
			Expected end:	2017			
			Status:	Complete			
			Spatial scale:	Local			
			Cost:	Operator Information			
Indicator:	Not available						
			Target emissions reduction:	Not available			
Appleby Coke Ovens 14	Underfiring Changeover Timings; Reversal of the heating cycle in the coke ovens at Appleby and	Permit systems and economic	Start:	2013	Source affected:	Industry including heat and	<b>COMPLETED</b>
			Expected end:	2013			

	Dawes Lane now timed not to coincide	instruments: IED permits	Status: Complete		power production	
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Appleby Coke Ovens 15	Benzole plant replacement. This will minimise pressure increase at the batteries, and secondly, prevent naphthalene in burner flues which leads to cold spots on oven walls, and eventual refractory damage caused by inconsistent heating.	Permit systems and economic instruments: IED permits	Start: 2014 Expected end: 2017 Status: Complete	Source affected:	Industry including heat and power production	<b>COMPLETED</b> The new benzole plant was successfully commissioned in 2017 and is now running a stable operation.
				Spatial scale:	Local	

Appleby Coke Ovens 16	Coke machine 'inching' facility; The facility to 'inch' the position of the machines will allow better alignment and less damage to the battery metalwork and fabric.	Permit systems and economic instruments: IED permits

Start:	2015		Cost:	Operator information	
Expected end:	2016		Indicator:	Not available	
Status:	Complete		Target emissions reduction:	Not available	
			Source affected:	Industry including heat and power production	<b>COMPLETED</b> New operator panels fitted to all three pushing machines. Systems fitted to four of the six machines.  Trial unsuccessful on pusher machines, implemented on all 3 guide machines in use.
			Spatial scale:	Local	
			Cost:	Operator information	
			Indicator:	Not available	

					Target emissions reduction:	Not available	
Appleby Coke Ovens 17	Automated leveller control; An automated leveller control system is currently being considered as part of a management of change exercise.	Permit systems and economic instruments: IED permits	Start: 2015 Expected end: 2018 Status: Planning		Source affected:	Industry including heat and power production	<b>PLANNING</b>  <b>2020 Update</b>  See action Appleby Coke Ovens 03. This work will follow interlock system installation, which will be progressed over the coming years.  <b>2021 Plan</b>  Look at alternatives with a feasibility study into a system that will work on the guides.
					Spatial scale:	Local	
					Cost:	Not available	
					Indicator:	Not available	
					Target emissions reduction:	Not available	
			Start: 2013				<b>COMPLETED</b>

<p>Appleby Coke Ovens 18</p>	<p>A new 'venting lid' has been developed to allow burn off of carbon deposits. The build-up of carbon deposits on the roof of the oven can also cause pressure issues within the oven by blocking the free passage of coke oven gas leading to door / tops leakage.</p>	<p>Permit systems and economic instruments: IED permits</p>	<p>Expected end: 2013</p> <p>Status: Complete</p>	<p>Source affected:</p>	<p>Industry including heat and power production</p>	
				<p>Spatial scale:</p>	<p>Local</p>	
				<p>Cost:</p>	<p>Operator information</p>	
				<p>Indicator:</p>	<p>Not available</p>	
				<p>Target emissions reduction:</p>	<p>Not available</p>	
<p>Appleby Coke Ovens 19</p>	<p>Primary cooler replacement; When primary coolers are not effective, the pressure of the by-products plant is increased, and this is</p>	<p>Permit systems and economic instruments</p>	<p>Start: 2013</p> <p>Expected end: 2019</p> <p>Status: Implementation</p>	<p>Source affected:</p>	<p>Industry including heat and power production</p>	<p><b>ON-GOING</b></p> <p><b>2020 Update</b></p>

	translated to the batteries and door / tops leakage.	s: IED permits								
Appleby Coke Ovens 20	Heating system checks; The original analysis of waste gas emissions from individual oven flues was completed. This was to provide information on the operation of each individual oven in terms of heating uniformity and emissions. No benefit from the trial and	Permit systems and economic instruments: IED permits	Start: 2013 Expected end: Ongoing Status: Complete		Source affected: Industry including heat and power production					<p>Refurbishment of No2 primary cooler and No3 saturator completed.</p> <p><b>2021 Plan</b></p> <p>Replace No3 &amp; No5 primary coolers.</p> <p><b>COMPLETED</b></p> <p>External consultants have completed a heating survey since the initial trials. Additional resources put in place to carry out the recommendations of this survey. Reviewed 6</p>
					Spatial scale: Local					
					Cost: Operator information					
					Indicator: Not available					
					Target emissions reduction: Not available					
					Source affected: Industry including heat and power production					
					Spatial scale: Local					



	engaged an external company.				Cost:	Not available	monthly. This is now business as usual.
					Indicator:	Not available	
					Target emissions reduction:	Not available	
Dawes Lane Coke Ovens 01	Closure of Dawes Lane Coke Ovens	Permit systems and economic instruments: other	Start: 2016 Expected end: 2016 Status: Complete		Source affected:	Industry including heat and power production	<b>Dawes Lane Coke Ovens closed 8 March 2016</b>
					Spatial scale:	Local	
					Cost:		
					Indicator:		

				Target emissions reduction:		
Sinter Plant 01	Installation of a fabric bag filter plant	Permit systems and economic instruments: other	Start: 2020 Expected end: 2023 Status: Planning	Source affected:	Industry including heat and power production	<b>ONGOING</b> <b>2020 Update</b> The environmental permit issued to British Steel's Scunthorpe Works includes an emission limit of 40 mg/Nm <sup>3</sup> in respect of the daily average concentration of particulate matter from the main stack at the sinter plant. This limit came into force on 8th March 2016 but although schemes to improve the performance of the abatement plant (electrostatic precipitators) have been undertaken, it has not been possible to consistently achieve the limit. As a result, British
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

					<p>Steel has now committed to the installation of a fabric filter. The fabric filter will not be commissioned until 2024 and in the interim a temporary increase in the emission limit value (ELV) for dust is requested (by permit variation) to return to the previous IPPC permit limit 115 mg/Nm<sup>3</sup>. Because the ELV is already at the top of the range of relevant BAT-associated emission levels (BAT-AELs), increasing it has required a formal derogation under Article 15(4) of the Industrial Emissions Directive as part of Measure 06 Permitting.</p> <p><b>2021 Plan</b></p> <p>Submit permit variation application to temporarily</p>
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						increase ELV as detailed above.
Sinter Plant 02	Review B[a]P emissions, post installation of bag filter, to assess the new abatement system's effect on reducing the emissions of B[a]P	Permit systems and economic instruments: other	Start: 2023 Expected end: 2024 Status: Planning	Source affected:	Industry including heat and power production	<b>PLANNING</b> <b>2020 Update</b> Use of the pre-installed lignite injection system is a contingency should failings in air ingress management lead to an increase in dioxin/furans formation at concentrations that would require this additional measure to be taken. However, in combination with a bag filter, this may also reduce B[a]P emissions. British Steel will review the B[a]P emissions data post commissioning of the bag filter system to determine the mass contribution of B[a]P emissions from the sinter plant. <b>2021 Plan</b> Awaiting installation of bag filter.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	