Department
for Environment
Food & Rural Affairs

Report on measures for 2015 exceedance of the Target Value for Benzo[a]pyrene in Yorkshire and Humberside non-agglomeration zone (UK0034)

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1. Introduction

1.1 Context

Under the EU Directive 2004/107/EC[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 Directive requires that Member States report on measures in place to address the exceedance of the TV and that all reasonable measures that do not entail disproportionate cost should be taken to ensure this target is not exceeded.

Exceedance of the TV were reported in 2013 and 2014 in the Yorkshire and Humberside non-agglomeration zone and a report on measures was published detailing the exceedance and the measures in place[2].

This document reports the exceedance situation for 2015 reflecting the more recent assessment and updating the 2013 and 2014 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 2015 UK air quality assessment. Exceedances within this zone were identified on the basis of measurement data with model results providing supplementary information. This exceedance was reported via e-Reporting dataflow G[3] on attainment 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] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:023:0003:0016:EN:PDF
[2] https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/bap_yorkshireandhumberside_UK0034_reportonmeasures_2014.pdf
[3] http://cdr.eionet.europa.eu/gb/eu/aqd
[4] http://uk-air.defra.gov.uk/library/annualreport/index

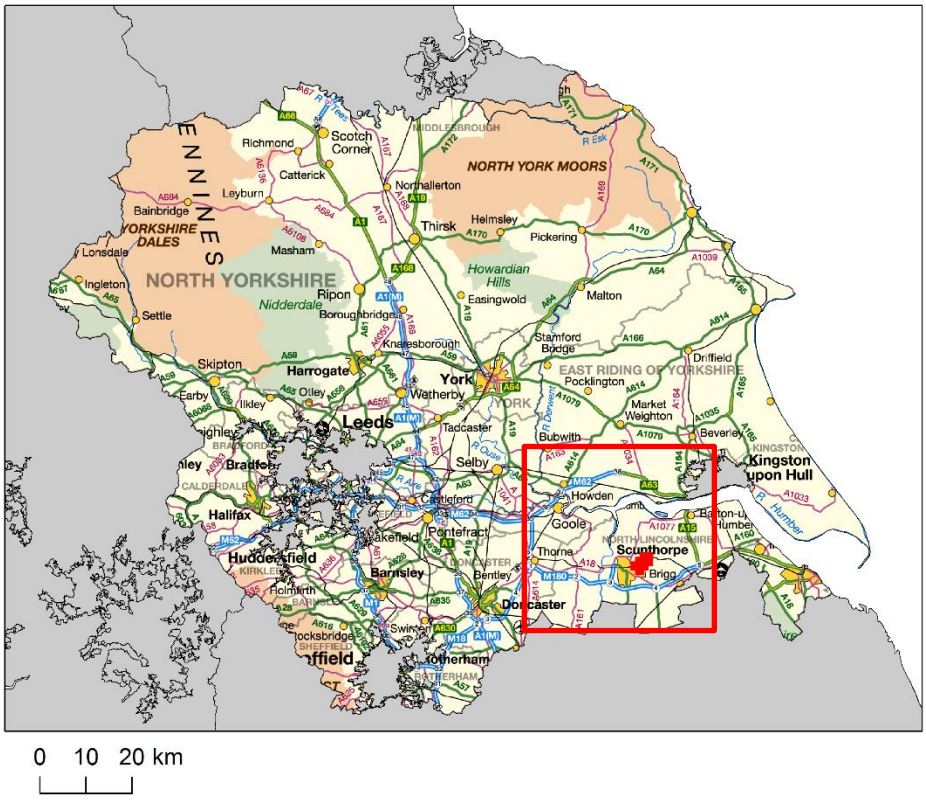
Table 1. Area exceeding B[a]P target value in 2015 and associated population for zone UK0034

Zone code	Zone Name	Area exceeding TV (km^2)	Population exceeding TV
UK0034	Yorkshire & Humberside	18	2277

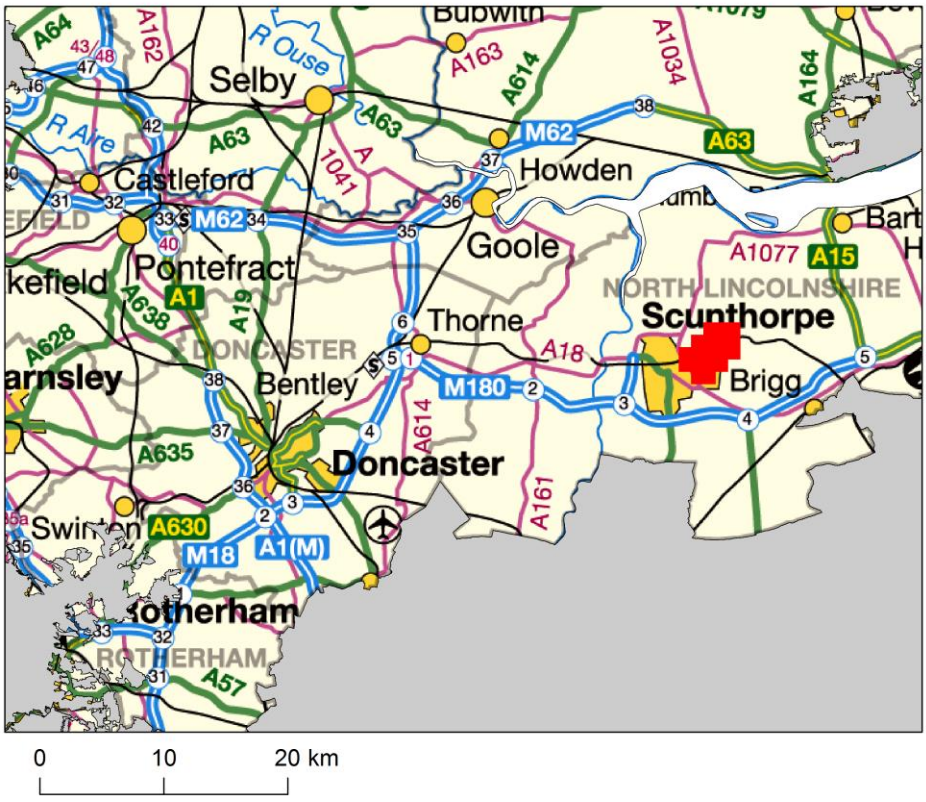
Figure 1a shows the locations of the exceedances in the context of the zone as a whole. Figure 1b shows the part of the zone including the exceedances in more detail.

Figure 1. Location of exceedance of the B[a]P target value on 2013 in 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_2015_1] related to industrial emissions (area of exceedance 18 km^2)

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 or to be taken. Information on measures is reported within e-Reporting dataflow K[5].

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

2 Exceedance situation Yorkshire and Humberside [B[a]P_UK0034_2015_1] related to industrial emissions

2.1 Description of exceedance

This exceedance situation is an area of exceedance 18 km^2 to the north east 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 2,277, the majority (1,701) being in exceeding grid square 13, which is the exceedance square in the south west of the exceedance situation. It is highlighted with a white border in Figure 2 below. Many of the grid squares have no resident population and several are largely or wholly within the steelworks industrial complex area. During 2015, the operator was Longs Steel UK Ltd, however in August 2016, the name changed to British Steel UK Ltd following purchase from Tata Steel UK Ltd.

Table 2 lists the measured exceedances of the TV for B[a]P associated with this exceedance situation.

Table 2. Exceedances of the target for B[a]P in exceedance situation Yorkshire and Humberside [B[a]P_UK0034_2015_1]

Station (EoI code)	Annual mean concentration (ngm^{-3}) in 2015	Data capture (%)
Scunthorpe Low Santon (GB1004A)	3.5	99
Scunthorpe Town (GB0841A)	1.3	92

Figure 2 also shows the locations of the monitoring sites associated with the exceedance situation and the locations of the key industrial sources. 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_2015_1]. Exceeding grid squares are marked red. Locations of coke works at Appleby and Dawes Lane and sinter plant at Scunthorpe are also shown as well as the two monitoring sites at Scunthorpe Town and Scunthorpe Low Santon.

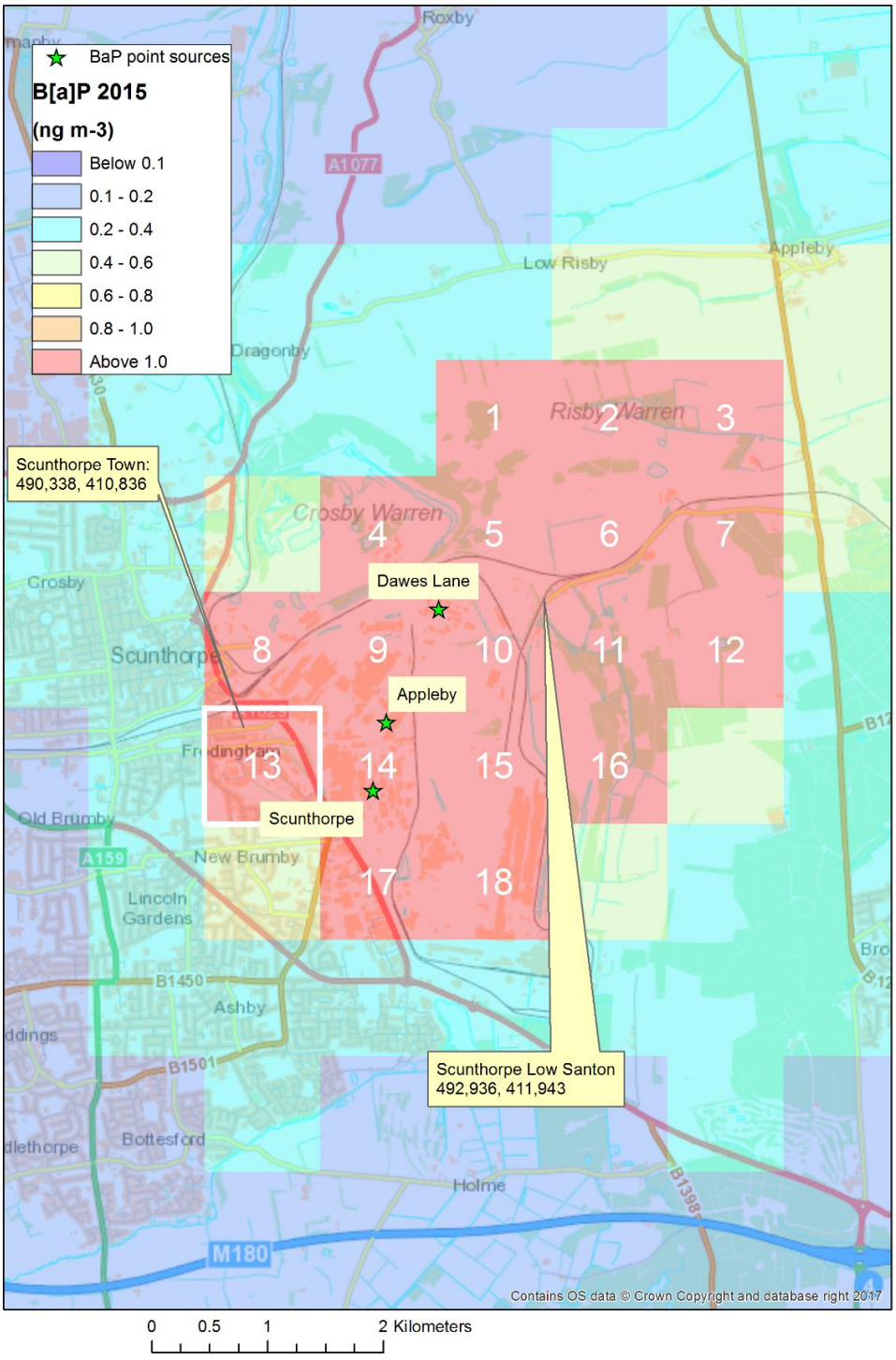


Table 3. Exceeding grid squares for exceedance situation BaP_UK0034_2015_1.

Grid square number	Resident population	Notes
1	0	Not part of the steelworks industrial complex
2	0	Not part of the steelworks industrial complex
3	2	Not part of the steelworks industrial complex, farm
4	0	Steelworks industrial complex
5	0	Partly steelworks industrial complex
6	98	Not part of the steelworks industrial complex, High Santon Village
7	10	Not part of the steelworks industrial complex, farms
8	326	Mostly steelworks industrial complex, Scunthorpe Town
9	0	Steelworks industrial complex
10	7	Mostly steelworks industrial complex, houses in High Santon
11	0	Partly steelworks industrial complex
12	0	Not part of the steelworks industrial complex
13	1701	Scunthorpe Town, industrial estate
14	0	Mostly steelworks industrial complex

15	0	Steelworks industrial complex
16	0	Partly steelworks industrial complex
17	134	Scunthorpe Town, industrial estate
18	0	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 and Dawes Lane are the main sources associated with this exceedance situation, with the relative proportions from these two sources varying for each grid square.

Table 4. Source apportionment for exceedance situation Yorkshire and Humberside [B[a]P_UK0034_2015_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	Urban background increment: commercial and	Urban background increment: Shipping	Urban background increment: Off road mobile	Urban background increment: Other	**c) Local increment: Total**	Local increment: Industry including heat and power	**Total for all emission sources (a+b+c)**	Resident population
1	492500	413500	34	n/a	0.048	0.000	0.001	0.030	0.000	0.001	0.015	1.317	1.317	1.4	0
2	493500	413500	34	n/a	0.051	0.000	0.001	0.034	0.000	0.001	0.015	1.368	1.368	1.4	0
3	494500	413500	34	n/a	0.056	0.000	0.001	0.039	0.000	0.000	0.015	1.112	1.112	1.2	2
4	491500	412500	34	n/a	0.037	0.000	0.002	0.023	0.000	0.001	0.011	1.600	1.600	1.6	0
5	492500	412500	34	n/a	0.044	0.000	0.001	0.028	0.000	0.001	0.014	3.715	3.715	3.8	0
6	493500	412500	34	n/a	0.057	0.000	0.001	0.040	0.000	0.001	0.015	2.069	2.069	2.1	98
7	494500	412500	34	n/a	0.052	0.000	0.001	0.035	0.000	0.000	0.015	1.177	1.177	1.2	10

Grid square number	OS easting (m)	OS Northing (m)	Zone	**a) Regional background: Total**	**b) Urban background increment: Total**	Urban background increment: Traffic	Urban background increment: Industry	Urban background increment: commercial and	Urban background increment: Shipping	Urban background increment: Off road mobile	Urban background increment: Other	**c) Local increment: Total**	Local increment: Industry including heat and power	**Total for all emission sources (a+b+c)**	Resident population
8	490500	411500	34	n/a	0.053	0.001	0.011	0.026	0.000	0.004	0.011	1.334	1.334	1.4	326
9	491500	411500	34	n/a	0.039	0.001	0.003	0.023	0.000	0.002	0.010	9.056	9.056	9.1	0
10	492500	411500	34	n/a	0.034	0.000	0.001	0.022	0.000	0.001	0.010	7.698	7.698	7.7	7
11	493500	411500	34	n/a	0.042	0.000	0.001	0.026	0.000	0.001	0.014	1.813	1.813	1.9	0
12	494500	411500	34	n/a	0.044	0.000	0.001	0.027	0.000	0.000	0.015	1.119	1.119	1.2	0
13	490500	410500	34	n/a	0.055	0.001	0.002	0.037	0.000	0.003	0.012	1.294	1.294	1.3	1701
14	491500	410500	34	n/a	0.038	0.001	0.002	0.024	0.000	0.001	0.010	6.046	6.046	6.1	0
15	492500	410500	34	n/a	0.033	0.001	0.001	0.021	0.000	0.001	0.010	2.484	2.484	2.5	0
16	493500	410500	34	n/a	0.040	0.000	0.001	0.024	0.000	0.001	0.014	1.297	1.297	1.3	0

Grid square number	OS easting (m)	OS Northing (m)	Zone	**a) Regional background: Total**	**b) Urban background increment: Total**	Urban background increment: Traffic	Urban background increment: Industry	Urban background increment: commercial and	Urban background increment: Shipping	Urban background increment: Off road mobile	Urban background increment: Other	**c) Local increment: Total**	Local increment: Industry including heat and power	**Total for all emission sources (a+b+c)**	Resident population
17	491500	409500	34	n/a	0.038	0.001	0.001	0.023	0.000	0.002	0.011	1.110	1.110	1.1	134
18	492500	409500	34	n/a	0.033	0.001	0.001	0.020	0.000	0.001	0.010	1.139	1.139	1.2	0

Table 5. Detailed source apportionment for industrial sources only for exceedance situation Yorkshire and Humberside [B[a]P_UK0034_2015_1]. Annual mean B[a]P concentration (ngm^{-3})

Grid square number	OS easting (m)	OS Northing (m)	Zone	Appleby coke ovens	Dawes Lane coke ovens	Scunthorpe, other plant	Local increment: Industry including heat and power production
1	492500	413500	34	0.777	0.534	0.007	1.317
2	493500	413500	34	0.835	0.522	0.011	1.368
3	494500	413500	34	0.736	0.363	0.013	1.112
4	491500	412500	34	0.950	0.647	0.004	1.600
5	492500	412500	34	1.655	2.050	0.011	3.715
6	493500	412500	34	1.322	0.732	0.016	2.069
7	494500	412500	34	0.823	0.342	0.011	1.177
8	490500	411500	34	1.140	0.192	0.003	1.334
9	491500	411500	34	8.284	0.768	0.004	9.056
10	492500	411500	34	4.750	2.929	0.018	7.698
11	493500	411500	34	1.353	0.448	0.013	1.813
12	494500	411500	34	0.827	0.282	0.010	1.119
13	490500	410500	34	1.129	0.163	0.002	1.294

14	491500	410500	34	5.820	0.225	0.001	6.046
15	492500	410500	34	2.244	0.232	0.008	2.484
16	493500	410500	34	1.046	0.241	0.009	1.297
17	491500	409500	34	0.964	0.144	0.002	1.110
18	492500	409500	34	1.023	0.111	0.005	1.139

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 2015 compliance assessment for B[a]P.

2.3 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). However, there are some narrative and specific BAT Conclusions to minimise particulate emissions, indirectly reducing B[a]P emissions. Permit conditions transposing these into the forthcoming EPR permit during 2016 will focus on the Coke Ovens and Sinter plant, which are the main sources of this pollutant. BAT Reference Document (BREF) contains stringent requirements for iron and steel works to significantly reduce their fugitive emissions, including Polycyclic Aromatic Hydrocarbons (PAH) (B[a]P is a pollutant from this chemical group.

During 2015, the coke ovens at Appleby and Dawes Lane are the main sources associated with the exceedance in this zone where as the Sinter Plant has a significant mass emission point but the emission is highly dispersed. The Environment Agency have completed a review of the permit, at the now named British Steel Ltd (formerly Longs Steel UK Ltd) installation. This was completed against the BAT conclusions contained in the revised Steel and Iron BREF, published in March 2012. In addition, following an operational strategic review, the owners of the steelworks announced in October 2015 their intention to close down

Dawes Lane Coke Oven (DLCO). DLCO subsequently closed on the first compliance day for IED (8th of March 2016).

During 2015, the performance of both coke ovens plants were poor at the then Longs Steel UK Ltd installation. Following regulatory pressure to improve, the 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. The Recovery of ACO to improve operational performance with improved infrastructure would minimise particulate emissions, specifically PAH BaP reductions. This work was essentially a rebuild of Battery 3, operated on hot idle from December 2015 to August 2016, the refurbishment of Batteries 1, 2 and 3 and the associated By-products plant. During 2016, DLCO was closed and decommissioned whilst ACO was refurbished. As such the measures in previous reports on “Measures for Dawes Lane Coke Ovens” can now be discounted.

Appleby Coke Ovens (4 Batteries) have during 2016 been further progressing their Coke Oven recovery project, running well under name plate coke making capacity. They had to have completed refurbishment of Battery 3 by August 2016 and are focussing on Battery 1, 2 and 4 into 2017. These Batteries will take some slot ovens out of service to prevent pollution and are part of the two-year intensive maintenance and improvement programme.

The Sinter plant stack is a significant PAH mass emitter. It is a point source release and the emissions are highly dispersed as it is released via a 107m stack. Some specific Best Available Techniques (BAT) conclusions under the Industrial Emissions Directive (EU Directive 2010/75/EU) do apply to reduce particulate and dioxin/furan limits that have some potential to minimise B[a]P emissions.

The Environment Agency have set a permit condition in the 8 Feb 2016 issued EPR permit HP3736AW to review and report on measures to prevent and minimise PAH emissions and the PAH AQ Management plan, due during 2016. A transitional report on measures has been received by the Environment Agency. As such the measures set out in the table to prevent and minimise PAH have been updated.

Table 6 sets out measures that are being taken or are to be taken, some of which are subject to the outcome of the review of the permit conditions and ACO Recovery project or affected by the closure of the DLCO.

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

Measure code	Description	Classification	Implementation dates	Other information		Comment
1	Polycyclic Aromatic Hydrocarbon (PAH) Improvement Plan; The operator shall submit a written plan, to the Environment Agency (the regulator) for approval, of the measures to be taken to minimise PAH emissions (IARC Group 1, 2a & 2b), particularly the marker PAH; Benzo [a] Pyrene (B[a]P) and Volatile Organic Compounds as fugitive releases from existing	Permit systems and economic instruments: EPR permits	Start: 2012 Expected end: 2024 Status: Implementation	Source affected:	Industry including heat and power production	An improvement condition on the Scunthorpe site permit BL3838IW V007 9 May 2012. The measures described in column 1 of this table (Measure codes); Appleby Coke Ovens 1 -20 and Dawes Lane 1 are from the PAH improvement Plan. This PAH Improvement Plan forms part of a wider Coke Oven Battery Recovery Project.
				Spatial scale:	Local	
				Cost:	Unknown, Operator information	
				Indicator:	Reduction in ambient B[a]P concentration	

	Appleby and Dawes Lane coke oven battery plants			Target emissions reduction:	Not available	
2	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.	Permit systems and economic instruments: EPR permits	Start: 2012 Expected end: None Status: Implementation	Source affected:	Industry including heat and power production	Measurements and analysis indicate that the coke ovens at Appleby and Dawes Lane are the key sources for this exceedance situation. Emission factors calculated for each plant by reverse modelling methodology (Measure No. 4). **2016 Update** – DLCO closed in March 16. Coke production has reduced which will also affect emission levels. **2017 Update** - Moved to measuring PAH at one location, with time
				Spatial scale:	Local	
				Cost:	Unknown, Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

						resolution now at 3 days.

3	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: EPR permits	Start: 2007 Expected end: 2008 Status: Complete	Source affected:	Industry including heat and power production	COMPLETED: Analysis indicates that B[a]P emission dominated by door leakage (>98% of total). Emission rates consistent with estimates at other similar plants across Europe
				Spatial scale:	Local	
				Cost:	Unknown, Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

4	Reverse Dispersion Modelling; To provide an independent estimate of emission rates, based on ambient measurements	Permit systems and economic instruments: EPR permits	Start: 2014 Expected end: 2015 Status: Complete	Source affected:	Industry including heat and power production	COMPLETED: 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	

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 instruments: EPR permits	Start: 2012 Expected end: Ongoing Status: Implementation	Source affected:	Industry including heat and power production	20 seals changed on No.1/2 batteries, 33 seals changed on No.3/4 batteries. Along with seal changes, 158 doors were repaired and 1 frame has been replaced. In 2016 all battery 3 doors replaced. **2017 Plan** – As part of the battery life extension work, new doors and seals to be placed on rebuild ovens. Regular maintenance meetings held at plant level.
				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 door will become easier and more consistent	Permit systems and economic instruments: EPR permits	Start: 2013 Expected end: 2018 Status: Implementation	Source affected:	Industry including heat and power production	New door extractor fitted to 1 Pusher and successful in removing play in seal alignment. Repairs carried out to 3 and 4 pusher machines to allow new extractors to be installed. In 2016 new extractors were installed on No. 4 pusher machine. **2017 Plan** – Complete installation of extractor on No. 3 pusher machine.
				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: EPR permits	Start: 2015 Expected end: 2018 Status: Implementation	Source affected:	Industry including heat and power production	Trial complete based on other coke plant system. Scheme is developed, interlock to implement and capital expenditure plan approved. Order placed and work commenced on site Aug 2015. **Update** – This is currently under review. Issues with bench and guide and pusher rails. Major maintenance work to complete.
				Spatial scale:	Local	
				Cost:	Operator information	
				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: EPR permits	Start: 2012 Expected end: 2018 Status: Implementation	Source affected:	Industry including heat and power production	4 new EZ bonding lines in place. These will allow for quicker access. An alternative option and design developed to implement on the Pusher side; a lanyard and running rail system. Trial successful full engineering design developed. 2016 Update – Additional improvements to allow quicker and safer bench access through the development of post holes drilled in to the bench to allow full height fencing to be utilised completed. **2017 Plan** – Install Easi line on B4. Look at potential new systems
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

						and work together to improve access.
Appleby Coke Ovens 05	New Doors and Frames; Where damage to doors and frames is such that repairs cannot be effected 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: EPR permits	Start: 2015 Expected end: Ongoing Status: Implementation	Source affected:	Industry including heat and power production	Included in the PAH / coke oven recovery capital expenditure plan. Subject to capital plan. **2016 Update** – All damaged frames changed. **2017 Plan** – To continue as part of recovery plan.
				Spatial scale:	Local	
				Cost:	Unknown, Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

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: EPR permits	Start: 2013 Expected end: 2015 Status: Complete	Source affected:	Industry including heat and power production	132 hatches fitted , all COMPLETED.
				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: EPR permits	Start: 2013 Expected end: 2014 Status: Complete	Source affected:	Industry including heat and power production	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. Action COMPLETED.
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Appleby Coke Ovens 08	Pullman valve replacements; A programme of valve replacements, to combat a design issue, is ongoing.	Permit systems and economic instruments: EPR permits	Start: 2009 Expected end: Ongoing Status: Implementation	Source affected:	Industry including heat and power production	17 Pullman Valves replaced YTD (Q3 2015). **2016 Update** – All not fully functional Pullman valves changed. **2017 Plan** – Implement battery life extension work and day to day maintenance.
				Spatial scale:	Local	
				Cost:	Operation information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

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 expected to continue until 2015	Permit systems and economic instruments: EPR permits	Start: 2013 Expected end: Ongoing Status: Implementation	Source affected:	Industry including heat and power production	Tie rod surveys, maintenance and subsequent replacements are carried out on a regular frequency throughout the year. **2016 Update** – All failed tie bars on all batteries changed. **2017 Plan** – As part of the battery life extension work. OSL have been awarded the contract for this work with rewards and penalties.
				Spatial scale:	Local	
				Cost:	Operator Information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Appleby Coke Ovens 10	Repairs to battery refractories; A programme of silica welding and end flue repairs to seal oven wall cracks has begun and is expected to continue throughout the remaining operational lifetime of the coke oven plant	Permit systems and economic instruments: EPR permits	Start: 2013 Expected end: 2024 Status: Implementation	Source affected:	Industry including heat and power production	This is part of the Battery Recovery Programme and PAH capital expenditure plans. Approx. 14 end flues replaced according to most recent information. (Q3 2015). New recovery plan put in place Dec 2015. Battery 3 hot idled. Battery 3 recovery work completed in 2016 and new life extension programme implemented. **2017 Plan** – As part of the battery life extension work. OSL have been awarded the contract for this work with rewards and penalties.
				Spatial scale:	Local	
				Cost:	Operator information.	
				Indicator:	Not available	
				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: EPR permits	Start: 2013 Expected end: 2024 Status: Implementation	Source affected:	Industry including heat and power production	A significant Battery Recovery Programme has initiated during 2014 and subject to a capital plan proposal put forward. Mainly end wall and flue repairs.
				Spatial scale:	Local	
				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: EPR permits	Start: 2012 Expected end: 2013 Status: Complete	Source affected:	Industry including heat and power production	COMPLETED.
				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: EPR permits	Start: 2015 Expected end: 2017 Status: Planning	Source affected:	Industry including heat and power production	A scheme to demolish and clear the obsolete gas holder site has been completed. A further capital expenditure scheme for the construction is being developed. Gas Holder project ongoing. New pressure valve installed, which has resolved pressure spike issue. Ownership of gas holder project is now with Energy Operations.
				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 Dawes Lane now timed not to coincide	Permit systems and economic instruments: EPR permits	Start: 2013 Expected end: 2013 Status: Complete	Source affected:	Industry including heat and power production	COMPLETED.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Appleby Coke Ovens 15	New benzole plant; The benzole plant will be replaced. This will minimise pressure increase at the batteries, and secondly, prevent naphthalene in burner flues and leading to cold spots on oven walls, and eventual refractory damage caused by inconsistent heating.	Permit systems and economic instruments: EPR permits	Start: 2014 Expected end: 2017 Status: Implementation	Source affected:	Industry including heat and power production	Capital plan approved in 2014. Project is progressing well. Excavations and work on base completed. Construction in an advanced stage. **2017 Plan** – Hot commissioning of benzole plant.
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

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: EPR permits	Start: 2015 Expected end: 2016 Status: Complete	Source affected:	Industry including heat and power production	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. **Update** – **Completed.**
				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: EPR permits	Start: 2015 Expected end: 2018 Status: Planning	Source affected:	Industry including heat and power production	Semi-auto system to be trialled and results of trial ongoing. Can only be fully automated with PLC controls, which is not possible at this time. Auto levelling function created and awaiting implementation of machine alignment completion. Semi auto facility is available if required. **2017 Plan** - Review once cross battery interlock work has been completed.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Appleby Coke Ovens 18	New venting lids; 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.	Permit systems and economic instruments: EPR permits	Start: 2013 Expected end: 2013 Status: Complete	Source affected:	Industry including heat and power production	COMPLETED.
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Appleby Coke Ovens 19	Primary cooler replacement; When primary coolers are not effective, the pressure of the by-products plant is increased and this is translated to the batteries and door / tops leakage.	Permit systems and economic instruments: EPR permits	Start: 2013 Expected end: 2017 Status: Implementation	Source affected:	Industry including heat and power production	All coolers have been replaced in recent years on the by-product plants. No. 1 Primary cooler commissioned 2015. Part of new recovery plan stream 2 taken offline Dec 2015 to allow replacement of 6 & 8 primary cooler. 6 & 8 primary cooler replaced in 2016 and capital requested for replacement of no. 7 primary cooler **2017 Plan** – Replace and commission No 7 primary cooler.
				Spatial scale:	Local	
				Cost:	Operator information	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

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 engaged an external company.	Permit systems and economic instruments: EPR permits	Start: 2013 Expected end: Ongoing Status: Implementation	Source affected:	Industry including heat and power production	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 monthly. Extra resource allocated as part of new recovery plan. **2016 / 2017 Update** – Extra resource within day team including engineering. Heating is part of daily management and meeting reviews held.
				Spatial scale:	Local	
				Cost:	Not available	
				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	Dawes Lane Coke Ovens closed 8 March 2016
				Spatial scale:	Local	
				Cost:		
				Indicator:		
				Target emissions reduction:		