



Department
for Environment
Food & Rural Affairs

Report on measures for 2021 exceedance of the Target Value for Nickel in Yorkshire and Humberside non- agglomeration zone (UK0034)

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Any enquiries regarding this publication should be sent to us at

Air Quality and Industrial Emissions
Department for Environment, Food and Rural Affairs
Ground Floor, Seacole Building
2 Marsham Street
London, SW1P 4DF

Email: air.quality@defra.gov.uk

With technical input from Ricardo

www.gov.uk/defra

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1. Introduction

1.1 Context

Under the Air Quality Standards Regulations 2010¹, the target value (TV) for nickel (Ni) is an annual mean concentration of 20 nanograms (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. Nickel emissions have reduced 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 2021 for the UK, data shows that there is a continuing, downward trend in emissions of Ni, which is reflected by ambient-air measurements both nationally and locally (see Table 2 of this report).

Exceedance of the TV was previously reported in the Yorkshire and Humberside zone in 2018, 2019 and 2020 and additionally in the Sheffield Urban Area in 2014, 2016, 2018, 2019 and 2020. Reports on measures detailing the exceedance and the measures in place were published in 2018, 2019 and 2020 for the Yorkshire and Humberside zone and in 2014, 2016, 2018, 2019 and 2020 for the Sheffield Urban Area.² The reports for the Sheffield Urban Area, relate to the same sources as in the reports for Yorkshire and Humberside.

This document reports the progress in reducing emissions, together with exceedances for 2021 for the Yorkshire and Humberside zone, reflecting the more recent assessment and updating the 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 Ni within the Yorkshire and Humberside non-agglomeration zone identified within the 2021 UK air

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

² <https://uk-air.defra.gov.uk/library/bap-nickel-measures>

quality assessment. Exceedances within this zone were identified on the basis of model data. Model results on a 1 km x 1 km grid resolution provided supplementary information for the air quality assessment. The model results are based on fine scale modelling on a 50 m x 50 m grid resolution located around an identified industrial source. This exceedance was reported via e-Reporting dataflow G³ on attainment for the compliance assessment in 2021 and Air Pollution in the UK⁴.

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 Ni target value in 2021 and associated resident population for exceeding areas within Yorkshire and Humberside non-agglomeration zone UK0034.

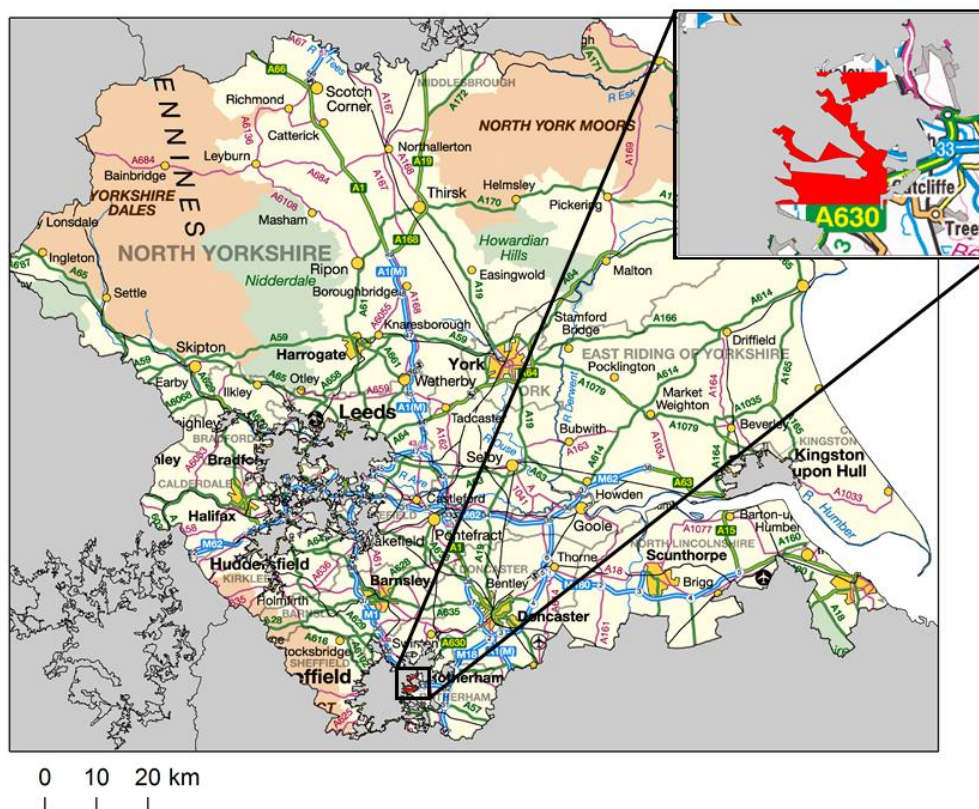
Zone code	Zone Name	Area exceeding TV (km ²)	Population exceeding TV
UK00034	Yorkshire and Humberside	3	2154

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

³ <https://uk-air.defra.gov.uk/data/compliance-xml-files>

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

Figure 1. Location of exceedance of the Ni target value in 2021 in Yorkshire and Humberside non-agglomeration zone UK00034. Areas of the zone in exceeding grid squares are marked in red.



An initial source apportionment was carried out and this analysis identified one exceedance situation within this zone related to industrial emissions:

- Yorkshire and Humberside [Ni_UK0034_2021_1] related to industrial emissions (area of exceedance: 3 km²)

This report describes the exceedance situation in the zone. The sections below include a description of the exceedance situation, including maps, information on source apportionment and a list of measures already taken, ongoing or to be taken.

2 Exceedance situation Yorkshire and Humberside [Ni_UK0034_2021_1] related to industrial emissions

2.1 Description of exceedance

This exceedance situation has an area of exceedance of 3 km² and is located in the valley of the river Don to the Northeast of Sheffield City Centre in the Yorkshire and Humberside non-agglomeration zone. The exceedance was reported on the basis of model data. There is a population of 2154 associated with this exceedance situation. This exceedance situation is adjacent to and shares common sources with the exceedance situation for Sheffield [Ni_UK0007_2021_1].

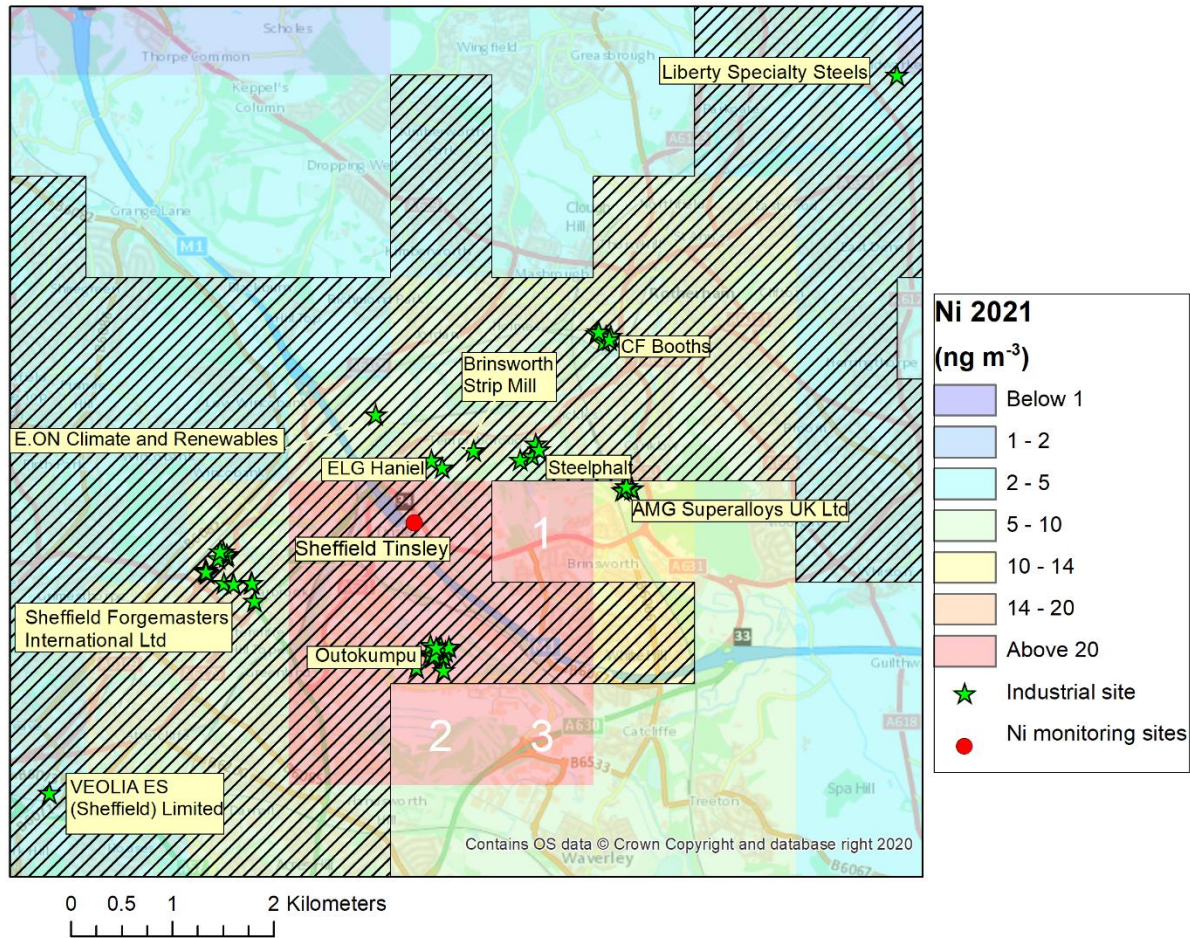
Table 2 lists measured annual mean concentrations of Ni from monitoring sites in the Yorkshire and Humberside non-agglomeration zone from 2004-2022. There are two monitoring station in the Yorkshire and Humberside non-agglomeration zone, Scunthorpe Town (GB0841A) located towards the north of the zone (490338, 410836) approximately 54 km from the modelled exceedance situation for Yorkshire and Humberside [Ni_UK0034_2021_1] and Scunthorpe Low Santon (GB1004A) located towards the north of the zone (492936, 411943) approximately 57 km from the modelled exceedance situation for Yorkshire and Humberside [Ni_UK0034_2021_1]. No exceedances of the Ni TV were measured at these monitoring sites in 2021 or in previous years.

Figure 2 shows the exceedance situation Ni_UK0034_2021_1 in detail. The figure indicates the location of the modelled exceedances. The figure presents the results of national modelling on a 1 km x 1 km grid resolution that were produced for the supplementary assessment for the compliance assessment. Zone boundaries for the 1 km model grid used to assign exceedance situations and associated populations are presented as black hatching for the Sheffield Urban Area zone and not hatched for the Yorkshire and Humberside zone. Figure 2 shows the location of several industrial sites located close to the exceedance situation.

Table 2. Measured annual mean Ni concentrations in the Yorkshire and Humberside zone UK0034 from 2004 to 2022 (ngm⁻³). Percentage data capture is shown in parentheses.

Station (Eol code)	Zone	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Scunthorpe Town (GB0841A)	UK0034					1.61 (91)	0.84 (96)	0.82 (98)	1.41 (100)	1.12 (92)	1.26 (96)	1.36 (95)	1.13 (98)	0.94 (98)	0.88 (97)	1.18 (95)	1.08 (99)	0.80 (96)	0.9 (100)	0.9 (100)
Scunthorpe Low Santon (GB1004A)	UK0034					1.18 (80)	1.27 (96)	1.01 (100)	1.58 (98)	1.25 (92)	1.65 (90)	1.68 (93)	1.51 (97)	1.27 (99)	1.23 (96)	1.26 (98)	1.27 (100)	1.20 (100)	1.2 (100)	1.4 (98)

Figure 2. Exceedance situation in Yorkshire and Humberside [Ni_UK0034_2021_1]. The Sheffield Tinsley monitoring station is marked in red. Locations of local industrial sites are also shown. Non-hatched grid squares are assigned to the Yorkshire and Humberside zone UK0034. Note that multiple emissions sources are indicated on the map for some industrial sites (Outokumpu, Sheffield Forgemasters International Ltd, AMG Superalloys UK Ltd, E.L.G. Haniel Metals Limited, Harsco Metals Group Limited (Steelphalt), and CF Booths Limited).



2.2 Source apportionment

Modelling has been used to determine the annual mean Ni source apportionment for the exceedance situation. National modelling on a 1 km x 1 km grid resolution apportions the Ni concentration to regional and urban background sources. Additional fine scale modelling has also been carried out in support of this Report on Measures to characterise local industrial emissions, this is described in Appendix A1 of the 2021 Report on Measures for the Sheffield Urban Area.

Table 3 provides a breakdown of the main emission sources (source apportionment) that have contributed to the grid squares of the modelled exceedances. The penultimate column is the total concentration from all emissions sources. The total concentrations are presented rounded to integers for consistency with the values reported in the compliance assessment. The values in the other columns have been rounded to two decimal places. The other shaded columns are the subtotals for the regional, urban background and local contributions.

Table 3 identifies that local emissions from industrial sources are the most significant source of Ni. Table 4 shows that the Outokumpu site is the most significant local industrial emissions source for this exceedance situation.

Table 3. Source apportionment for exceedance situation Ni_UK00034_2021_1. Annual mean Ni 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 emissions sources (a+b+c)	Resident population
1	441500	390500	34	0.44	1.07	0.16	0.62	0.18	0.00	0.09	0.02	20.30	20.30	22	2035
2	440500	388500	34	0.45	0.90	0.15	0.48	0.17	0.00	0.09	0.02	32.79	32.79	34	0
3	441500	388500	34	0.49	0.86	0.19	0.42	0.16	0.00	0.07	0.02	24.19	24.19	26	118

Table 4. Detailed source apportionment for industrial sources only for exceedance situation Yorkshire and Humberside [Ni_UK00034_2021_1]. Annual mean Ni concentration (ngm⁻³).

Grid Square Number	OS easting (m)	OS Northing (m)	Zone	Outokumpu	Local increment: Industry including heat and power production
1	441500	390500	34	20.30	20.30
2	440500	388500	34	32.79	32.79
3	441500	388500	34	24.19	24.19

2.3 Measures

Improving air quality is a high priority for the Government, that published the Clean Air Strategy in January 2019, which sets out new and ambitious goals. An exceedance in this zone was reported in 2014, 2016, 2018, 2019 and in 2020, but not in other years since the TV came into force, including 2017. The Government takes any exceedance seriously whilst ensuring that any measures put in place are proportionate to the exceedance. The Government has brought together the regulators and local industrial operators with emissions of Ni to air in pursuit of this aim. Meetings have enabled:

- the Government to communicate to the industrial regulators and operators the extent of the issue and the seriousness with which it is taken;
- the regulators to demonstrate that the operators are applying all cost-effective measures, and in particular are applying best available techniques as required by The Environmental Permitting Regulations (England & Wales), which aim to prevent or minimise pollution by placing stringent limits on emissions from industrial sources.
- the operators to cooperate and share best practice in managing their operations; and
- the development of the latest evidence in understanding the predominant sources.

The Report on Measures for Sheffield [UK0007, Appendix 1] details work thus far undertaken has included fine scale modelling to model the impact of known emissions to the measurements at Tinsley Monitoring Station.

The Report on Measures for Sheffield [UK0007, Section 2.3] summarises measures taken or to be taken at local industrial sites identified that may contribute to nickel in ambient air.

In the future, the regulator will continue to engage with local operators to minimise nickel emissions. It is planned to hold regular inspection visits to verify that the above measures remain implemented. Efficiency of the already implemented measures will be reviewed on a regular basis and opportunities for further improvements will be discussed.

In addition to the measures listed in the Report on Measures for Sheffield [UK0007, Section 2.3], the regulator has recently focused in identifying additional fugitive nickel sources in the area. This primarily includes scrapyards that process stainless steel scrap using cutting and burning techniques. Newly identified sites will be visited in the coming months, and improvement measures identified. There was a change of ownership of the Outokumpu site and this has now been rebranded Marcegaglia, this was completed in early 2023.