



Department
for Environment
Food & Rural Affairs

Report on measures for 2022 exceedance of the Target Value for Nickel in South Wales non-agglomeration zone (UK0041)

December 2024



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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 (a nanogram is one billionth of a gram (10^{-9})) per cubic metre (m^{-3}) of ambient air or lower. The regulation requires the UK to report on measures in place to address the exceedance of the TV and that all reasonable measures that do not entail disproportionate cost should be taken to ensure this target is not exceeded.

Exceedance of the TV was reported in 2013 - 2021 in the South Wales zone and a report on measures was published detailing the exceedance and the measures in place².

This document reports the exceedance situation for 2022 reflecting the more recent assessment and updating the 2013 - 2021 report on measures.

1.2 Status of zone

This is the report on measures required for exceedances of the TV for Ni within the South Wales non-agglomeration zone identified within the 2022 UK air 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 assessment in addition to the results from fixed monitoring stations. Fine scale modelling on a 20 m x 20 m grid resolution located around an identified industrial source provided a more detailed local assessment. This exceedance was reported via e-Reporting dataflow G³ on attainment for the compliance assessment in 2022 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.

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>

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

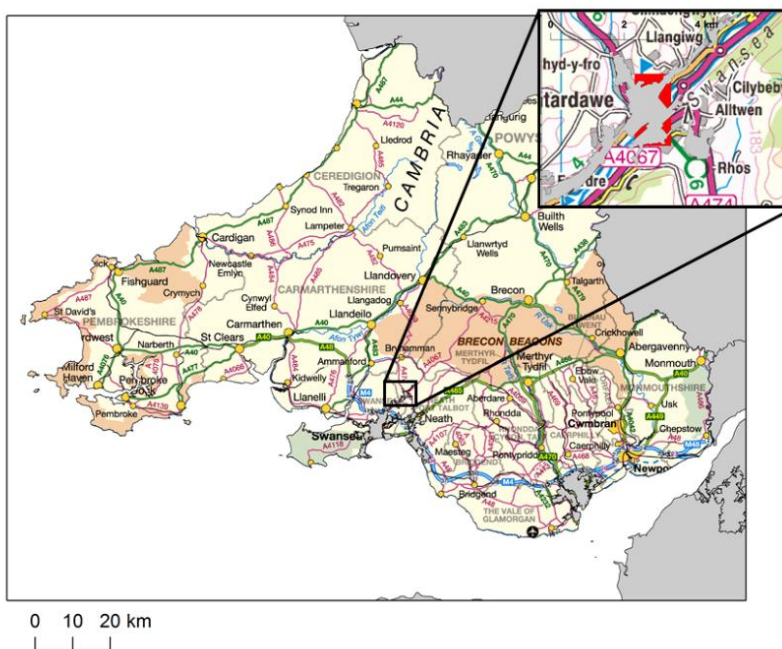
⁴ <https://uk-air.defra.gov.uk/library/annualreport/index>

Table 1. Area exceeding Ni target value in 2022 and associated resident population for exceeding areas within South Wales non-agglomeration zone UK0041

Zone code	Zone Name	Area exceeding TV (km ²)	Population exceeding TV
UK0041	South Wales	1	1,817

Figure 1 shows the locations of the exceedances in the context of the zone.

Figure 1. Location of exceedance of the Ni target value during 2022 in South Wales non-agglomeration zone UK0041. Areas of the zone in exceeding grid squares are marked red.



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

- South Wales [Ni_UK0041_2022_1] related to industrial emissions (area of exceedance: 1 km²)

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

2 Exceedance situation South Wales [Ni_UK0041_2022_1] related to industrial emissions

2.1 Description of exceedance

This exceedance situation has an area of exceedance of 1 km² and is located in the Swansea valley within the South Wales non-agglomeration zone. The resident population associated with this exceedance situation is 1,817.

Table 2 lists measured annual mean concentrations of Ni from the monitoring site in South Wales non-agglomeration zone from 2004 to 2023. There is one monitoring station in the South Wales non-agglomeration zone, Cwmystwyth (GB08544A) located towards the north of the zone (277138, 274242) approximately 70 km from the modelled exceedance situation for South Wales [Ni_UK0041_2022_1]. No exceedance of the Ni TV was measured at this monitoring site in 2022 or in previous years.

The exceedance situation for South Wales [Ni_UK0041_2022_1] is located adjacent to Swansea Urban Area agglomeration zone. Table 3 presents measured annual mean concentrations of Ni from monitoring sites in Swansea Urban Area agglomerations zone. The locations of the monitoring sites are shown in Figure 2. These sites are located closer to the exceedance situation than the Cwmystwyth site in the South Wales zone. There were no measured exceedance in the Swansea Urban Area agglomeration zone in 2022.

Figure 3 shows the location of the exceedance situation in detail. This map also shows the locations of the monitoring sites in the vicinity of the exceedance situation and the locations of local industrial sources. The map shows that Pontardawe Tawe Terrace is located closest to the exceedance situation for South Wales [Ni_UK0041_2022_1].

Figure 3 shows the high-resolution zone boundary used to assign the locations of monitoring sites in grey and the zone boundaries for the 1 km grid used to assign exceedance situations and associated populations as black hatching. The local topography and locations of settlements results in the Swansea Urban Area Agglomeration zone extending up the Swansea Valley but only the larger urban areas are assigned to the agglomeration zone within the 1 km gridded data.

Detailed dispersion modelling has been undertaken for this exceedance. This includes detailed modelling of Ni emissions from the Wall Colmonoy site, an

industrial source located close to the Pontardawe Tawe Terrace monitoring site (see Figure 2). The modelling has been used to assess the likely spatial scale of the exceedance. The conclusions from this dispersion modelling study were that it is likely there was an exceedance of Ni TV in only the South Wales zone in 2022 and this exceedance was likely to have included an area with clear public access (the Pontardawe Recreation Ground) and represents a 1 km x 1 km grid square with resident population.

Additional modelling of the process contribution was conducted by Ricardo as part of a full review of Wall Colmonoy's permit. This modelling predicted concentrations above the Ni TV of 20 ng/m³ at sensitive locations using both Sennybridge and Pontardawe Leisure Centre meteorological data. The modelling report investigated the nickel levels that would result if process emissions were all at the Emission Limit Value for the entire year and concentrations were predicted to be above the nickel Ni TV for all receptors except Frondeg SSSI and Crymlyn Bog SAC. However, after undertaking a site visit at Wall Colmonoy and a review of the processes, Ricardo have concluded that based on the normal operation of the process this scenario is highly unlikely and should be considered a worst-case scenario. The comparison between modelled and monitored concentrations showed that the model predictions in this study typically overestimated nickel concentrations in air and are therefore conservative in nature.

Table 2. Measured annual mean Ni concentrations in South Wales non-agglomeration zone UK0041 from 2006 to 2023 (ngm⁻³). (Percentage data capture is shown in brackets).

Station (Eol code)	Zone	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Cwmystwyth (GB0854A)	UK0041	0.56 (100)	0.31 (89)	0.46 (87)	0.46 (2)	0.49 (72)	0.39 (89)	0.33 (48)	0.37 (80)	0.48 (98)	0.56 (100)	0.42 (100)	0.38 (96)	0.39 (100)	0.32 (100)	0.20 (100)	0.20 (100)	0.30 (99)	0.20 (89)

Table 3. Measured annual mean Ni concentrations in Swansea Urban Area agglomeration zone UK0027 from 2004 to 2023 (ngm⁻³). (Percentage data capture is shown in brackets).

Station (Eol code)	Zone	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Pontardawe Brecon Road	UK0027								6.5 (37)	6.6 (94)	5.7 (98)	8.1 (96)	9.2 (97)	4.8 (100)	4.5 (94)	6.2 (98)	5.6 (98)	4.5 (97)	6.3 (98)	3.3 (92)	2.2 (94)
Pontardawe Tawe Terrace	UK0027								28 (93)	30 (98)	37 (98)	43 (100)	28 (100)	47 (97)	19 (95)	57 (100)	35 (100)	23 (96)	25 (99)	17 (96)	12 (99)
Port Talbot Margam	UK0027					2 (98)	1.4 (92)	1.5 (100)	1.7 (97)	1.4 (99)	1.5 (100)	1.7 (100)	4.1 (100)	2.4 (98)	1.4 (100)	1.6 (100)	1.1 (98)	1.1 (98)	1.1 (99)	1.1 (94)	1.1 (99)

Swansea	UK0027	34 (96)	20 (97)	26 (97)	28 (64)																
Swansea Coedgwilym	UK0027					20 (100)	16 (96)	10 (98)	11 (92)	8.5 (84)	7.8 (100)	12 (100)	13 (100)	10 (100)	8.5 (98)	12 (100)	14 (95)	8.3 (91)	11 (91)	8.1 (79)	6.7 (98)
Swansea Morrison	UK0027					7.6 (87)	9.3 (98)	15 (98)	8.2 (95)	5.6 (98)	6.5 (100)	9.4 (100)	7.4 (94)	5.9 (93)	5.8 (86)	8.6 (100)	10 (100)	6.8 (100)	10 (100)	10 (96)	5.3 (100)
Pontardawe Leisure Centre*	UK0027	76	47	74	70	43	29	8.5	15	14	12	22	15	22	10 (78)	20 (99)	16 (98)	9.5 (99)	9.0 (90)	8.0 (54)	4.8 (96)

* Pontardawe Leisure Centre is a Local Authority monitoring site. It is included here as the site was operated continuously between 2004 and 2023. Data capture statistics were not available for this site before 2017.

Figure 2. Location of monitoring sites in Swansea Urban Area

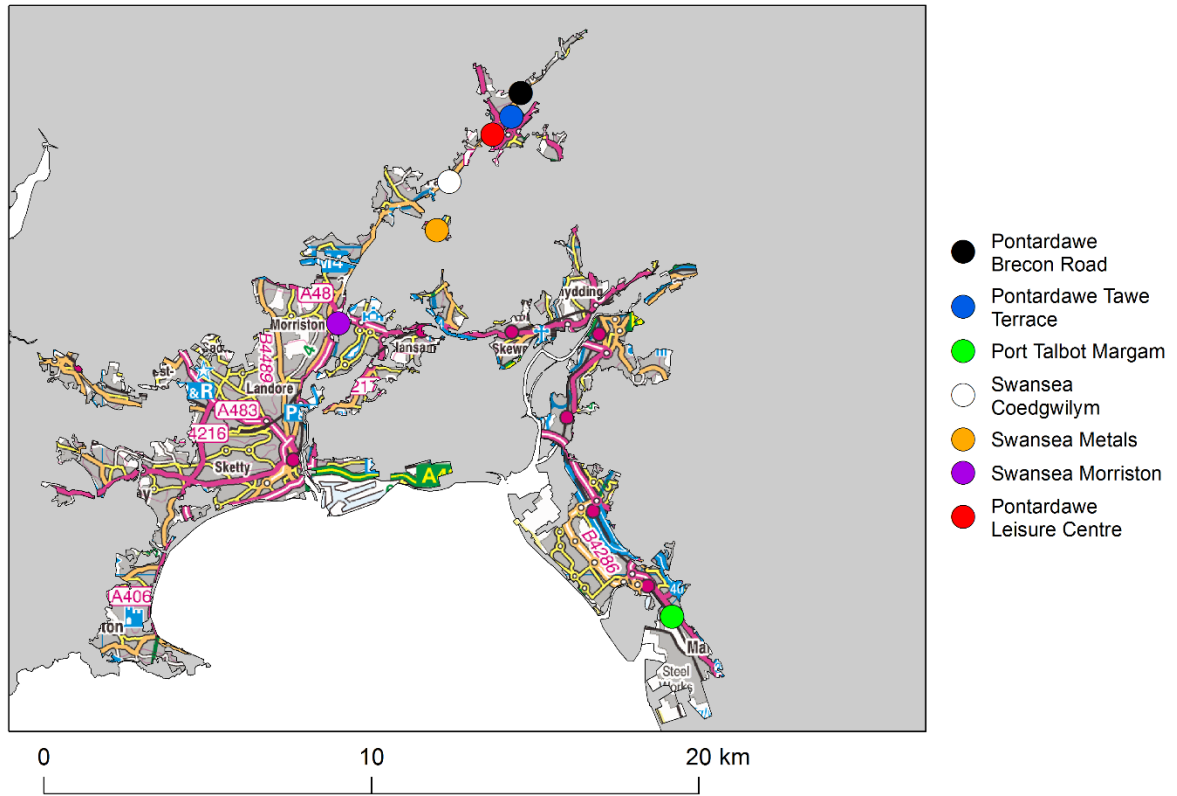
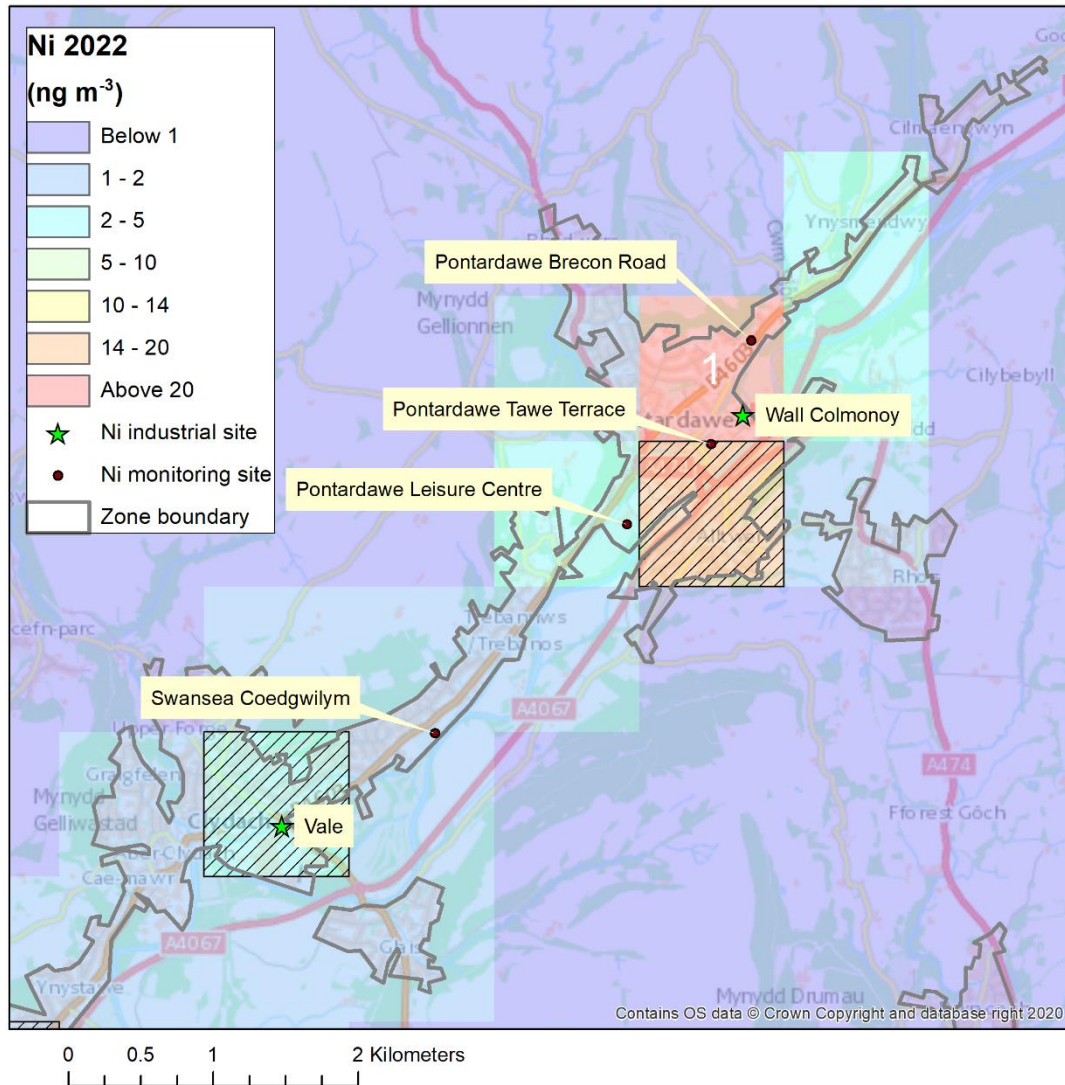


Figure 3. Exceedance situation South Wales [Ni_UK0041_2022_1]. Exceeding grid squares are marked red. Locations of local industrial sites Wall Colmonoy works at Pontardawe and Vale Europe Ltd Clydach refinery and the locations of local monitoring stations are also shown. Hatched grid squares are assigned to Swansea Urban Area agglomeration zone UK0027 and do not form part of this exceedance situation.



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 background sources. Additional fine scale modelling has also been carried out to characterise the impact of local industrial emissions for the Wall

Colmonoy site located in the vicinity of the exceedance situation, this is described in Appendix 1.

Table 4 provides a breakdown of the main emission sources (source apportionment) that have contributed to the grid square in this exceedance situation. It is clear that industrial sources are the main source associated with this exceedance situation. The penultimate column in the table is the total from all emissions sources. The values in this column have been rounded to integers for consistency with the values 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 for the industry sector and shows that the main source associated with this exceedance situation are industrial emissions attributed to stack emissions from Wall Colmonoy. The emissions from Wall Colmonoy are regulated by the Neath Port Talbot County Borough Council and measures undertaken (see Section 2.3) describe how these stack emissions have changed recently.

In previous years, the Welsh Government have commissioned supplementary monitoring studies to improve the confidence in the source apportionment and identification of the predominant Ni sources. The sampling frequency at the Pontardawe Tawe Terrace measurement site was increased from weekly to daily sampling between August 2015 and February 2016. A subsequent study by King's College London measured the concentration of Nickel and other metals at hourly time resolution during November and December 2015. Both assessments looked at the relationship between local meteorological data, the levels of Ni compared with other metals and industrial activity to help identify Ni sources. Both studies indicated that Wall Colmonoy was a significant source of Ni at the Tawe Terrace monitoring station, although acknowledged that other sources were present. Details of both studies were provided in Appendix A1.2 of the 2015 Report on Measures for Swansea Urban Area.⁵

⁵https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/ni_swansea_UK0027_reportonmeasures_2015.pdf

Table 4. Source apportionment for exceedance situation Ni_UK0041_2022_1. Annual mean Ni concentration (ngm⁻³).

OS easting (m)	OS Northing (m)	Zone	Regional background: Total	Regional background: From within Member State	Urban background increment: Total	Urban background increment: Traffic	Urban background increment: Industry including heat and power production	Urban background increment: commercial and residential	Urban background increment: Shipping	Urban background increment: Off road mobile machinery	Urban background increment: Other	Local increment: Total	Local increment: Industry including heat and power production	Total for all emission sources	Resident population
272500	204500	41	0.30	0.30	0.65	0.13	0.23	0.24	0.00	0.04	0.00	28.43	28.43	29	1817

Table 5. Detailed source apportionment for industrial sources only for exceedance situation Ni_UK0041_2022_1. Annual mean Ni concentration (ngm⁻³)

OS easting (m)	OS Northing (m)	Grid square number	Zone	Wall Colmonoy stack emissions	Local increment: Industry including heat and power production	Total for all emission sources
272500	204500	1	41	28.43		28.43

2.3 Measures

Improving air quality is a high priority for the Welsh Government. The Clean Air Plan for Wales, published in August 2020, sets out the ambition to deliver compliance with the Target Value as soon as practicable. The Welsh Government brings together the regulators and local industrial operators with emissions of Ni to air through a ‘Nickel in the Air’ group in pursuit of this aim. Regular meetings have enabled: the Welsh 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) 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.

Table 6 presents measures that have been taken and are to be taken at the Wall Colmonoy and Vale industrial sites and the remainder of this section describes action taken at the industrial sites during 2019. Given the level of uncertainty and the cause and spatial extent of this local exceedance, the Welsh Government has undertaken further modelling studies to help identify the predominant sources (more information is provided at the end of this report).

Vale

A comparison between the reported annual Ni emissions from Vale works in Table 7 and annual Ni concentrations recorded at local monitoring sites in Table 2 shows a positive correlation. This is between the timing of reductions of reported emissions at Vale site and the trend in measured annual mean Ni concentrations at the long running Pontardawe Leisure Centre site – although an increase was seen at this site

in 2014. The timing of the large drop in measured concentrations at this site between 2007 and 2010 coincides with the large reduction in reported stack emissions from the Vale works. More recently, trends in the measured annual mean Ni concentrations at the Pontardawe Leisure Centre site have correlated less well with the reported annual Ni emissions from Vale. Table 7 shows that emissions from Vale have been relatively stable since 2011. Emissions were elevated in 2015 compared to recent previous years but decreased in 2016 back to levels similar to other years since 2011. The emissions further decrease in 2017 and continue to decrease in 2018. In 2019 the emissions remained similar to recent years.

The regulator for the Vale site, Natural Resources Wales, has assessed measures already taken by Vale constitute BAT for the industrial site. There is no evidence to suggest the emissions from this source are a significant contributor to the high results seen at some monitoring stations throughout 2019. Natural Resources Wales will work with Vale to ensure continual improvements are made to the operations and to minimise emissions. However, no additional measures are proposed at this time. The measures reported in Table 6 are unchanged from those reported in the Report on Measures for 2016 exceedance of the Target Value for Nickel in Swansea Urban Area agglomeration zone⁶.

Vale have continued with environmental improvements by reducing water consumption on the installation and minimising effluent loads into the River Tawe. The reduced canal water consumption has also improved process control in relation to cooling and temperature control on the furnaces. On site processes are also utilising closed loop cooling systems to minimise water consumption and improving energy efficiency. This is a major change to the cooling systems on the facility and has incorporated a wider programme across the plant following the initial installation.

The reduced effluent volume has improved effluent efficiency of the treatment and results in 50% reduction in final discharge volumes. The changes to the closed loop cooling has also reduced the reduce nickel discharges into the River Tawe, improving water quality. This in turn will also minimise potential nickel in the river bed and any potential re suspension.

The ongoing changes at the Vale installation has resulted in the closure of further air release points by introducing HEPA filtration. The mass volume releases of nickel from the installation are continuing to reduce. NRW have reviewed the process emissions from the installation looking at the mass release figures which are reducing based on continual improvements for both fixed release points and fugitive sources. This work also involved a modelling assessment of the current emission

⁶https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/ni_swansea_UK0027_reportonmeasures_2016.pdf

source profiles in comparison to a historical modelling report. This work will be shared with operator and wider Nickel in Air group in 2025.

Wall Colmonoy

The regulator for the Wall Colmonoy site, Neath Port Talbot County Borough Council, has assessed the measures taken at the Wall Colmonoy site also constitute BAT. Neath Port Talbot are conducting a full review of Wall Colmonoy's permit which includes an assessment of the full process to ensure it is BAT compliant. Modelling of the process contribution from all release points based on current Emission Limit Values to determine maximum concentration at Tawe Terrace and finally an update of the Environmental Permit to reflect the outcomes of the review. The recommendations from the complete review have been fully considered by the Local Authority and relevant recommendations have been included in a draft updated permit which is currently being agreed internally and will then be issued to the operator for comment. Although this is unlikely to be completed by the end of 2024 the Local Authority hopes to complete the summer of 2025. The operator has already started to implement some of the proposed new actions which appears to be having a positive impact on offsite ambient nickel concentrations.

Table 8 shows reported annual emissions for the Wall Colmonoy site decreased from 120.09 kg yr⁻¹ in 2019 to 10.39 kg yr⁻¹ in 2020. Estimates of annual stack emissions are based on an annual stack test result, which is a snapshot of emissions and is dependent on the relative Ni content of the specific products that are being made or processed and the operation of the emission abatement equipment at the time of the emissions test.

The measured annual mean concentrations of Ni at Pontardawe Tawe Terrace site (the monitoring site nearest to the Wall Colmonoy site) decreased between 2019 and 2020. A comparison between reported annual Ni emissions from Wall Colmonoy site in Table 8 and Ni concentrations at local monitoring sites shows some correlation between the reported emissions from the Wall Colmonoy site and measured annual mean Ni concentrations at Pontardawe Tawe Terrace. In 2018, two issues were recorded by the regulator and site operator to understand and rectify the increase in emissions during 2018. These are detailed in a previous report on measures.⁷

⁷https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/ni_swanseas_UK0027_reportonmeasures_2019.pdf

Table 6. Table of measures taken or to be taken at Wall Colmonoy and Vale industrial sites.

Measure code	Measure Description	Classification	Implementation dates	Other information		Comment
Wall Colmonoy_1	Water wash cyclone (Aqualine) filtration for casting foundry	Permit systems and economic instruments: Other measure	Start: 2010	Source affected:	Industry including heat and power production	Regulator (Neath Port Talbot County Borough Council) have assessed that this system meets BAT. This measure is complete.
			Expected end: 2010			
			Status: Complete	Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Nickel concentration in emissions test: October 2014 results of 0.01 mgm ⁻³ against limit specific in environmental permit of 15 mgm ⁻³	
	Target emissions reduction:	Not available				
Wall	New local	Permit systems	Start: 2014	Source affected:	Industry including	This measure is complete.

Colmonoy_2	exhaust ventilation system and filter unit installed in the powders section	and economic instruments: Other measure	Expected end: 2014		heat and power production	
			Status: Complete	Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Wall Colmonoy_3	Deep clean of powders section	Permit systems and economic instruments: Other measure	Start: 2014	Source affected:	Industry including heat and power production	This measure is complete.
			Expected end: 2014			
			Status: Complete	Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
	Target emissions	Not available				

				reduction:			
Wall Colmonoy_4	Install new centralised vacuum system in powders section	Permit systems and economic instruments: Other measure	Start: 2014	Source affected: Industry including heat and power production	Industry including heat and power production	This measure is complete.	
			Expected end: 2015				
			Status: Complete				Spatial scale: Local
			Cost: Not available				
			Indicator: Not available				
Target emissions reduction: Not available							
Wall Colmonoy_5	New Local Exhaust Ventilation (LEV) and filter in fettling section	Permit systems and economic instruments: Other measure	Start: 2014	Source affected: Industry including heat and power production	Industry including heat and power production	This measure is complete.	
			Expected end: 2014				
			Status: Complete				Spatial scale: Local
			Cost: Not available				
Indicator: Not available							

				Target emissions reduction:	Not available		
Wall Colmonoy_6	Deep clean of atomising section	Permit systems and economic instruments: Other measure	Start: 2014	Source affected:	Industry including heat and power production	This measure is complete.	
			Expected end: 2014				
			Status: Complete	Spatial scale:			Local
				Cost:			Not available
				Indicator:			Not available
	Target emissions reduction:	Not available					
Wall Colmonoy_7	Flap curtains installed between the powder room and driers to minimise escape of dust	Permit systems and economic instruments: Other measure	Start: 2014	Source affected:	Industry including heat and power production	This measure is complete.	
			Expected end: 2014				
			Status: Complete	Spatial scale:	Local		

	from powder room			Cost:	Not available		
				Indicator:	Not available		
				Target emissions reduction:	Not available		
Wall Colmonoy_8	Nutating inlets (containment at transfer points) fitted on lockers (screens) 7 & 8	Permit systems and economic instruments: Other measure	Start:	2014	Source affected:	Industry including heat and power production	
			Expected end:	2015			
			Status:	Complete	Spatial scale:		Local
					Cost:		Not available
					Indicator:		Not available
					Target emissions reduction:		Not available
Wall Colmonoy_9	New enclosure and Local Exhaust	Permit systems and economic instruments:	Start:	2014	Source affected:	Industry including heat and power production	
			Expected	2014		This measure is complete.	

	Ventilation (LEV) filter on blenders dispense into sieve	Other measure	end: Status: Complete			
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Wall Colmonoy_10	Lip extraction fitted to furnaces feeding atomising (powder manufacture) Tower 4	Permit systems and economic instruments: Other measure	Start: 2014 Expected end: 2014 Status: Complete	Source affected:	Industry including heat and power production	This measure is complete.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Wall Colmonoy_11	Dalamatric filter system upgraded with bags to same specification as Vale A1 site	Permit systems and economic instruments: Other measure	Start:	2014	Source affected:	Industry including heat and power production	This measure is complete.
			Expected end:	2014			
			Status:	Complete	Spatial scale:	Local	
			Cost:		Cost:	Not available	
			Indicator:		Indicator:	Nickel concentration in emissions test. November 2014 results of 0.01 mgm ⁻³ against limit specific in environmental permit of 15 mgm ⁻³	
Target emissions reduction:		Target emissions reduction:	Not available				
Wall Colmonoy_12	Russell sieve enclosed with curtains	Permit systems and economic instruments: Other measure	Start:	2014	Source affected:	Industry including heat and power production	This measure is complete.
			Expected end:	2014			
			Status:	Complete	Spatial scale:	Local	

				Cost:	Not available		
				Indicator:	Not available		
				Target emissions reduction:	Not available		
Wall Colmonoy_13	Cut off saw bag filters installed	Permit systems and economic instruments: Other measure	Start:	2012	Source affected:	Industry including heat and power production	
			Expected end:	2014			
			Status:	Complete	Spatial scale:		Local
					Cost:		Not available
					Indicator:		Not available
					Target emissions reduction:		Not available
Wall Colmonoy_14	Cyclone followed by bag filter (Dalamatic)	Permit systems and economic instruments:	Start:	2014	Source affected:	Industry including heat and power production	
			Expected	2014			

	arrestment used in powder manufacturing (atomising)	Other measure	end: Status: Complete			
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Wall Colmonoy_15	High-efficiency particulate arrestance (HEPA) filters used on drier units where air is emitted to internal atmosphere	Permit systems and economic instruments: Other measure	Start: 2014 Expected end: 2014 Status: Complete	Source affected:	Industry including heat and power production	This measure is complete.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	

Wall Colmonoy_16	Workplace nickel monitoring to take place to identify hot spots.	Permit systems and economic instruments: Other measure	Start:	2015	Source affected:	Industry including heat and power production	Results from this monitoring will be used to identify and prioritise future improvements. A new tranche of monitoring started in Sep 2017
			Expected end:	2018			
			Status:	Implementation	Spatial scale:	Local	
			Cost:	Not available	Indicator:	Not available	
			Target emissions reduction:	Not available			
Wall Colmonoy_17	Ambient (external) monitoring is to take place to help identify any hot spots	Permit systems and economic instruments: Other measure	Start:	2015	Source affected:	Industry including heat and power production	Hourly monitoring study by King's College London in November/December 2015 is now complete. Monitoring by Wall Colmonoy and at Pontardawe Tawe Terrace is on-going.
			Expected end:	2018			
			Status:	Implementation	Spatial scale:	Local	

				Indicator:	Not available	
				Target emissions reduction:	Not available	
Wall Colmonoy_18	Modify hoods in castings 450kg furnaces. Only extract from two working furnaces instead of all four	Permit systems and economic instruments: Other measure	Start: 2015 Expected end: 2016 Status: Complete	Source affected:	Industry including heat and power production	This measure is complete.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Wall Colmonoy_19	Install water flow alarms on Aqualine filter system	Permit systems and economic instruments: Other measure	Start: 2015 Expected end: 2015	Source affected:	Industry including heat and power production	This measure is complete.

			Status: Complete	Spatial scale: Local		
				Cost: Not available		
				Indicator: Not available		
				Target emissions reduction: Not available		
Wall Colmonoy_20	Roll out of differential pressure gauges on all Local Exhaust Ventilation (LEVs) including those < 50m ³ /min	Permit systems and economic instruments: Other measure	Start: 2015 Expected end: 2015 Status: Complete	Source affected: Industry including heat and power production Spatial scale: Local Cost: Not available Indicator: Not available Target emissions reduction: Not available		This measure is complete.
Wall	Air drier pans	Permit systems	Start: 2015	Source affected: Industry including		This measure is complete.

Colmonoy_21	LEV to be improved	and economic instruments: Other measure	Expected end:	2016		heat and power production	
			Status:	Complete	Spatial scale:	Local	
			Cost:		Cost:	Not available	
			Indicator:		Indicator:	Not available	
			Target emissions reduction:		Target emissions reduction:	Not available	
Wall Colmonoy_22	Door closures for existing maintenance area	Permit systems and economic instruments: Other measure	Start:	2015	Source affected:	Industry including heat and power production	This measure is complete
			Expected end:	2015			
			Status:	Complete	Spatial scale:	Local	
			Cost:		Cost:	Not available	
			Indicator:		Indicator:	Not available	
		Target emissions		Target emissions	Not available		

				reduction:		
Wall Colmonoy_23	Improve powder decanting arrangements on Tower 4. Better extraction & LEV	Permit systems and economic instruments: Other measure	Start: 2015	Source affected:	Industry including heat and power production	This measure is complete
			Expected end: 2015	Spatial scale:	Local	
			Status: Complete	Cost:	Not available	
			Indicator:	Not available		
			Target emissions reduction:	Not available		
Wall Colmonoy_24	TD100 discharge under positive pressure. Can put strain on neoprene at transfer points	Permit systems and economic instruments: Other measure	Start: 2015	Source affected:	Industry including heat and power production	This measure is complete.
			Expected end: 2016	Spatial scale:	Local	
			Status: Complete	Cost:	Not available	
			Indicator:	Not available		

				Target emissions reduction:	Not available		
Wall Colmonoy_25	Enclose vibratory feeders	Permit systems and economic instruments: Other measure	Start: 2015	Source affected:	Industry including heat and power production	This measure is complete. This is also additionally addressed through a process design change in the feed.	
			Expected end: 2016				
			Status: Complete	Spatial scale:			Local
				Cost:			Not available
				Indicator:			Not available
	Target emissions reduction:	Not available					
Wall Colmonoy_26	DSB mill LEV solution to be established before installation. Although this is already within	Permit systems and economic instruments: Other measure	Start: 2015	Source affected:	Industry including heat and power production	This measure is complete.	
			Expected end: 2015				
			Status: Complete	Spatial scale:			Local

	an enclosed room			Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Wall Colmonoy_27	Waste from bag filters are collected in enclosed drums, which are sealed prior to disposal by licenced carrier. Dust collected by the Aqualine system is saturated with water and is placed in Intermediate Bulk Containers before disposal by registered waste carrier.	Permit systems and economic instruments: Other measure	Start: 2014 Expected end: 2014 Status: Complete	Source affected:	Industry including heat and power production	This measure is complete.
				Spatial scale:	Local	
				Cost:	Not available	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Vale_1	Installation of	Permit systems	Start: 2007	Source affected:	Industry including	This was the most significant

	stack filtration plant (bag house) to replace electrostatic precipitators	and economic instruments: IED permits	Expected end:	2007		heat and power production	measure for this source.
			Status:	Complete	Spatial scale:	Local	This measure is complete.
			Cost:		£1.8M		
			Indicator:		Monthly average particulate concentration from main stack reduced from ~10 mgm ⁻³ to less than 1 mgm ⁻³		
			Target emissions reduction:		3: Annual stack emission reduced from 2855 kg in 2007 to less than 100 kg by 2009, value in 2013 was 42 kg		
Vale_2	Undertook soil remediation on abandoned parcel of contaminated land to render contained nickel inert	Permit systems and economic instruments: IED permits	Start:	2011	Source affected:	Industry including heat and power production	This measure is complete.
Expected end:	2011						
Status:	Complete	Spatial scale:	Local				
Cost:		£90K					
Indicator:		Not available					
Target emissions reduction:		Not available					

Vale_3	Consolidated 3 emission points from Powder Plant Storage Hoppers into 1 emission point and installed HEPA filter at outlet	Permit systems and economic instruments: IED permits	Start:	2012	Source affected:	Industry including heat and power production	This measure is complete.
			Expected end:	2012			
			Status:	Complete	Spatial scale:	Local	
			Cost:		£100K		
			Indicator:		Not available		
		Target emissions reduction:		Not available			
Vale_4	Replaced cladding and added belt enclosure on feed conveyors	Permit systems and economic instruments: IED permits	Start:	2013	Source affected:	Industry including heat and power production	This measure is complete.
			Expected end:	2013			
			Status:	Complete	Spatial scale:	Local	
			Cost:		£600K		
			Indicator:		Not available		
		Target emissions reduction:		Not available			
Vale_5	Replaced all 1700 filter bags on the Stack Filtration Plant as part of planned	Permit systems and economic instruments: IED permits	Start:	2014	Source affected:	Industry including heat and power production	This measure is complete.
			Expected end:	2014			
		Status:	Complete	Spatial scale:	Local		

	preventative maintenance			Cost:	£160K	
				Indicator:	Not available	
				Target emissions reduction:	Not available	
Vale_6	Replacement of gas fired band dryer in effluent treatment plant with a vacuum dryer. Resulting in the removal of three emissions points and efficient drying.	Permit systems and economic instruments: IED permits	Start : 2015 Expected: 2017 Status: Complete	Source affected	Industry including heat and power production	This measure is complete.
				Spatial scale	Local	
				Cost:	£4 million	
				Indicator	Reduction in emission points	
				Target emissions reduction:	Not available	

Table 7. Reported annual Ni emissions to air from Vale works (kg year⁻¹).

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Stack	1934	763	1382	3154	2855	193	56	96	25	31	42	11	108	36	17.3	13.6	14.05	8.49	12.78	19.22
Other	54	280	31	12	116	93	45	16	11	29	37	12	38	19	0.74	1.61	6.38	5.84	5.22	14.29

Table 8. Reported annual stack emissions of Ni from Wall Colmonoy site (kg year⁻¹).

	2008	2009	2010 ^a	2011	2012	2013	2014	2015	2016	2017	2018 ^b	2019	2020	2021	2022
Stack	157.57	157.57	89.93	37.25	74.48	15.82	3.73	24.23	95.37	97.74	54.32	120.09	10.39	23.08	71.60

^a Abatement measures implemented mid-2010. Reported emissions assume 6 months emissions at 2009 levels and six months at post abatement emissions level of 22.29 kg year⁻¹.

^b four stack emissions were reported in 2018, a weighted average is presented here representing the days for which each stack emission was assumed. The stack emissions were 102.73 kg, 53.71 kg, 216.11 kg and 39.51 kg.

Appendix

A1 Assessment of industrial source

A1.1 Local scale modelling of the industrial point source

Detailed dispersion modelling has been undertaken using ADMS 5.2 for the area in South Wales where exceedances of the annual mean TV of 20 ng m⁻³ have been modelled in 2022. This fine-scale modelling has been used to assess the likely magnitude and spatial extent of exceedance. Modelling was carried out at a spatial resolution of 20 m x 20 m over an area of 3 km x 3 km centred on the industrial point source.

Information on the Ni emissions from the principal Ni point source were provided by the site operator. Annual Ni emissions were reported to be 71.60 kg year⁻¹ by the site operator. Emissions were released from thirteen emission points distributed across the site. Building effects were included in the model, and a 6 km x 6 km area was extracted from the OS Terrain 50 dataset to allow the effect of the topographical features of the valley to be included in the model. The height of the terrain was specified at the centre of each 50 m x 50 m grid square.

Table A1 compares measured annual mean Ni concentrations with modelled concentrations. The modelled concentrations include a component resulting from the local industrial point source in Pontardawe and a background component from the annual modelling Ni concentrations across the UK. The model reproduces the measured concentration at Pontardawe Leisure Centre and Pontardawe Brecon Road well. Agreement is also good at Pontardawe Tawe Terrace, for which the measured concentration was used to inform the modelling and thus good agreement is to be expected.

Figure A1 shows the modelled annual mean Ni concentration on a 20 m x 20 m grid resulting from the local industrial point source in Pontardawe and including a background component from the annual modelling of Ni concentrations across the UK. The Ni concentrations in Pontardawe were strongly influenced by the terrain in the area, as can be seen in Figure A1. The Swansea Valley runs south-west to north-east through the village of Pontardawe, where the point source is located. The distribution of the Ni concentrations in the vicinity of Pontardawe shows the channelling of the local wind flow by the Swansea Valley.

The conclusions from this dispersion modelling study are that Ni concentrations in only the South Wales zone in 2022 exceeded the Ni TV.

Table A1 – Comparison of annual mean measured and modelled Ni concentrations at Pontardawe Tawe Terrace, Pontardawe Leisure Centre and Pontardawe Brecon Road in 2022.

	Measured Ni (ng m ⁻³)	Modelled Ni (ng m ⁻³)
Pontardawe Tawe Terrace	17.1	17.1
Pontardawe Leisure Centre	8.0	5.6
Pontardawe Brecon Road	3.3	2.8

Figure A1: Modelled annual mean Ni concentration resulting from the local industrial point source in Pontardawe in 2022.

