



Department
for Environment
Food & Rural Affairs

Report on measures for 2021 exceedance of the Target Value for Nickel in Swansea Urban Area agglomeration zone (UK0027)

December 2023



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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, 2014, 2015, 2016, 2018, 2019 and 2020 in the Swansea Urban Area and a report on measures was published detailing the exceedance and the measures in place².

This document reports the exceedance situation for 2021 reflecting the more recent assessment and updating the 2013, 2014, 2015, 2016, 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 Swansea Urban Area agglomeration zone identified within the 2021 UK air quality assessment. Exceedances within this zone were identified on the basis of measurement data, with model results on a 1 km x 1 km grid resolution providing supplementary information. 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 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 Swansea Urban Area zone UK0027.

Zone code	Zone Name	Area exceeding TV (km^2)	Population exceeding TV
UK0027	Swansea Urban Area	1	2,208

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

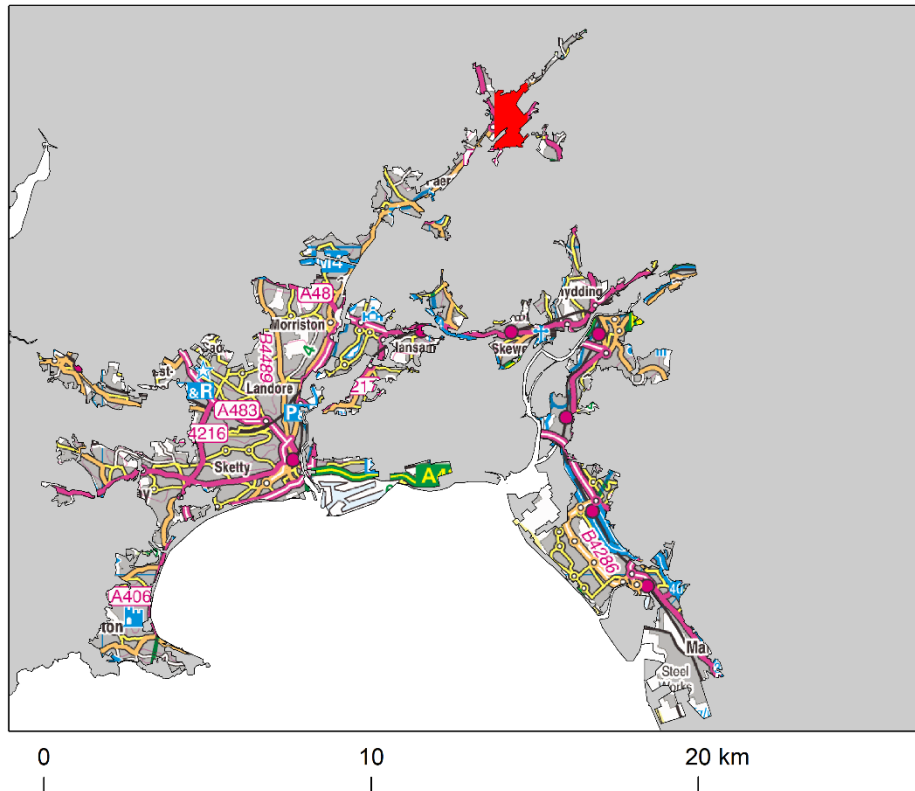
² <https://uk-air.defra.gov.uk/library/bap-nickel-measures>

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

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

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 2021 in Swansea Urban Area agglomeration zone UK0027. 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:

Swansea Urban area [Ni_UK0027_2021_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. This exceedance situation is adjacent to and shares common sources with the exceedance situation South Wales [Ni_UK0041_2021_1] for which further information can be found in the report on measures for [South Wales UK0041](#).

2 Exceedance situation Swansea Urban Area [Ni_UK0027_2021_1] related to industrial emissions

2.1 Description of exceedance

This exceedance situation is an area of exceedance of 1 km² and is located in the Swansea valley in the north of the Swansea Urban Area agglomeration zone. The resident population associated with this exceedance situation is 2,208. This exceedance situation is adjacent to and shares common sources with the exceedance situation for South Wales [Ni_UK0041_2021_1].

Table 2 lists measured annual mean concentrations of Ni from monitoring sites in Swansea Urban Area agglomeration zone from 2004 to 2022, and Figure 2 indicates the location of measurement sites. There was one measured exceedance at Pontardawe Tawe Terrace (GB1016A) in 2021 for which this report relates. 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 in Figure 3 shows that Pontardawe Tawe Terrace is located within the exceedance situation for Swansea [Ni_UK0027_2021_1]. The measured concentrations of Ni at other national monitoring sites within the Swansea Urban Area agglomeration zone were all below the TV in 2021.

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.

Figure 2. Location of monitoring sites in Swansea Urban Area

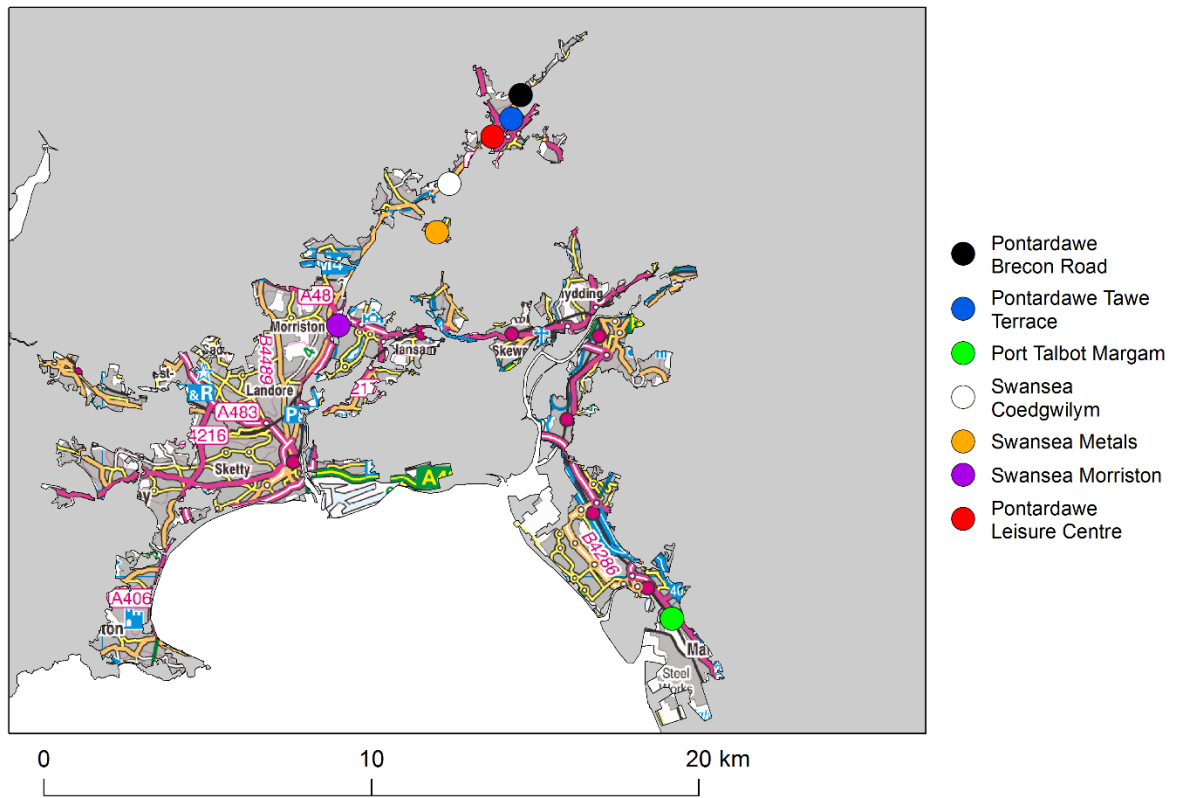
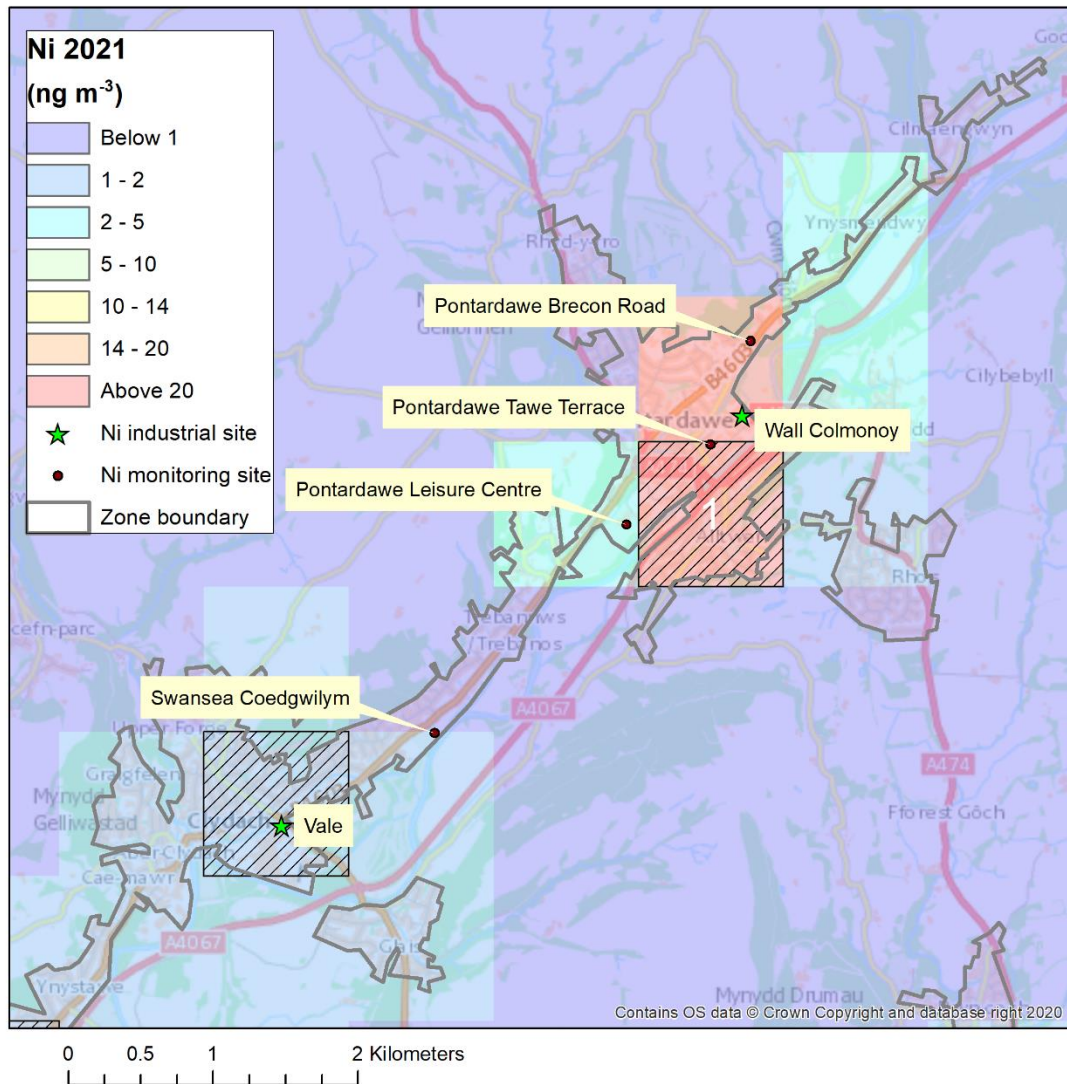


Table 2. Measured annual mean Ni concentrations in Swansea Urban Area agglomeration zone UK0027 from 2004 to 2022 (ngm⁻³). (Percentage data capture is shown in brackets).

Station (Eol code)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Pontardawe Brecon Road (GB1015A)								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)
Pontardawe Tawe Terrace (GB1016A)								28 (93)	30 (98)	37 (98)	43 (100)	28 (100)	47 (97)	19 (95)	57 (100)	35 (100)	23 (96)	25 (99)	17 (96)
Port Talbot Margam (GB0906A)					2.0 (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)
Swansea Metals (GB0876A)	34 (96)	20 (97)	26 (97)	28 (64)															
Swansea Coedgwilym (GB0981A)					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)
Swansea Morriston (GB0979A)					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)
Pontardawe Leisure Centre*	76	47	74	70	43	29	8.5	15	14	12	22	15	22	10 (78)	20 (99)	16 (98)	9.6 (99)	9.0 (90)	8.0 (54)

Pontardawe Leisure Centre is a Local Authority monitoring site. It is included here as the site was operated continuously between 2004 and 2022. Data capture statistics were not available for this site before 2017.

Figure 3. Exceedance situation Swansea [Ni_UK0027_2021_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. Non-hatched grid squares are assigned to the South Wales zone UK0041 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 local industrial emissions for the Wall Colmonoy site located within the exceedance situation, this is described in Appendix 1.

Table 3 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 4 gives a more detailed source apportionment for the industry sector and shows that the main source associated with this exceedance situation is Wall Colmonoy stack emissions. 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 since 2008. Appendix 1 presents modelling undertaken to understand the impact of this emission source.

In previous years, the Welsh Government has 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 and 2016 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
https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/ni_swansea_UK0027_reportonmeasures_2016.pdf

Table 3. Source apportionment for exceedance situation Ni_UK0027_2021_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	203500	27	0.52	0.52	0.63	0.07	0.13	0.38	0.02	0.03	0.00	23.83	23.83	25	2208

Table 4. Detailed source apportionment for industrial sources only for exceedance situation Ni_UK0027_2021_1. Annual mean Ni concentration (ngm⁻³)

OS easting (m)	OS Northing (m)	Zone	Wall Colmonoy stack emissions	Local increment: Industry including heat and power production	Total for all emission sources
272500	203500	27	23.83	23.83	25

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 5 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 6 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 6 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 5 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 are in the process of reviewing the reduced emissions on an offsite monitoring location. This will be carried out by a modelling assessment in late 2023.

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. It is intended that this work will be completed in 2024.

Table 7 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

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

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 7 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

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https://uk-air.defra.gov.uk/assets/documents/reports/bap-nickel-measures/ni_swansea_UK0027_reportonmeasures_2019.pdf

Table 5. 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:		Cost:	Not available	
			Indicator:		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:		Target emissions reduction:	Not available				
Wall Colmonoy_2			Start:	2014	Source affected:		This measure is complete.

	New local exhaust ventilation system and filter unit installed in the powders section	Permit systems and economic instruments: Other measure	Expected end: 2014 Status: Complete		Industry including heat and power production	
				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 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_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	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	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:				Cost:	Not available
			Indicator:				Indicator:	Not available
Target emissions reduction:		Target emissions reduction:	Not available					
Wall Colmonoy_7	Flap curtains installed between the powder room and driers to minimise escape of dust from powder room	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:	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	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_9	New enclosure and Local Exhaust Ventilation (LEV) filter on blenders dispense into sieve	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_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	Dalamatic filter system upgraded with bags to same	Permit systems and economic instruments: Other measure	Start: 2014 Expected end: 2014	Source affected:	Industry including heat and power production	This measure is complete.

	specification as Vale A1 site		Status: Complete	Spatial scale: Local		
				Cost: Not available		
				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: Not available		
Wall Colmonoy_12	Russell sieve enclosed with curtains	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_13	Cut off saw bag filters installed	Permit systems and economic instruments: Other measure	Start:	2012	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:			Not available
				Target emissions reduction:	Not available			
Wall Colmonoy_14	Cyclone followed by bag filter (Dalmatic) arrestment used in powder manufacturing (atomising)	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_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	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_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.
			Expected end:	2018			

			Status: Implementation	Spatial scale: Local		A new tranche of monitoring started in Sep 2017
				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 Expected end: 2018 Status: Implementation	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.
				Spatial scale: Local		
				Cost: Not available		
				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	Source affected:	Industry including heat and power production	This measure is complete.		
			Expected end:	2016					
			Status:	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	Source affected:	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_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	Source affected:	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_21	Air drier pans LEV to be improved	Permit systems and economic instruments: Other measure	Start:	2015	Source affected:	Industry including heat and power production	This measure is complete.	
			Expected end:	2016				
			Status:	Complete	Spatial scale:			Local
				Cost:	Not available			

				Indicator:	Not available		
				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:	Not available			
			Indicator:	Not available			
			Target emissions reduction:	Not available			
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 Expected end: 2016 Status: Complete	Source affected: Industry including heat and power production Spatial scale: Local Cost: Not available Indicator: Not available Target emissions reduction: Not available	Industry including heat and power production	This measure is complete.
Wall Colmonoy_25	Enclose vibratory feeders	Permit systems and economic instruments: Other measure	Start: 2015 Expected end: 2016	Source affected: Industry including heat and power production	Industry including heat and power production	This measure is complete. This is also additionally addressed through a process design change in the feed.

			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 an enclosed room	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.
			Start: 2014	Source affected:		This measure is complete.

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	Expected end:	2014		Industry including 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	
Vale_1	Installation of stack filtration plant (bag house) to replace electrostatic precipitators	Permit systems and economic instruments: IED permits	Start:	2007	Source affected:	Industry including heat and power production	This was the most significant measure for this source.
			Expected end:	2007			
			Status:	Complete	Spatial scale:	Local	This measure is complete.
					Cost:	£1.8M	
		Indicator:	Monthly average particulate				

					concentration from main stack reduced from $\sim 10 \text{ mgm}^{-3}$ 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 Expected end: 2011 Status: Complete	Source affected:	Industry including heat and power production	This measure is 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	Permit systems and economic instruments: IED permits	Start: 2012 Expected end: 2012 Status: Complete	Source affected:	Industry including heat and power production	This measure is complete.
				Spatial scale:	Local	
				Cost:	£100K	

	HEPA filter at outlet			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 preventative maintenance	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		
					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 6. 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
Stack	1934	763	1382	3154	2855	193	56	96	25	31	42	11	108	36	17.3	13.6	14.05	8.49
Other	54	280	31	12	116	93	45	16	11	29	37	12	38	19	0.74	1.61	6.38	5.84

Table 7. 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
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

^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 2021. 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 $20 \text{ m} \times 20 \text{ m}$ over an area of $3 \text{ km} \times 3 \text{ km}$ 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 $23.03 \text{ kg year}^{-1}$ by the site operator. Emissions were released from thirteen emission points distributed across the site. Building effects were included in the model, and a $6 \text{ km} \times 6 \text{ km}$ 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 $50 \text{ m} \times 50 \text{ m}$ 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 $20 \text{ m} \times 20 \text{ m}$ 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 both the South Wales and Swansea Urban Area zones in 2021 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 2021.

	Measured Ni (ng m ⁻³)	Modelled Ni (ng m ⁻³)
Pontardawe Tawe Terrace	25	25
Pontardawe Leisure Centre	9.0	11
Pontardawe Brecon Road	6.3	3.2

Figure A1: Modelled annual mean Ni concentration resulting from the local industrial point source in Pontardawe in 2021.

