WESP 21 Odour Trials

Background

Wet electrostatic precipitators (WESPs) are effective in removing particulate matter from dryer flue gases, but they may not adequately address odorous compounds present in the emissions. Hydrogen peroxide (H_2O_2) is an oxidizer and has the potential to reduce volatile organic compounds (VOCs) and other odorous substances.

A trial has been undertaken to assess the impact of varying hydrogen peroxide dosing rates on the reduction of odour levels within the WESP emission, thereby improving overall air quality emissions from the site and reducing the odour intensity of the wet abatement system emission.

The effectiveness of hydrogen peroxide dosing is dependent on the concentration used. Too little may not achieve significant odour reduction, whilst too much may lead to operational issues, such as foaming or increased corrosion within the WESP.

Odour emissions from the site emission points were first quantified in October 2022 and the results included in the odour management plan to assist in the identification of improvements. A summary table is provided below of these results. As WESP 21 had the highest mean odour mass release rate, it was selected as the most appropriate plant to commence odour reduction trials on.

Process / emission point	**Individual odour concentrations (ouE/m^3)**	**Mean odour concentration (ouE/m^3)**	**Mean odour mass release rate (ouE/s)**
ECS (A1)	451 388 151	298	709
Resin/ VITS Nairb (A5)	152 175 155	160	4,313
Resin Sly (A6)	261 360 337	316	2,032
Press abatement at WESP 32 (A28)	1,818 1,680 1,517	1,667	75,554
K8 biomass boiler (A27)	989 508 474	620	14,278
MDF 1 (A29)	2,138 1,781 1,489	1,783	65,445
MDF 2 (A30)	3,887 4,126 4,042	4,017	307,639
WESP 21 (A32)	6,464 8,576 6,006	6,931	464,789

Trial Details

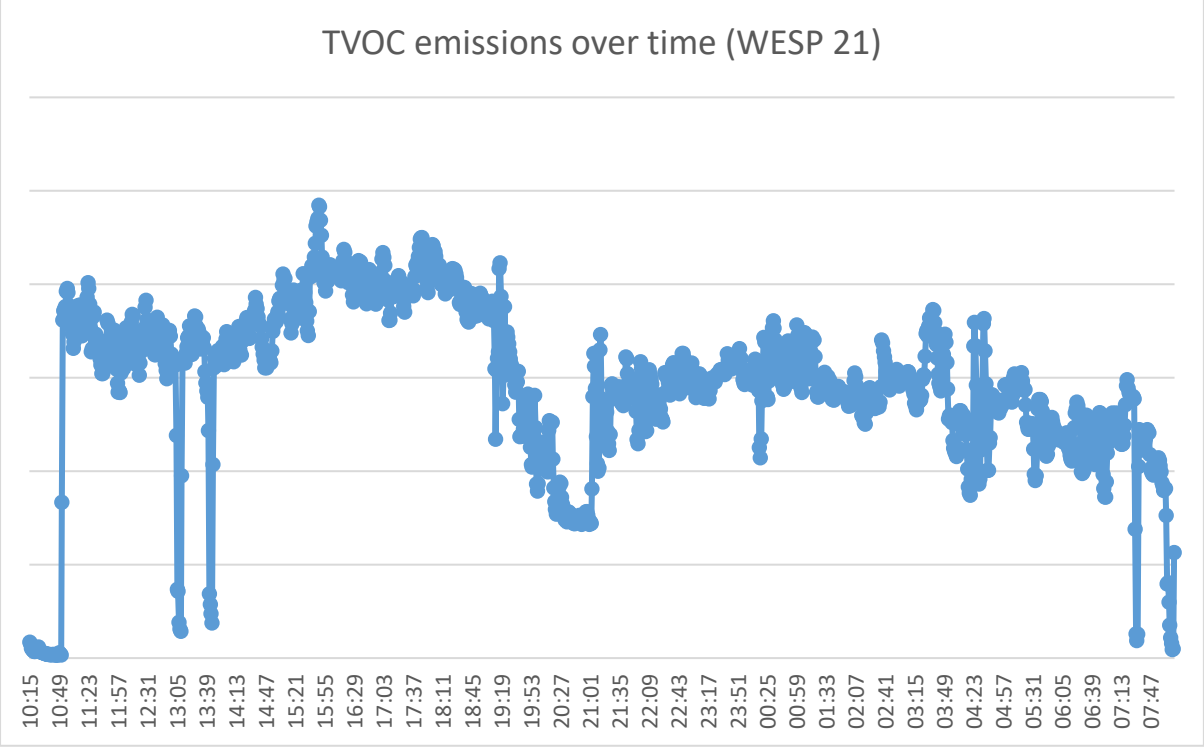
Hydrogen peroxide has been continually dosed into WESP 21 since 4th October 2024. An automated dosing system was installed which pumps a controlled amount of hydrogen peroxide into the water within the wet scrubbing element of the WESP which receives flue gases from the particleboard dryer (Dryer 4).

After 2 weeks of dosing 20litres/hour, emissions monitoring was carried out for volatile organic compounds (as TVOC) and odour. In addition, odour monitoring has been carried out weekly by site personnel to assess the improvement subjectively and is discussed in the Observations section. The results of this initial odour monitoring and TVOC data are shown below.

Sample date / time	Odour concentration (ouE/m³)	Uncertainty in result +/-
16/10/2024 10:46	9,478	-7,200 / +7,773
16/10/2024 10:50	9,568	-7,005 / +7,613
16/10/2024 10:54	6,385	-4,758 / +5,165
16/10/2024 14:54	7,276	-4,687 / +5,209
16/10/2024 14:56	5,640	-3,473 / +3,877
16/10/2024 14:50	8,332	-5,305 / +5,905

The results of the odour monitoring were disappointing, despite a significant measurement uncertainty (for comparison, the uncertainty declared during the initial scoping exercise in 2022 was -2,219 / +3,264), and showed an increase in odour levels on average.

A flame ionisation detector was utilised to determine if any improvement was made to the levels of TVOCs in the emission. The equipment was installed at a sample port at the end of the WESP emission and left overnight to gain trending data. The below graph was generated from the data this provided.



The TVOC data was gathered during stable, consistent production and showed increased variability to what was anticipated, potentially indicating issues with the dosing system. This was inspected and found to be in good working order. The dosing rate initially chosen does not appear to have had an impact on the emissions, despite initial trials (shock dosing) showing significant reductions.

Observations

Subjective odour monitoring has taken place weekly in the local community by a member of the EHS team to ascertain if any improvement in odour intensity was observed. Three locations were chosen at the start of the monitoring period (Station Avenue, Maes Y Waun, and Crogen) Wind speed and direction was noted.

A summary of the results are provided below.

Date	Wind direction	Wind speed	Station Avenue	Maes Y Waun	Crogen	Site
07/10/2024	180°	2.0 m/s	No odour detected	No odour detected	No odour detected	No odour detected (Logyard / Lagoons)
14/10/2024	190°	1.2 m/s	No odour detected	No odour detected	No odour detected	No odour detected (Logyard / K+)
21/10/2024	210°	2.7 m/s	No odour detected	No odour detected	Intermittent odour present	Intermittent odour present (East Road)
28/10/2024	210°	2.5 m/s	No odour detected	No odour detected	No odour detected	Intermittent odour present (East Road)
04/11/2024	100°	0.6 m/s	No odour detected	No odour detected	No odour detected	No odour detected (Preproduction)
11/11/2024	0°	3.2 m/s	Intermittent odour present	No odour detected	No odour detected	Intermittent odour present (car park / Farmhouse)
18/11/2024	0°	1.7 m/s	No odour detected	No odour detected	No odour detected	No odour present (car park / Farmhouse)
25/11/2024	215°	3.9 m/s	No odour detected	No odour detected	No odour detected	No odour detected (East Road)

In addition to the subjective observations made above, the site has not received as many odour reports from local residents as in previous months. However, it is thought that the weather conditions over the past 2 months have not been conducive to odour complaints as the ambient temperature has dropped, giving the relatively low-temperature emissions better buoyancy and reducing the frequency of grounding occurrences, and the wind direction has rarely been in the prevailing direction.

The average number of odour complaints per month increased from an average of 5/month in 2022 to 10/month in 2023 to 17/month in 2024 (prior to hydrogen peroxide dosing), with higher

figures seen the summer months when ambient temperatures are higher and more time is spent outside.

Since dosing began 5 odour complaints have been received; 3 from Castle Walks (south) and 2 from Lodgevale housing estate (Crogen & Offa – north east). This is significantly less than has been experienced in recent months.

Actions

Dryer 4 will be offline as part of the wider particleboard planned maintenance shutdown throughout December. The dosing system will be inspected to ensure it remains in good working order. Additionally, as a precautionary measure the internals of the WESP will be inspected to check for any signs of problematic foaming or corrosion (no issues have been experienced to date). The WESP and dryer will also undergo planned preventative maintenance at this time.

As the dosing rate of 20litres/hour has not had a quantifiable improvement in the emissions, the site propose the following schedule to determine the feasibility of chemical oxidation through the use of hydrogen peroxide at the WESP(s):

Date	Dosing rate (litres/hour)	Odour sampling date	TVOC monitoring period
06/01/2025	30	14/01/2025	14/01/2025-15/01/2025
20/01/2025	40	28/01/2025	28/01/2025-29/01/2025
03/02/2025	50	11/02/2025	11/02/2025-12/02/2025
17/02/2025	60	25/02/2025	25/02/2025-26/02/2025

Subjective monitoring will continue in addition to the above testing and we will continue to correlate complaint data wherever possible.