NRW IC49 Updated Response

Introduction

The following is a summary of the work undertaken to date in response to Improvement Condition NRW IC49 and subsequent actions raised in CAR_NRW0043121.

NRW IC49: The Operator shall investigate potential technical solutions with regard to monitoring and control of dust filtration units B01-B31.

HEADING

As discussed in previous responses relating to this IC, extractive MCERTS-compliant monitoring is not possible at the majority of filtration units due to a combination of the below factors:

- Poor access to the measurement planes with many only accessible with the use of a mobile elevated working platform,
- A lack of working platforms, or space for them, around the outlets,
- Short or curved ducting that does not provide homogenous flow conditions,
- A lack of space to increase ducting sufficiently to provide a sampling location with homogenous flow.

As a result of the difficulties observed above, it was determined that quarterly extractive monitoring would not be a practicable option for monitoring of emissions from dust filtration units across the site. Residual dust monitoring equipment was investigated as a potential alternative solution. A number of different probes were trialled on existing exhausts and outlets across the site filter boxes. Results from this show that the atmospheric conditions highly affected the accuracy of the equipment.

A programme of work has since been undertaken to ascertain the optimum differential pressure range for each filter unit and confirm that processes are in place to detect faults and / or any reduction in particulate abatement. This has included a review of manufacturer's specifications for the system, the filter bag types employed at each unit, and the associated control systems, alerts and alarms that are in place.

Confirmation of the results of this work is provided in the table at Appendix 1.

However, during an audit on 18/10/24 material was observed on the Melamine Facing roof underneath the four filtration units for the department. An environmental audit was completed on 17/10/24 in the department which contained photographs of the roof showing that the roof was free of dust at that time. As part of the investigation into the cause of the failure of one of the filter units, the differential pressure readings for the previous 24-hour period were reviewed. No significant pressure drop was observed.

This demonstrated that differential pressure is less reliable for detecting leaks than for use as indication of blinding. When filter bags become blinded with particulate, the airflow is restricted, causing an increase in differential pressure. However, when a filter bag bursts, the material that was once trapped in the bag is no longer held back which allows unfiltered air to pass through without significant resistance. In many cases, this can lead to a sudden drop in differential pressure however, it is now apparent that in other cases there may not be a significant drop at all depending on the extent of the leak and the flow dynamics within the system.

Blinding of the filter bags is therefore effectively detected through the use of set-points specific to each filtration unit and indicates that bag replacement is required. Preventative maintenance schedules have been implemented based on the recommended lifetime of the filter bags from the manufacturer as well as historic operational data. In certain cases, were the differential pressure to reach a maximum set-point, process trips are in place to cause shutdown of the associated plant to prevent over-pressurising the extraction systems and further escape of material.

Leak detection is less reliable as in practice the system operates at a lower resistance following bag failure. The airflow often also redistributes among the remaining filter bags within the system which can mask the effects of the leak and only minimal changes in differential pressure well within normal ranges. The filtration units across site contain large numbers of filter bags, in some cases over 400 in one unit. A single filter bag leaking would not cause a significant change in differential pressure as the remaining bags can still effectively handle the airflow.

The differential pressure within each system also gradually increases over time, not only due to blinding but also natural degradation of the filtration media. This gradual shift over time complicates the establishment of consistent thresholds for differential pressure that would indicate a leak. As pressure sensors are primarily used for detecting gradual changes in resistance they may also not be sensitive enough to detect quick changes resulting from a bag leak.

In some cases, the differential pressure range is relatively wide to accommodate for process / product changes. The density of the material being filtered can influence the pressure drop across the filter, with higher density materials requiring a higher baseline differential pressure than lower density products that may mask the effects of a burst bag, further complicating the setting of effective minimum differential pressure set points.

Due to this lack of confidence in relying solely on differential pressure, further exploration bust bag detection methods and residual dust monitoring will be undertaken. Previous exploration involved trialling equipment on the filtration units that are not suitable for monitoring equipment. The final column of the table in Appendix 1 shows that, from an initial review, 18 filter boxes may have sufficient ducting and accessibility to install equipment. Options for the remaining 13 filtration units will need to be explored further.

It is proposed that residual dust monitoring, in the form of tribo-electric probes or inductive electrification technology, is trialled on the filters that are potentially suitable at present, commencing with the Melamine Facing dust units following the issues seen in October and the height at which they exhaust to atmosphere.

Following completion of the previously agreed actions, the site now proposes further investigations to ensure more robust control of dust emissions from the site filter boxes, and will commit to providing NRW the results of by 13/03/2025.

Appendix 1

Filter ref.	**Area / Equipment**	**Outlet Dimensions (m)**	**Flow Rate (m^3/h)**	**Fan Location**	**Exhaust Type**	**dP Range (mBar)**	**Alert Level**	**Alarm Level / Response**	**Suitability for RDM**
B01	MDF Finishing Line Sander	⌀ 1.4 (x2)	170,000	Inlet side	Fan ductwork	4-8mbar	9mbar	16mbar (stops the process)	Yes
B02	MDF Finishing Line Kontra Saws	⌀ 1.0	40,000	Inlet side	Fan ductwork	5-7mbar	7mbar	10mbar	Yes
B03	MDF 2 Cross Cut Saw & Hoggers	4.5 x 0.55	50,000	Exhaust side	Filter box outlet	2-4mbar	5mbar	7mbar	No
B04	MDF 1 Cross Cut Saws & Hoggers	2.25 x 0.55	45,700	Exhaust side	Filter box outlet	2-4mbar	5mbar	7mbar	Yes
B05	MDF 1 Forming Extraction	3.37 x 0.55	30,000	Exhaust side	Filter box outlet	2-4mbar	5mbar	7mbar	No
B06	MDF 2 Forming Extraction	11.25 x 0.55	147,300	Exhaust side	Filter box outlet	3-6mbar	7mbar	9mbar	No
B07	Particleboard Forming Extraction	6.75 x 0.55	96,000	Exhaust side	Filter box outlet	6-11mbar	12mbar	15mbar	No
B08	Particleboard Hamatec	⌀ 0.8	30,000	Inlet side	Fan ductwork	2-4mbar	5mbar	7mbar	Yes
B09	Particleboard Core Layer	1.12 x 1.6	75,000	Exhaust side	Filter box outlet	6-10mbar	12mbar	15mbar (stops the process)	Yes

B10	Particleboard Surface Layer	1.12 x 1.6	60,000	Exhaust side	Filter box outlet	6-10mbar	12mbar	15mbar (stops the process)	Yes
B11	Particleboard Conidur Mill	1.12 x 1.6	60,000	Exhaust side	Filter box outlet	6-10mbar	12mbar	15mbar (stops the process)	Yes
B12	Particleboard Mat Former	5.5 x 0.55	80,000	Exhaust side	Filter box outlet	8-12mbar	14mbar	20mbar	No
B13	Particleboard Sander	⌀ 1.4 (x2)	170,000	Inlet side	Fan ductwork	9-12mbar	20mbar	25mbar (stops the process)	Yes
B14	Tongue & Groove Extraction	⌀ 0.8	30,000	Inlet side	Fan ductwork	20-25mbar	28mbar	35mbar (stops the process)	Yes
B15	Particleboard Cross Cut Saws & Hoggers	⌀ 0.8	60,000	Exhaust side	Filter box outlet	15-23mbar	25mbar	30mbar (stops the process)	Yes
B16	Melamine Facing P1 Press & Lath Machine	1.8 x 1.0	57,500	Inlet side	Fan ductwork	2-6mbar	7mbar	10mbar	Yes
B17	Melamine Facing P2 Press	1.8 x 1.0	57,500	Inlet side	Fan ductwork	2-6mbar	7mbar	10mbar	Yes
B18	Melamine Facing P3 Press	1.12 x 1.12	24,050	Inlet side	Fan ductwork	2-6mbar	7mbar	10mbar	Yes
B19	Melamine Facing P4 Press	1.8 x 1.0	57,500	Inlet side	Fan ductwork	2-6mbar	7mbar	10mbar	Yes
B20	Zeno Extraction	1.12 x 0.5	43,020	Exhaust side	Filter box outlet	8-10mbar	12mbar	15mbar	No
B21	Pre-Screening Air Grader	4.5 x 0.55	60,000	Exhaust side	Filter box outlet	8-10mbar	12mbar	15mbar	No

B22	MDF 1 & 2 Boardbreaker	2.25 x 0.55	3,000	Exhaust side	Filter box outlet	6-10mbar	12mbar	15mbar	No
B23	Chip Preparation TST Filter 1	2.0 x 0.55	25,000	Exhaust side	Filter box outlet	3-5mbar	8mbar	15mbar (stops the process)	No
B24	Chip Preparation TST Filter 2	2.0 x 0.55	25,000	Exhaust side	Filter box outlet	3-5mbar	8mbar	15mbar (stops the process)	No
B25	Chip Preparation Line 1 Extraction	6.75 x 0.55	96,000	Exhaust side	Filter box outlet	3-5mbar	8mbar	15mbar (stops the process)	Yes
B26	Chip Preparation Line 2 Extraction	1.12 x 1.6	90,000	Exhaust side	Filter box outlet	3-5mbar	8mbar	15mbar (stops the process)	No
B27	Kronoplus Extraction Silo	⌀ 0.56	9,800	Inlet side	Fan ductwork	3-6mbar	7mbar	10mbar	Yes
B28	Kronoplus Worktop Line	⌀ 1.25	70,000	Inlet side	Fan ductwork	3-6mbar	7mbar	10mbar	Yes
B29	Kronoplus Flooring Line 2	7.78 x 0.55	89,250	Exhaust side	Filter box outlet	3-6mbar	7mbar	10mbar	Yes
B30	Kronoplus Flooring Line 1	⌀ 1.6	105,000	Inlet side	Fan ductwork	3-6mbar	7mbar	10mbar	Yes
B31	Kronoplus Flooring Line 3	⌀ 1.6	98,000	Inlet side	Fan ductwork	3-6mbar	7mbar	10mbar	Yes