



EVALUATION OF THE
DYNAVANE DUST FILTER UNIT
EQUIPPED WITH
AIRCURE FILTRATION PRODUCTS
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PURPOSE

To evaluate the dust filtering efficiency of the Dynavane dust filter unit, when equipped with AirCure dust filtration products. Both dust mass filtering efficiency and dust particle filtering efficiency was evaluated.

METHODOLOGY

Project was conducted at the Dynavane dust filter installation on Tau Tona Mine. This unit is currently installed at the 112 Level station tips.

Two AEROCET 531 particle mass and count instruments were utilised to determine the filtering efficiency of the dust filter unit.

Samples were collected at:

- The intake to the dust filter, and
- The return of the dust filter.

Samples were collected during tipping and non-tipping activities.

FINDINGS

The detailed results of the tests are depicted in Appendix A.

Particle filtrating efficiency

The overall particle filtrating efficiency was measured as being 55%. The highest efficiency occurred in the $\geq 5 \mu\text{m}$ category (99,8 to 99,9% with an average of 99,8% filtrating efficiency). The filtrating efficiencies in the in the 0,5 to 5 μm category ranged from 52,8 to 53,1%, with an average filtrating efficiency of 52,9%.

Dust mass filtrating efficiency

The overall dust mass filtrating efficiency ranged from 77% to 99% (average of 90%). The highest efficiency occurred in the PM1 category (93 to 100 % with an average of 98% filtering efficiency).

During tipping operations the overall dust mass filtrating efficiencies ranged from 45% (PN2.5 category) to 74% (PM7 category) with an overall mass efficiency of 66%.

CONCLUSION

The filter unit renders excellent filtration efficiency in the $>5\text{ }\mu\text{m}$ particle range (99,8%).

Some alterations must still be made to the filter unit (see recommendations) to improve dust filtrating efficiency in the $0,5\text{ to }5\text{ }\mu\text{m}$ particle range (currently 52,9%).

The large variations in the PM_{2,5} (33 to 98%), PM_{7,0} (50 to 99%), PM₁₀ (72 to 99%) and TSP (77 to 99%) test results can mainly be attributed to existing leakage's (as discussed under recommendations).

The utilisation of AirCure filtration products greatly enhances both the dust filtration efficiency and durability of the dust filtration system (also see Appendix B for before and after photos).

RECOMMENDATIONS

Holding frame for primary filter must be enhanced (screen fitted) as to prevent the primary filter from expanding out of the filter frame.

Primary filter need to be enlarged to 620mm x 620mm (currently 600mm x 600mm) to ensure proper sealing of the primary filter against the filter casing frame.

Access doors needs to be improved (i.e. closing clamps, thicker steel, sponge type seals to be replaced with rubber type seals) as to reduce leakage's caused by vibration and static pressure influences.

Filter slides must be enhanced to ensure proper sealing after maintenance activities.

Secondary (envelope) filter area to be enlarged to prevent filter-compressing effect. This results in reduced availability of secondary filter capacity and also an increase in leakage due to the static pressure effect.

Side extraction fan to be removed and outlet port to be fitted with removable sealing plate. The fan is currently not operation and results in short circuiting of air that must be filtrated, thus reduced filtration capacity.

AirCure to suggest maintenance methodology to ensure no contamination of secondary filters by dust on primary filter, during maintenance activities.

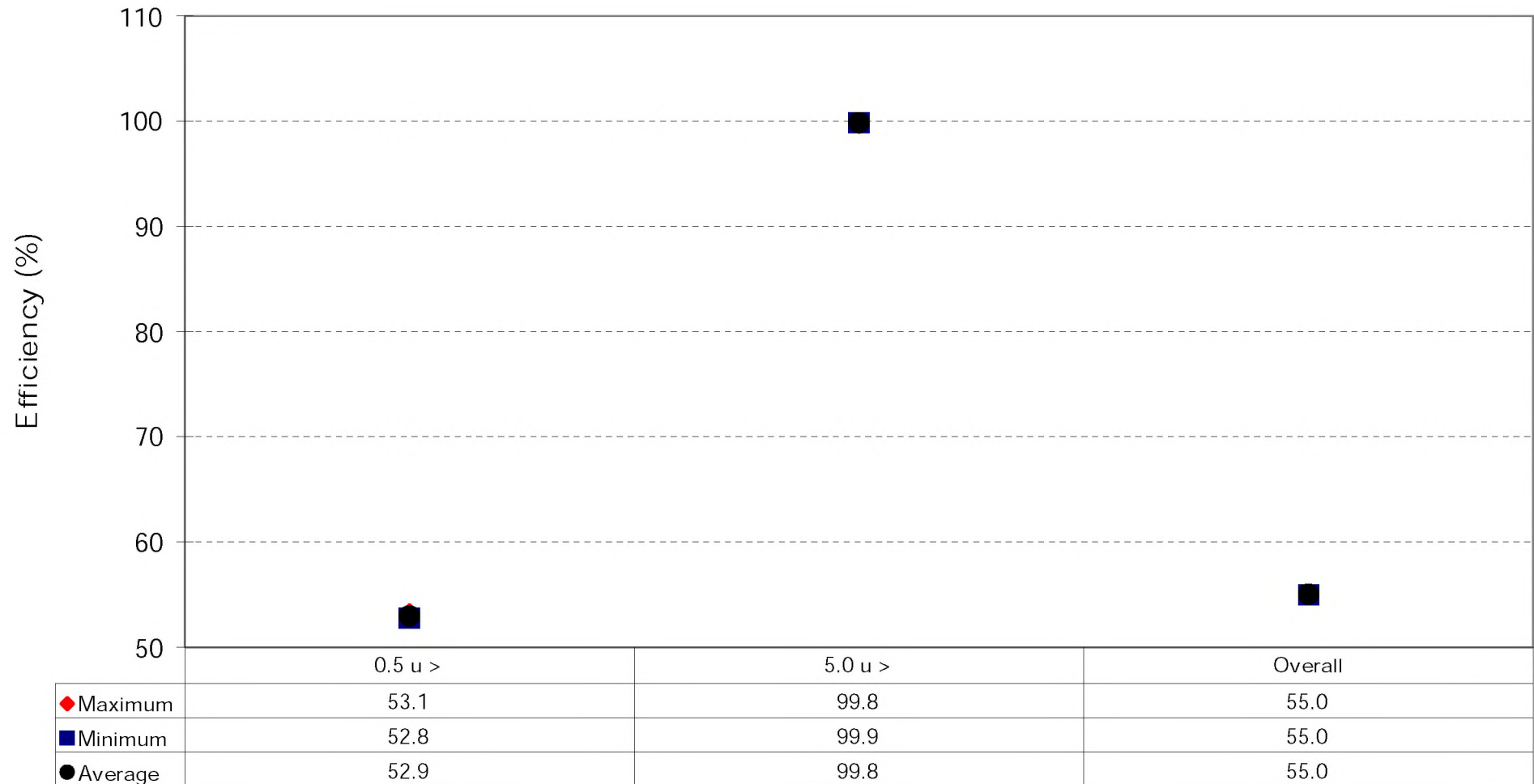
APPENDIX A – Test Results

ENVELOPE FILTER UNIT (Particle Count Evaluation)							
Location	INTAKE		RETURN		EFFICIENCY		
	0.5 u > /Litre	5.0 u > /Litre	0.5 u > /Litre	5.0 u > /Litre	0.5 u > /Litre	5.0 u > /Litre	Overall /Litre
	18597	943	8783	2	52.8	99.8	55
	17631	724	8263	1	53.1	99.9	55
Average	18114	834	8523	2	52.9	99.8	55

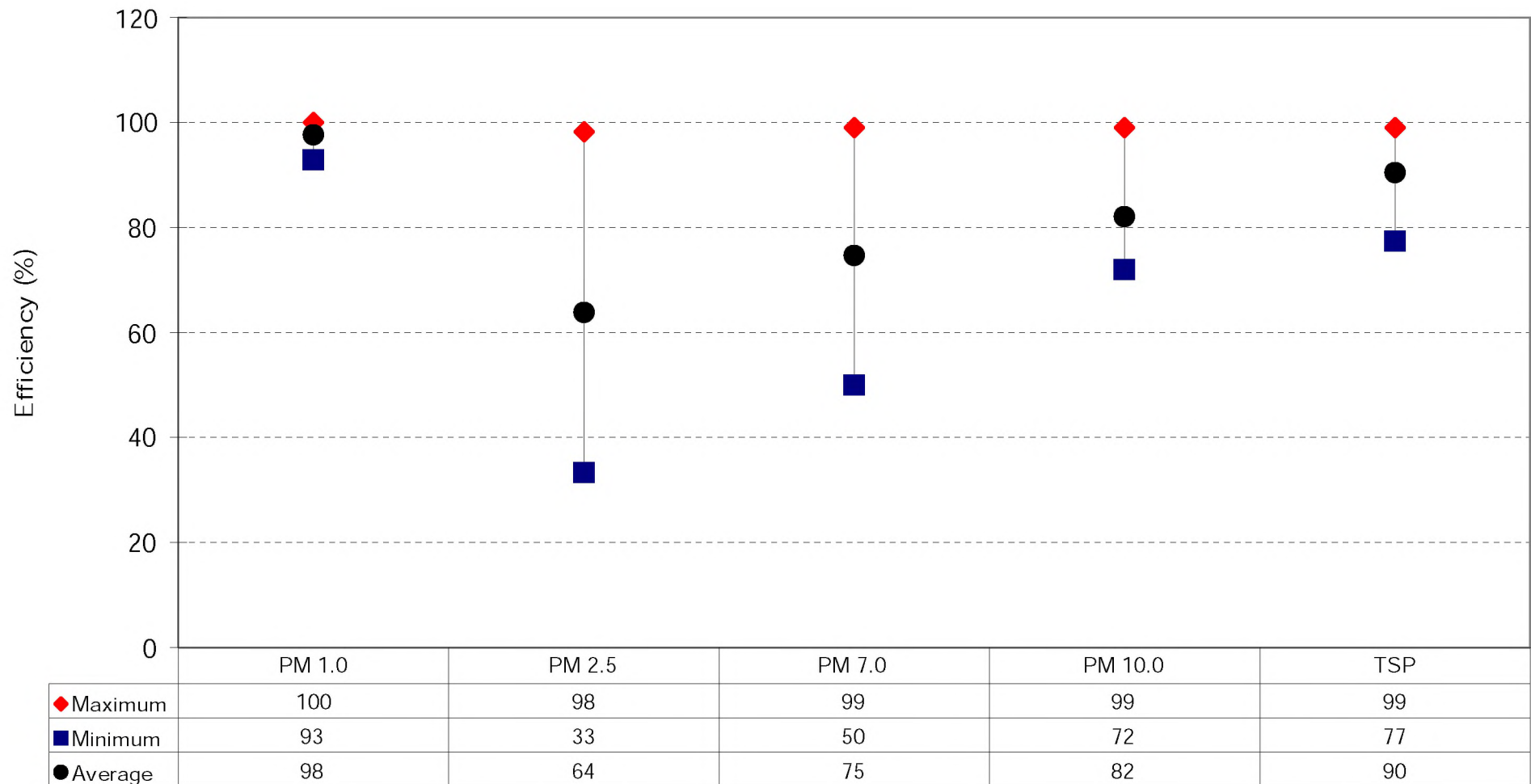
ENVELOPE FILTER UNIT (Particle Mass Evaluation)															
Location	INTAKE					RETURN					EFFICIENCY				
	PM 1.0	PM 2.5	PM 7.0	PM 10.0	TSP	PM 1.0	PM 2.5	PM 7.0	PM 10.0	TSP	PM 1.0	PM 2.5	PM 7.0	PM 10.0	TSP
	mg/m3														
	0.028	0.386	0.87	0.88	0.887	0.002	0.007	0.009	0.009	0.009	93	98	99	99	99
112 Level Dynavane fitted with AirCure Filter media	0	0.002	0.014	0.025	0.031	0.001	0.005	0.007	0.007	0.007	100	60	50	72	77
	0	0.004	0.024	0.024	0.116	0.001	0.006	0.006	0.006	0.006	100	33	75	75	95
Average	0.009	0.131	0.303	0.310	0.345	0.001	0.006	0.007	0.007	0.007	98	64	75	82	90

DYNAVANE DUST FILTER UNIT EQUIPPED WITH AIRCURE FILTRATION PRODUCTS

(Particle Filtrating Efficiency)



DYNAVANE DUST FILTER UNIT EQUIPPED WITH AIRCURE FILTRATION PRODUCTS (Mass Filtrating Efficiency)



APPENDIX B – Photos: Before vs After



Condition of Dynavane Primary Filter – X days after installation.



Condition of Dynavane Secondary Filter – X days after installation



AirCure Primary Filter before installation - Front view



AirCure Primary Filter connected to Secondary (envelope) filter – Top view



AirCure Primary Filter –9 Days after installation.
Improved holding frame required



AirCure Secondary Filter – 9 days after installation
Filter collapsing due to inadequate chamber space available



Blow marks (leakage) on access door due to incorrect door design