



EVALUATION OF THE SCORPION DUST FILTER

GREAT NOLIGWA MINE
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PURPOSE

To evaluate the dust particle filtering efficiency of the Scorpion dust filter unit. Both dust mass filtering efficiency and dust particle filtering efficiency was evaluated.

METHODOLOGY

Project was conducted at the Scorpion dust filter installation on Great Noligwa Mine. This unit is currently installed at the 76 Level station tips.

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

Samples were collected at:

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

The pressure over the filtration unit was also measured before the dust filtrating efficiency tests commenced and on completion of the dust filtrating efficiency tests.

FINDINGS

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

Particle filtrating efficiency

The overall particle filtrating efficiency ranged from 25,2% to 92,0% (average of 71,7%). The highest efficiency occurred in the $> 5 \mu\text{m}$ category (66,4% to 98,0% with an average of 83,3% filtrating efficiency). The filtrating efficiencies in the in the $>0,5 \mu\text{m}$ category ranged from 24,7% to 91,9 %, with an average filtrating efficiency of 71,5%.

The particle filtrating efficiencies for the side extraction bag ranged from 77,0% to 82,0% with an overall particle efficiency of 78,0%.

Dust mass filtrating efficiency

The overall dust mass filtrating efficiency ranged from 57,0% to 85,0% (average of 78,0%). The highest efficiency occurred in the PM1 category (94 to 99% with an average of 98% filtering efficiency).

Pressure

The pressure over the Scorpion Dust Filter increased with 16,0% (from 105 Pa at start of tests to 125 Pa at end of tests).

CONCLUSION

This filter unit was previously known as the "Bona dust filter". The previous recommendations (report dated 7 March 2003) has been satisfactory addressed, i.e:

- The sealing material must be replaced with a more robust material that could withstand the forces present inside the Bona Dust Filter.
- Areas that are not properly sealed (as demonstrated to the Universal Engineering Representative who accompanied us during the visit) must be rectified.

The tertiary envelope filter must be replaced with a more efficient filter. This is required to improve the large variation in the $> 0.5 \mu\text{m}$ category.

RECOMMENDATIONS

The supplier must forward the dust filtrating efficiency and dust holding capacity tests results for the secondary and tertiary filters to Great Noligwa Mine O-ESH Department.

The entire test must be repeated, once the recommendation (as indicated above) has been completed.

APPENDIX A – Test Results

Location	INTAKE		RETURN		EFFICIENCY		
	>0.5 µm /Liter	>5.0 µm /Liter	>0.5 µm /Liter	>5.0 µm /Liter	>0.5 µm /Liter	>5.0 µm /Liter	Overall /Liter
Scorpion Dust Filter Unit	51574	375	38838	126	24.7	66.4	25
Scorpion Dust Filter Unit	19305	16	1556	3	91.9	81.3	92
Scorpion Dust Filter Unit	15522	24	1522	3	90.2	87.5	90
Scorpion Dust Filter Unit	71101	152	14796	3	79.2	98.0	79
Average	39376	142	14178	34	72	83	72
Side Extraction Bag	39376	142	8870	25	77.5	82.4	78

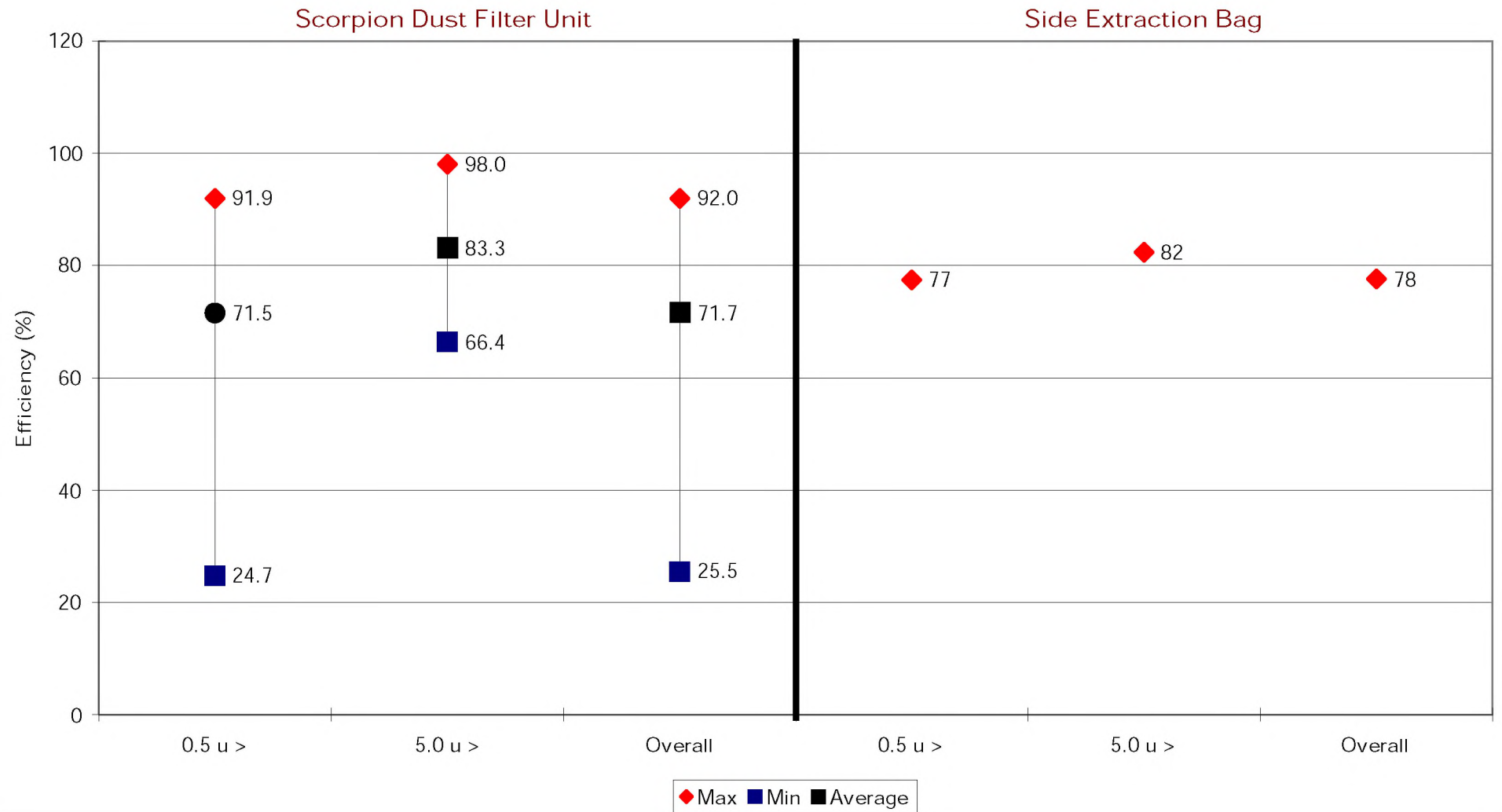
Location	SCORPION FILTER UNIT (Particle Mass Evaluation)														
	INTAKE					RETURN					EFFICIENCY (%)				
	PM 1.0 mg/m ³	PM 2.5 mg/m ³	PM 7.0 mg/m ³	PM 10.0 mg/m ³	TSP mg/m ³	PM 1.0 mg/m ³	PM 2.5 mg/m ³	PM 7.0 mg/m ³	PM 10.0 mg/m ³	TSP mg/m ³	PM 1.0	PM 2.5	PM 7.0	PM 10.0	TSP
Scorpion Dust Filter Unit	0.094	0.113	0.114	0.114	0.115	0.001	0.005	0.013	0.015	0.017	99	96	89	87	85
Scorpion Dust Filter Unit	0.017	0.029	0.042	0.042	0.042	0.001	0.005	0.016	0.018	0.018	94	83	62	57	57
Average	0.056	0.071	0.078	0.078	0.079	0.001	0.005	0.015	0.017	0.018	98	93	81	79	78

Pressure over Scorpion Dust Filter Unit: Start of tests = 105 Pa
End of tests = 125 Pa

Ventilating air quantity through Scorpion Dust Filter Unit = 7,1 m³/s

Number of filtration units inside Bona dust Filter = 9 units

SCORPION DUST FILTER EVALUATION (Particle Filtrating Efficiency)



SCORPION DUST FILTER EVALUATION (Mass Filtrating Efficiency)

