RESEARCH INTERNATIONAL

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Test Report Documenting
SASS 3100 filter Design Change

May 21, 2019

Discussion:

Research International recently incorporated a small change in the bio-type electret filter used with the SASS 3100 air sampler: a thin mesh backing now holds the electret fiber matrix in place. No other aspect of the filter have been changed. The new mesh consists of polypropylene fibers of about 0.13mm diameter in a 4 mm square array. Hence, there is also no change in the 100% polypropylene content. Tests have been performed on filters of the "old style" and "new style" to determine if there is any significant difference in air flow or collection efficiency.

These tests are summarized on Pages 2 and 3 of this Report. Briefly, the tests indicate that the new design filters tested had a slightly higher flow rate (+6.7%) and were also marginally better in collection efficiency in the 0.3 to 5 micron aerosol size range. For example, in the 1.0 to 2.0 micron size range, the old style filters had a collection efficiency of 86.2% +- 0.8%, while the new style filters had an efficiency of 87.9 +-3% efficiency. However, due to the fact that the old style filters were manufactured about 18 months ago and were not maintained under clean room conditions, it is not surprising they showed reduced performance. However, differences are barely statistically significant and efficiency profiles are consistent with prior tests (Figure 1).

Sincerely,

Elric W. Saaski

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CEO, Research International, Inc.

Test 1: Flow Rate Comparison

Method: A SASS 3100 was set to 300 liters/minute and incoming air flow to the filter face measured with an Alnor RVA 501 precision airflow meter.

Table 1:
Comparison of old and new electret filter flow rates at a nominal 300LPM

Electret Media	Flow Rate (LPM)	Standard deviation of measurements (LPM)	Number of filters measured
Old style	300. ref	7.1	9
New style	320.	15.0	18

Test 2: Collection Efficiency Comparison

Method: A SASS 3100 was set to 300 liters/minute flow rate. Air flow exiting the filter was sampled using a HalTech HAL-HPC601 particle counter prior to entering the centrifugal fan. The aerosol concentration was then compared ratiometrically as a function of particle size to the ambient aerosol concentration. Aerosol source: natural aerosols circulating in Research International's headquarters facility in Monroe, Washington USA.

Table 2:
Comparison of old and new electret filter aerosol collection efficiencies at a nominal 300LPM

Electret Media	Collection efficiency (%)					Number of filters measured
	0.3-0.5u	0.5-1.0u	1.0-2.0u	2.0-3.0u	3.0-5.0u	
Old style	46.6	70.6	86.2	86.3	84.6	3
	2.1	1.0	0.8	2.3	3.9	Std-dev. (%)
New style	51.0	72.9	87.9	92.5	90.8	5
	3.5	2.0	3.0	4.3	5.3	Std-dev. (%)

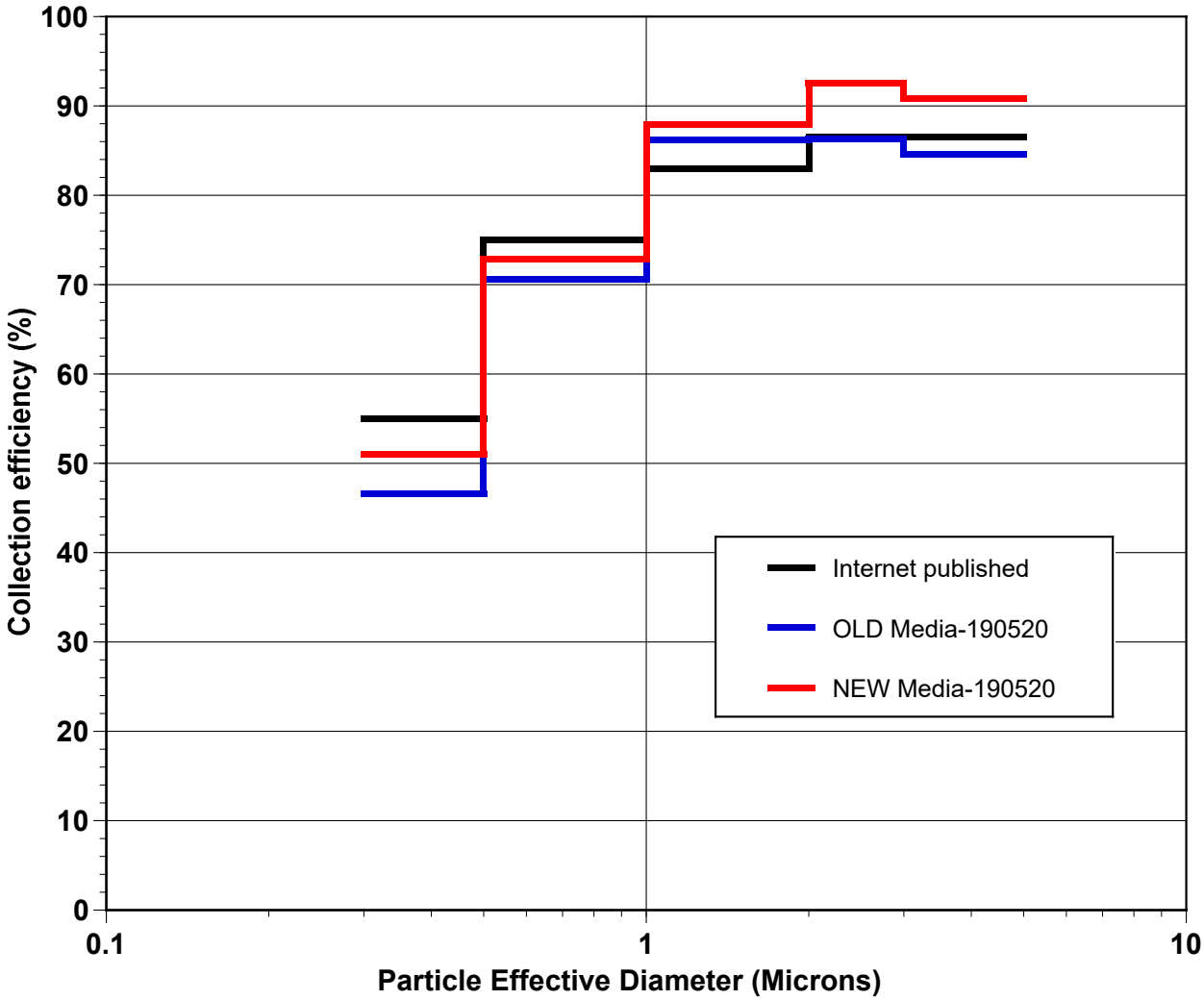

Figure 1. A comparison of efficiency test data published on the Internet by Research International with the recent test results for old style and new style media. The previous Internet tests used a MET-1 particle analyzer and polystyrene beads, whereas current May 20, 2019 tests were performed with an HPC601 particle analyzer and naturally-occurring ambient aerosols.