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TECHNICAL MEMORANDUM

DATE: March 2, 2001

TO: All Sales

COPY TO: Mike Boles

FROM: John Fischer

SUBJECT: Information regarding the level of bacteriological or particulate carry-over in SEMCO wheels

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We are frequently asked the questions "what about carry-over of bacteria within the SEMCO wheel" and "can't particulate stick to the entering edge of the media and then be blown back into the fresh air stream"?

We have several scientific investigations to support the statement "that with the SEMCO wheel, utilizing a purge section, the degree of carry-over of bacteria, viruses and other particulate is well below .045%, and similar to that expected for gaseous compounds."

I have included summaries of three of these research investigations, with a brief explanation of each provided as follows:

1) The independent investigation completed by GRTI (results attached as figure 1) confirms the ability of the SEMCO 3A wheel to limit the transfer of gaseous contaminants below the .045% claimed in our literature. It is logical to conclude that if carry-over of gaseous compounds (very small airborne particles) can be avoided, so will larger particulates.

   The smallest viruses are approximately .1 micron; bacteria are quite a bit larger. Gaseous contaminants are measured in angstroms, thereby the importance of our 3A patent (3 angstrom molecular sieve coating). One angstrom is .0001 microns. Therefore it is obvious that even the smallest virus will not fit into the 3 angstrom pores of the 3A sieve.

2) An investigation sponsored by the National Cancer Institute and conducted in the field at the Frederick Cancer Research Center quantified the degree of bacteriological transfer that existed in an actual installation of a fluted asbestos

paper total energy wheel. (These original asbestos wheels have since been retrofitted with SEMCO wheels).

Several key pages from a technical paper written to present the results of this research investigation are attached as figure 2. The investigation utilized the bacteria E coli to challenge the wheel at concentrations more than 10 times greater than would be encountered in an animal research environment. The results conclude that the measured carry-over was less than .003%, an extremely low percentage.

Since the older asbestos wheels were made of paper, we would anticipate that the thinner entering edge and non-fibrous flow channel provided by our 3A coated aluminum media would result in even less carry-over.

This research is also supported by the successful field experience, by SEMCO, at the research facility investigated, the Johns Hopkins research center, the University of Texas Micro Biology facility and many others.

3) In addition to bacteriological testing, which is dependent upon the counting of spores after incubation, testing has also been completed to quantify the percentage of particulate carry-over that exists when the SEMCO wheel is challenged with cigarette smoke.

   Figure 3 shows data collected by the Georgia Tech Research Institute, clearly showing that the particulate carry-over is essentially 0, thereby supporting the findings reported by the National Cancer Research Study. As you can see, even when the wheel is challenged with more than 260000 particles ranging in size from .01 microns to 2 microns, the supply air particulate concentration leaving the SEMCO wheel is essentially the same as the outdoor air particle levels.

This information will now allow all of you to provide designers and users with credible, quantitative data to answer questions related to particulate carry-over in the SEMCO wheel.

The complete Cancer Research Study as well as the GTRI data for tobacco smoke can be provided to those wanting more detailed support information.

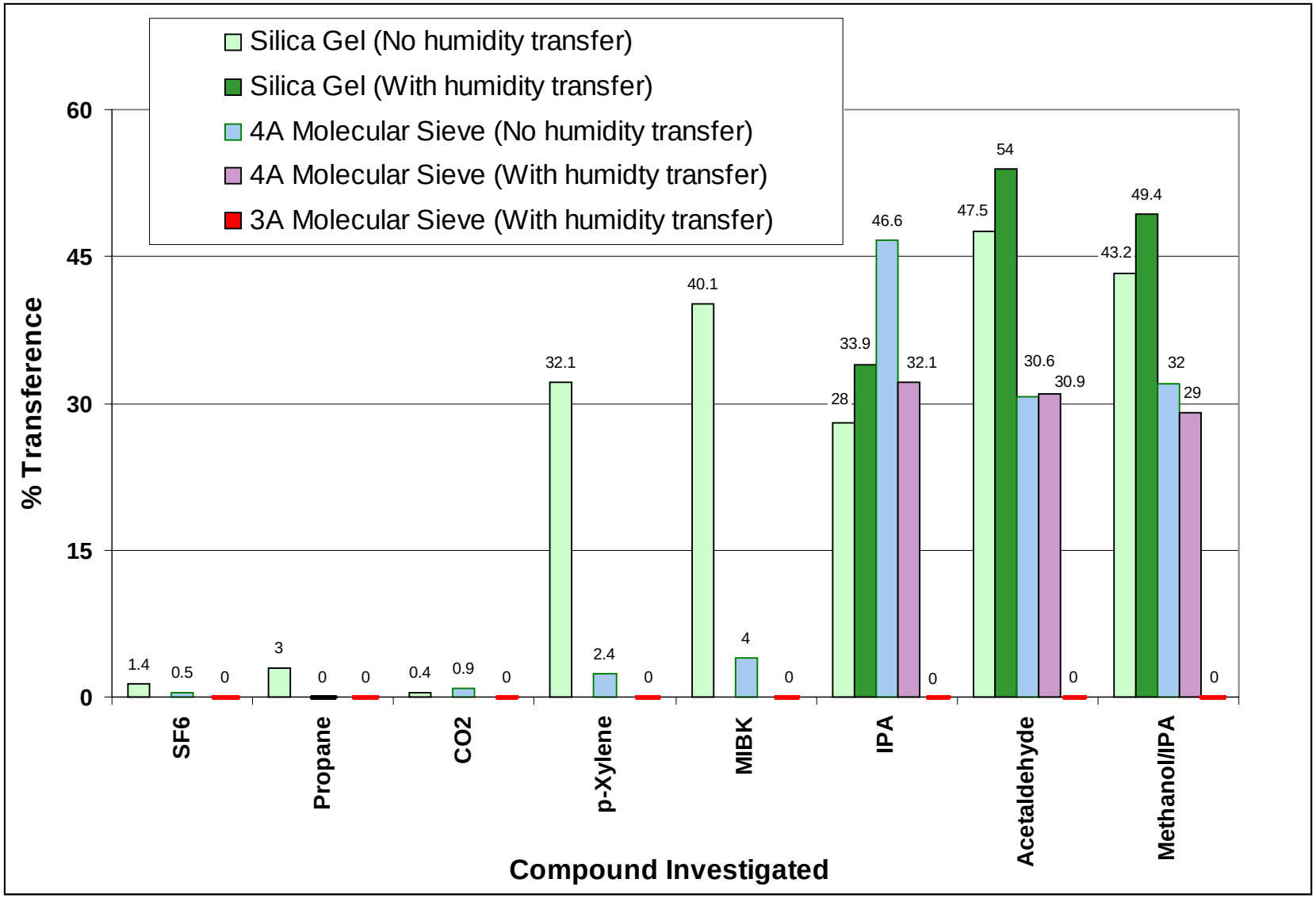
Silica Gel (No humidity transfer)
Silica Gel (With humidity transfer)
4A Molecular Sieve (No humidity transfer)
4A Molecular Sieve (With humidty transfer)
3A Molecular Sieve (With humidity transfer)
% Transference
60
45
30
15
0
1.4
0.5
0
3
0
0
0.4
0.9
0
32.1
2.4
0
40.1
4
0
28
33.9
46.6
32.1
0
47.5
54
30.6
30.9
0
43.2
49.4
32
29
0
SF6
Propane
CO2
p-Xylene
MIBK
IPA
Acetaldehyde
Methanol/IPA
Compound Investigated

Figure 1

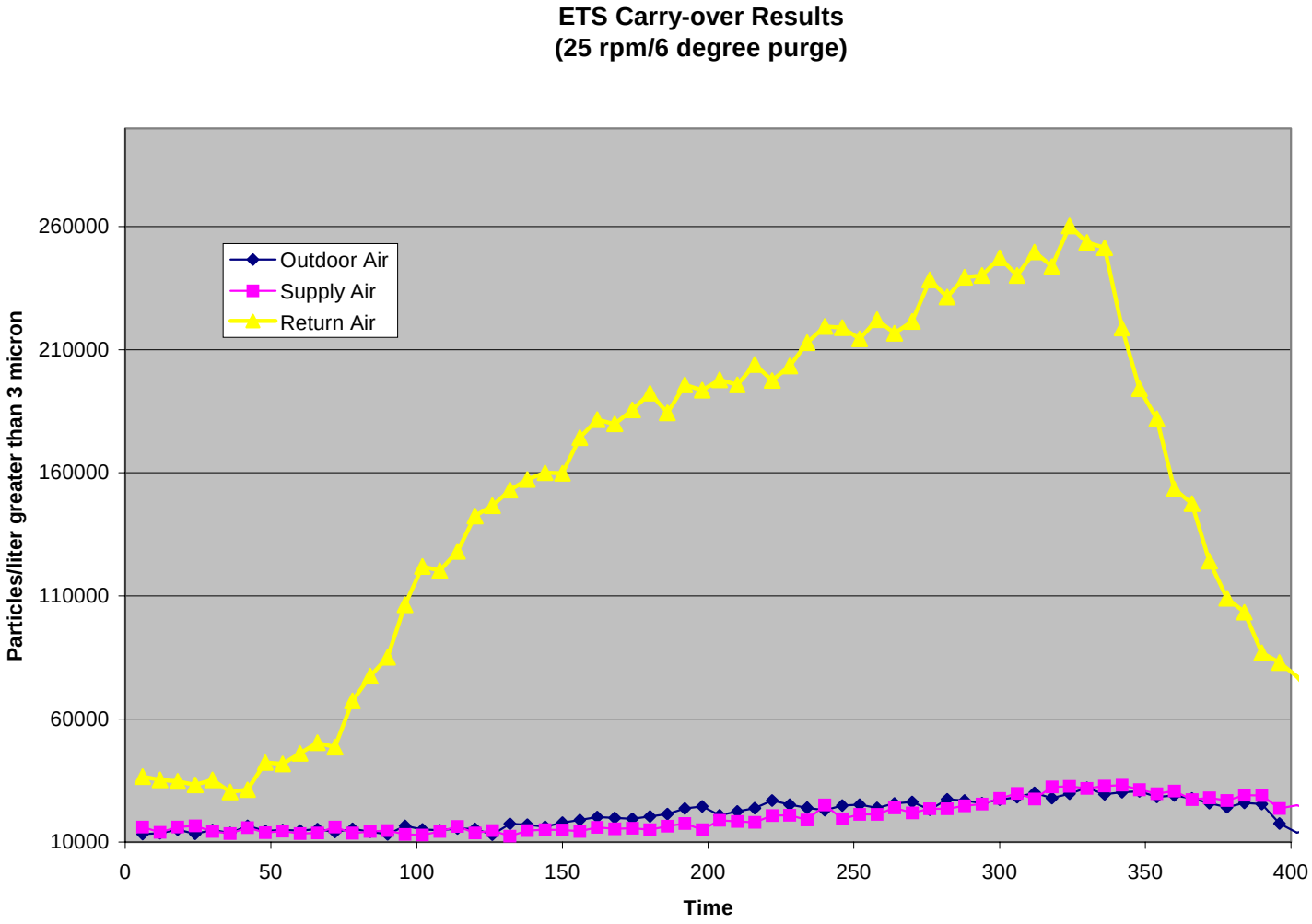
ETS Carry-over Results
(25 rpm/6 degree purge)
Outdoor Air
Supply Air
Return Air
Particles/liter greater than 3 micron
260000
210000
160000
110000
60000
10000
0
50
100
150
200
250
300
350
400
Time

Figure 3