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Comparisons of Particulate Matter Falling from Cleanroom Garb

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"Comparisons of Particulate Matter Falling from Clean Room Gear"

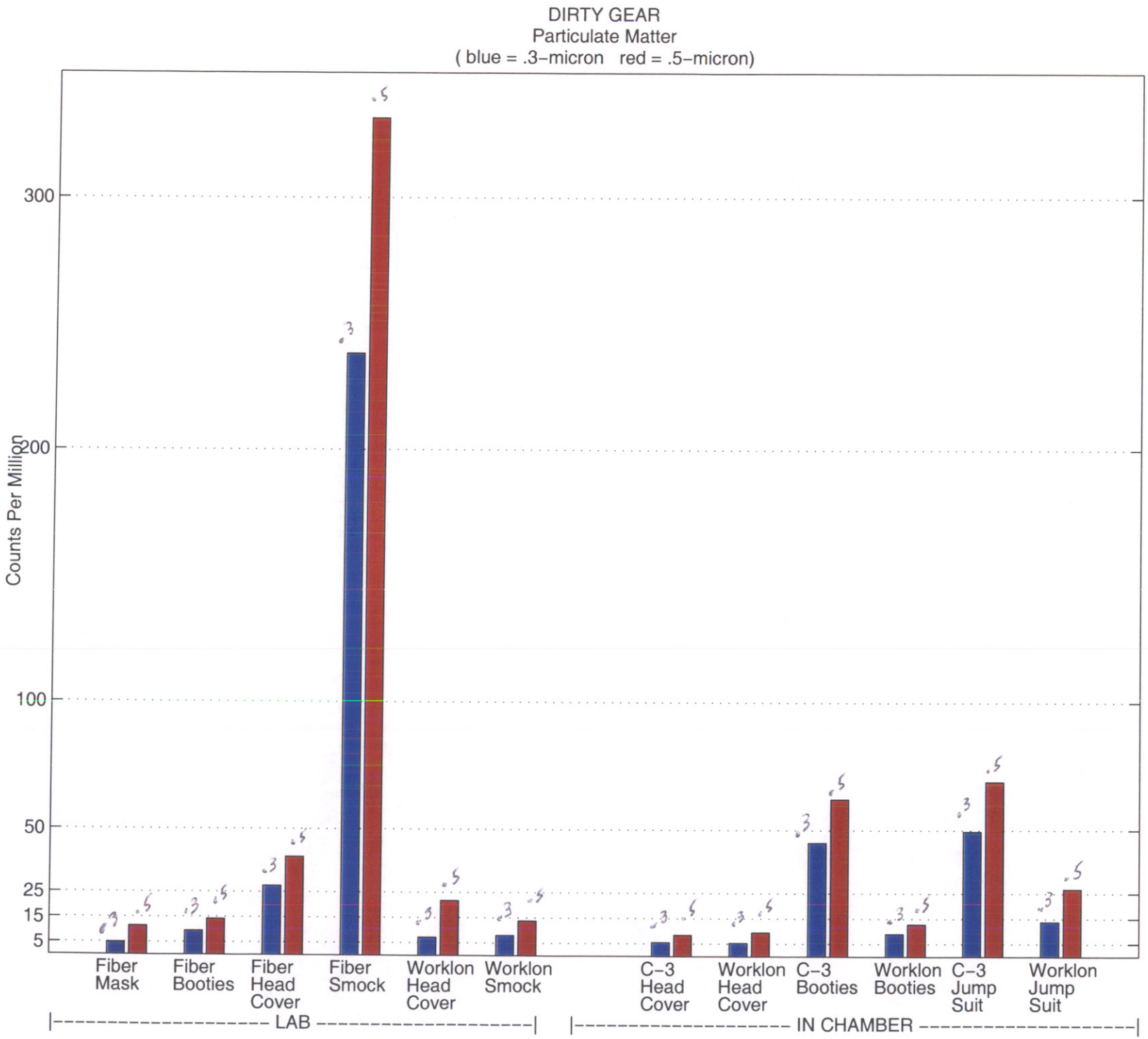
Sean R. Morriss

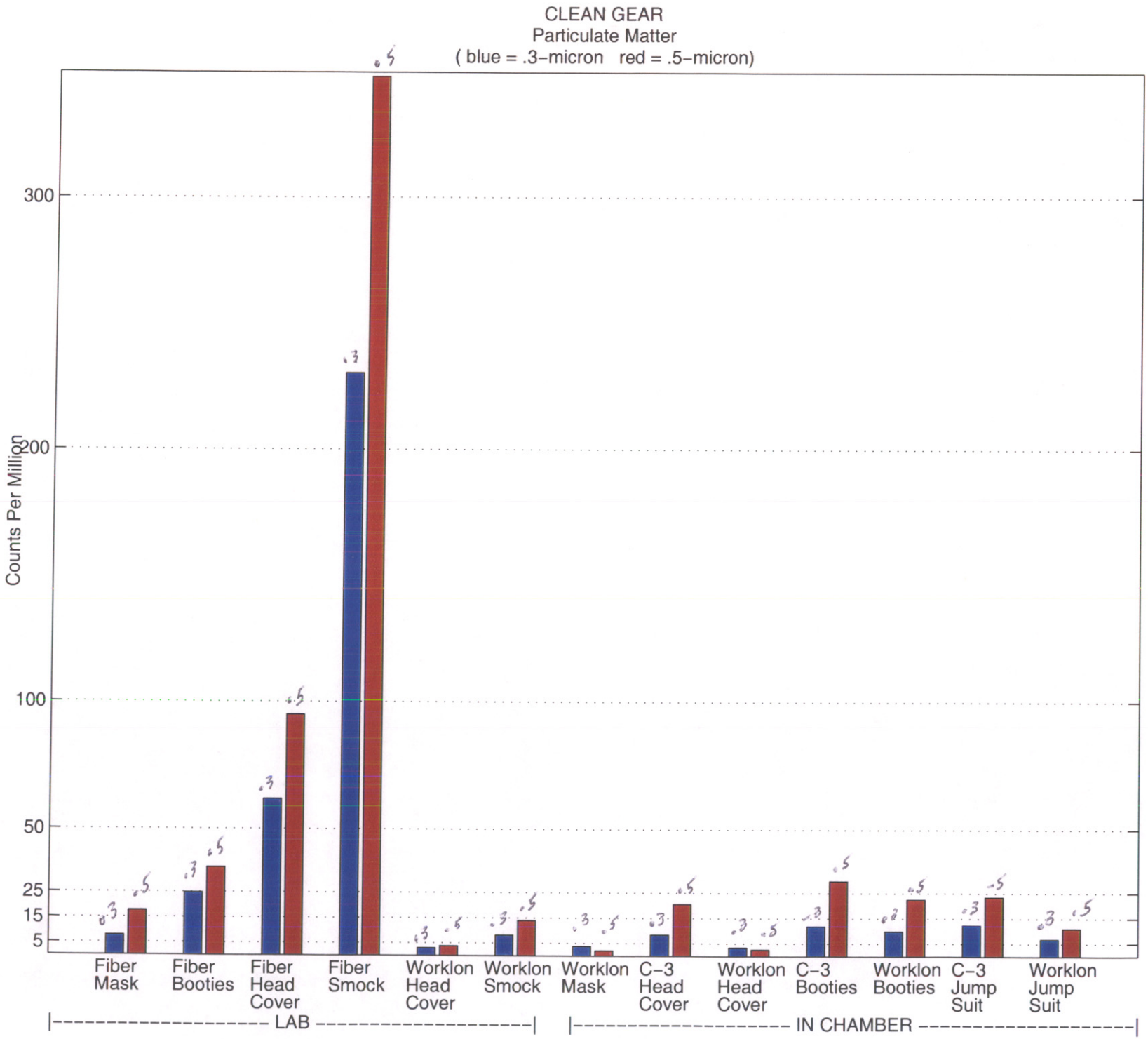
The experiment was conducted within the clean room itself to minimize any outside influence of particles already present in the air. The setup consisted of a particle counter as well as all the various types of gear to be tested, both clean items and those that had been soiled via one use. After the counter was set to run, the counts were observed when there was no garment being tested and only those few particulates that were in the air were registering. This was done for several readings and always for a long enough period that an approximate average could be ascertained for both the .3-micron and .5-micron particle counts. Occasionally the readings would become too erratic, but this would generally only persist for a brief time, presumably caused by a waft of dirty air, and one could quickly return to the task at hand These two "baseline" averages were recorded, and when the counter again read within two parts per million for both, the specific item to be tested was rubbed for 5 to 5.5 seconds (3 individual readings) above the particle counter. Waiting through the next 2 to 4 readings until the counts had reached maximum and began to drop, the .3 μm and .5 μm maxima were then recorded alongside their baselines, and one began again, finding a new baseline. After all the data had been collected, each baseline count was subtracted from its corresponding maximum to obtain the change in count due to the particles falling from the item being tested. Five to six sets of measurements, .3 μm and .5 μm, baseline and actual reading, were taken for each item, and the averages obtained from these made the data represented by the heights of the bars in the two graphs.

Conclusions

The first odd thing one notices when comparing the two graphs is that all the items of fiber gear shed fewer particles when dirty than when clean. The reason for this must be that the fiber material has more loose particles on its surface initially and loses less of them as its surface becomes freer of them, and that the shedding of these loose particles greatly outweighs any contributions due to accumulated dust. This seems to follow what one might expect, and leads logically to the idea that reusing the fiber gear is actually preferable to more frequently using new.

When comparing each of the C-3 items with its corresponding Worklon item, in all cases except for dirty head covers, we see that the Worklon is inherently cleaner than the C-3. Perhaps it should be used exclusively? As for the one exception, the amounts represented by the heights of all four bars are so small, it could easily be due to experimental error, perhaps of the type spoken of before (dirty air).


DIRTY GEAR
Particulate Matter
(blue = .3-micron red = .5-micron)
Counts Per Million
300
200
100
50
25
15
5
Fiber Mask
Fiber Booties
Fiber Head Cover
Fiber Smock
Worklon Head Cover
Worklon Smock
C-3 Head Cover
Worklon Head Cover
C-3 Booties
Worklon Booties
C-3 Jump Suit
Worklon Jump Suit
LAB
IN CHAMBER


CLEAN GEAR
Particulate Matter
(blue = .3–micron red = .5–micron)
Counts Per Million
300
200
100
50
25
15
5
Fiber Mask
Fiber Booties
Fiber Head Cover
Fiber Smock
Worklon Head Cover
Worklon Smock
Worklon Mask
C–3 Head Cover
Worklon Head Cover
C–3 Booties
Worklon Booties
C–3 Jump Suit
Worklon Jump Suit
LAB
IN CHAMBER