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MEMO FOR FILE:
VISIT TO McGILL UNIVERSITY
DUST RESPIRATOR PROGRAM

C. Sheckler, J. Eby, R. Gresham, J. Matheson of Welsch Manufacturing Company, W. Burgess of Harvard Public Health and I met with Prof. Bardswick and J. Lajzerowicz on December 1 to review their most recent report on studies of respirators for filtration of asbestos. Cliff Sheckler has a complete copy of this report.

In general the technique is satisfactory as a means of comparison between respirators, although it differs from the standard Bureau of Mines certification procedure in flow rate, particulate concentration and other factors, including the use of asbestos rather than silica dust.

A secondary part of the procedure was the evaluation of leakage around the mask using a helium concentration technique. There is some question concerning the significance of these helium leakage tests, especially where the face seal is accomplished by a sponge rubber media. Filter penetration tests were run using a Byrd Mark 9 respirator operating at a total air volume of 6 liters/minute and with fiber concentrations of approximately 20, 50, and 100 fibers/cc, respectively.

The data indicate that the new 3M disposable filter, the Welsch disposable filter and the Willson prototype filter were all satisfactory from a penetration standpoint. From a face leakage standpoint the 3M and Welsch units were satisfactory, but the Willson prototype showed excessive leakage. This will undoubtedly be less with the softer plastic to be used in the final material.

By combining the fiber penetration through leakage with the fiber penetration through the filter media, it was possible to calculate an anticipated fiber concentration within the mask for each of the three concentrations used in the test. While this calculation appears an approximation at best, it would again reveal the suitability of the Welsch and 3M masks for most applications. A significant problem was revealed in that at the lower fiber concentrations (20 fibers/cc) the mask efficiency was markedly reduced leading in some cases to a greater fiber concentration within the mask in an atmosphere of 20 fibers/cc than in a concentration of

MEMO FOR FILE:
VISIT TO McGILL UNIVERSITY

100 fibers/cc when the entire test period of 8 hr was considered. This problem must undoubtedly be examined in more detail when NIOSH and OSHA present their proposals in the near future for improved respirator control.

The report also attempted to arrive at an index of effectiveness by combining the three factors of filter media efficiency, face leakage and inhalation resistance. In this case again the Welsch units appeared to be the best, although the 3M disposables were satisfactory. From a cost standpoint the 3M units will undoubtedly be most acceptable since they will probably cost from 30 to 50 per cent as much as the Welsch disposable unit. However, other factors will have to be considered, including the greater durability of the Welsch unit and the actual conditions of use. For example, the 3M unit would be most satisfactory in a cold, dry atmosphere while the Welsch unit with its inhalation and exhalation valves would be much more comfortable in any hot or humid atmosphere. It is suggested that any future tests on face leakage be conducted with sodium chloride aerosol rather than a gas.

A byproduct of this test program was the observation that Dust Foe 77 respirators consistently failed to attain even 90 per cent efficiency compared to the 99+ per cent efficiency of the other satisfactory masks. This is particularly disturbing since Dust Foe 77 is one of the masks most recommended for use in J-M locations. This information became known to Bob Schutz of the U. S. Bureau of Mines who contacted the writer several weeks ago to verify what he had heard apparently from a meeting held in Canada.

Subsequent to the meeting at McGill, Cliff Sheckler and I visited Mr. Schutz to give him, on a privileged and confidential basis, the information contained in the report. He was very much concerned about the results with MSA Dust Foe and asked if we had any unused filters from this lot that he could test in his standard procedure to determine whether a QC problem existed at Mine Safety Appliance. Sheckler will check with Bardswick and arrange for transfer of filters if they are available.

Schutz thanked us for the information. He was also particularly impressed with the data concerning relatively high penetrations at low fiber concentrations and presumably also for short exposure periods at any concentration. Obviously in normal usage, fibers will constitute only a part of the dust exposure so that one might expect a greater build-up of particulates on the mask than was obtained with exposures to pure fiber at 10 fibers/cc. Considerable data would have to be obtained to investigate this problem in more detail. We do not anticipate doing this in the McGill program.

MEMO FOR FILE:
VISIT TO McGILL UNIVERSITY

Bob Schutz informed us that the emergency 5 fiber/cc TLV was being published in the FEDERAL REGISTER on December 7 and that he anticipated that an emergency 2 fiber/cc limit might be established in the not too distant future.

A significant program is now underway at the Los Alamos Laboratory under the direction of Ed Hyatt to evaluate techniques for quantitating the effectiveness of face fit by different masks using sodium chloride techniques. There is a good possibility that this would end up with the requirement for "sized masks" to meet requirements of different facial characteristics.

While no further program is contemplated at McGill, it appears highly desirable that we maintain good contact with Bob Schutz and establish contact with Ed Hyatt at Los Alamos. As a side issue, the most recent meeting of the subcommittee of ANSI on respirator protection was recessed with no action pending the recommendations which are anticipated from both NIOSH and OSHA on the entire question of protection against exposure to asbestos. Probably these recommendations will be made in the usual manner with little or no factual basis.

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