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Enclosed is my synopsis of the Industrial Hygiene Aspects of Asbestos for your use in the long range plan.

JA Riddle

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JAR/cg
enc:

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INDUSTRIAL HYGIENE

Newspaper headlines, such as "Ovary Cancer, Asbestos Link", "A Strange and Deadly New Cancer Among Asbestos Workers", and the like, have given the public the impression that there is a proven connection between asbestos and lung cancer, mesothelioma, or even ovarian cancer. Even a careful perusal of the newspaper accounts fails to bring out certain important facts:

1. There are four separate and distinct types of asbestos; chrysotile, crocidolite, amosite, and anthophyllite.
2. Crocidolite has been pretty conclusively established as a cause of mesothelioma. If there is a relationship between Chrysotile and mesothelioma, it is much less pronounced.
3. Mesothelioma is still a rare disease. For instance, only 250 cases related to exposure have been recorded in the United Kingdom, where 25,000 cases of lung cancer are diagnosed every year.
4. Crocidolite and Amosite contain hydrocarbons, including 3,4-benzopyrene, and also absorb oil from the jute bags in which they are packaged. Polycyclic hydrocarbons and jute oil have been shown to be carcinogenic under some circumstances. Chrysotile is oil-free and ordinarily is packed in paper bags.
5. Many of the sensational news stories are based upon the finding of "Asbestos Bodies" in microscopic examinations of tissue from various organs. In the original medical reports, the author usually is careful to point out that positive identification of asbestos bodies is quite difficult, that there is evidence that other materials besides asbestos may cause formation of "asbestos bodies", and that only a small number of "asbestos bodies" are seen except in the lung tissue of established asbestosis patients.

The foregoing is an attempt to put the situation in perspective, not to imply that there are no health problems with asbestos. Viewed objectively, there are probably three areas of risk due to exposure to asbestos:

1. Asbestosis, or progressive loss of lung function due to accumulation of asbestos fibers in the lungs, with accompanying fibrosis. Coalinga Chrysotile fibers are believed to be less dangerous than other varieties because the curved fiber shape reduces penetration depth into the lungs, and it is more rapidly eliminated than other asbestos varieties.
2. Mesothelioma is associated with exposure to Crocidolite, but not necessarily to Chrysotile.
3. Bronchial carcinoma is associated with asbestosis, and there may be a synergistic effect when smoking and exposure to asbestos are combined.

It was previously believed that asbestosis would not develop if the dust concentration in the working place were kept below 5 million particles per cubic foot (5×10^6 p/cf). With the long time span between initial exposure and the onset of clinical symptoms it will be evident that a rigorously defined safe limit is not possible. Currently, some environmental health authorities are in favor of lowering the limit, but with no solid evidence as to what it should be.

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The King City plant has operated since it started with dust concentrations below $5x10^6$ p/cf in non-respirator areas. A recent sampling indicated $2.8x10^6$ p/cf average in all non-respirator areas, with none above 3.7. The respirator area comprises the dry opening, packaging, and palletizing areas which are walled off from the rest of the building. All personnel working in the respirator area are required to wear USBM-approved respirators.

Customer's problems are in two categories, the pre-trial questions, and the actual problems which arise when they become consumers. For most people the questions are satisfactorily answered, for the moment at least, by the "asbestos toxicology" sheet. In the event of additional adverse publicity, an expansion of the asbestos toxicology sheet may be needed.

Problems of dust control in handling are susceptible to engineering solutions and we can pass on to the customer our experience in dust control and materials handling. The advantages of the pelletized form are obvious.

It will be necessary to maintain liaison with other organizations conducting research and statistical studies in this field. If it can be arranged, publication of reports which put the data in better perspective should be encouraged.

We perform chest x-rays on all new hires as part of the pre-employment physical. Fibrosis or Emphysema are cause for rejection. All employees are given periodic x-rays at intervals determined by their smoking habits, ranging from 2 years for the non-smokers down to 6 months for heavy smokers. The tabulation below shows the number of employees with various periods of exposure.

Number of Employees	Years of Exposure
6	6
8	5
9	4
6	3
33	less than 3

To date, our periodic x-rays have shown no changes from the x-rays taken at the time of initial hiring.

J.A. Riddle
7-25-68

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