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Testimony to DOL

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STATEMENT OF
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CENTER FOR DISEASE CONTROL
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

AT THE
OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
U. S. DEPARTMENT OF LABOR
INFORMAL HEARING

ON

PROPOSED STANDARD FOR OCCUPATIONAL EXPOSURE TO INORGANIC ARSENIC
SEPTEMBER 8, 1976

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Accompanying me today are Dr. Victor E. Archer, Division of Surveillance, Hazard Evaluations and Field Studies; Dr. Laurence J. Doemeny, Division of Physical Sciences and Engineering; Mr. Robert H. Schutz, Testing and Certification Branch; and Dr. J. Henry Wills, Division of Criteria Documentation and Standards Development.

The National Institute for Occupational Safety and Health is here to address only three technical issues concerning the arsenic standard. We are not here to comment on impacts. The technical issues include air sampling and chemical analysis, sputum cytology and respiratory protection.

Sampling and Analysis

Based on a review of information and studies available to us since our report at the OSHA hearing in April 1975, NIOSH concludes that personal sampling can be used to collect air samples to measure worker exposure to arsenic at the recommended level with a precision of approximately $\pm 25\%$ at the 95% confidence level for 0.8 μm pore size filter collected samples and analyzed using atomic absorption spectroscopy.

Using existing sampling equipment, it is possible to collect samples at 3 lpm for a 15 minute sampling period at air concentrations of 2 $\mu\text{g}/\text{cu m}$ which would therefore result in a 0.09 μg As sample. Analysis of samples with 0.06 to 0.200 μg sample of arsenic will yield

an absorbance which may be too low for acceptable quantitative analysis. To reduce this concern, samples should be collected so as to obtain as high an arsenic loading as possible which may require longer sampling times (30-50 min.).

Research is currently underway to develop a reliable sampling and analytical method for arsine in the desired range. While NIOSH has not yet completed studies for personal sampling of arsenical vapors such as arsenic trichloride, it is expected that midget bubblers containing 0.1N NaOH can be used to effectively collect these vapors for atomic absorption spectroscopy arsenic analysis. Results of these research efforts will be reported as quickly as possible.

Detailed information on Sampling and Analysis of Inorganic Arsenic is attached to the NIOSH statement as part of the record.

Sputum Cytology

Exfoliative cytology of sputum and urine are recognized methods of early detection of malignant disease of the lungs and urinary system-- two sites of occupational cancer. In both sites, exfoliative cytology is capable of detecting malignant disease at an earlier stage than is any other diagnostic method. There are few, if any, false positives when done by skilled cytopathologists. The earlier the detection, the better the chance of cure by medical intervention. Periodic chest films have been shown to be a poor method for early detection of lung cancer.

In addition, exfoliative cytology is capable of detecting pre-malignant changes. There is a gradual change in exfoliated cells from persons developing cancer. These gradual changes have been recognized and described repeatedly. The usual designation of these premalignant changes is mild atypia, moderate atypia, and marked atypia. Not all of these changes progress to malignant disease, but the more severe the change, the more likely it is to progress to cancer. Current studies are underway to establish how frequently each progresses to cancer. The time between the various stages of atypia is quite variable, but averages between 3 and 5 years among those destined to develop cancer.

With this time interval to work with, it has been found that periodic exfoliative cytological study of individuals who are at an elevated risk of lung cancer will result in (1) identification of individuals with premalignant disease, and (2) early diagnosis of malignant disease.

Respiratory Protection

The original criteria document for inorganic arsenic recommended half-mask respirators with replaceable dust or fume filters as minimum air-purifying respiratory protection. The proposed OSHA Inorganic Arsenic Standard specifies half-mask respirators with high-efficiency filters as minimum air-purifying respiratory protection.

Since it appears that some inorganic arsenic compounds have a significant vapor pressure, half-mask respirators are excluded because

of eye irritation and the probability of irritation between the facepiece and the face.

The normal minimal air-purifying respiratory protection recommended for inorganic arsenic compounds with significant vapor pressure would be a full facepiece chemical cartridge respirator. However, none of these have ever been submitted for testing and approval.

Until such time as approved methods are commercially available, the minimal respiratory protection recommended is an approved gas mask with a chin-style or a front- or back-mounted acid gas canister with high efficiency particulate filter.

Where there is no significant vapor pressure, as a minimum, approved high efficiency particulate filter respirators with full facepieces should be used.

A table of respirators for use under varying conditions is attached as part of the record. This table was developed through the OSHA-NIOSH SCP respirator decision logic. A copy of that logic is also attached.

If there are any questions, we would be pleased to try to answer them.

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16. Abstract (Limit: 200 words) This testimony addressed three technical issues concerning the arsenic (7440382) standard. These three aspects were sampling and analysis, sputum cytology, and respiratory protection. Having reviewed currently available information, NIOSH concluded that personal sampling can be used to collect air samples to measure worker exposure to arsenic at the recommended level with a precision of about plus or minus 25 percent at the 95 percent confidence level of 0.8 micrometer pore size filter collected samples using atomic absorption spectroscopy. Analysis of 0.06 to 0.200 microgram samples of arsenic will yield an absorbance which may be too low for acceptable quantitative analysis. Efforts were underway to develop a reliable method for determining arsine (7784421) in the desired range. Reviews of work on sputum cytology indicated that periodic exfoliative cytological study of individuals who were at an elevated risk of lung cancer assisted in identifying individuals with premalignant disease and aided in the early diagnosis of malignant disease. Concerning respiratory protection, the proposed OSHA standard for inorganic arsenic specified half mask respirators with high efficiency filters as minimum air purifying respiratory protection. The minimal respiratory protection recommended was an approved gas mask with a chin style or a front or back mounted acid gas canister with a high efficiency particulate filter.			
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