...available during the past several years support our current recommendations. The rationale for these revised recommendations was developed jointly by our staffs as part of a draft preamble to a proposed lead standard. Should there be a need to revise and reissue the lead criteria document, we would be glad to do so within a reasonable period of time.

General Policy

GAO WILL DETERMINE MOST EFFECTIVE USE OF CANCER RESEARCH RESULTS FOR AGENCIES

A study to determine how research results on the carcinogenicity of materials can be handled most effectively to meet the needs of regulatory agencies is being conducted by the General Accounting Office.

Research sponsorship and the government's coordinating activities for the screening of potential cancer-causing substances is carried out at the National Cancer Institute of the National Institutes of Health, but research is performed at many locations as implications for industrial, environmental, and other exposures are all different.

The study by GAO was initiated internally, that is, not at the specific request of Congress. Its purpose is to examine the problems in developing and recommending standards for screening possible carcinogens, and its scope includes costs, scheduling, and interagency information flow. A GAO spokesman said that in addition to the National Cancer Institute, research agencies surveyed included the National Institute for Occupational Safety and Health and the National Institute of Environmental Health Sciences. Regulatory agencies studied included the Occupational Safety and Health Administration, the Environmental Protection Agency, and the Consumer Product Safety Commission.

A draft report for agency review is in preparation, and a final report is expected to be ready in about four months, according to a GAO spokesman.

Health Hazards

NIOSH ISSUES ASBESTOS DUST ALERT FOR WORKERS EXPOSED SERVICING BRAKES

An alert concerning the potential health hazard for persons exposed to asbestos during the servicing of motor vehicle brake and clutch assemblies was issued by the National Institute for Occupational Safety and Health on August 8.

NIOSH convened a meeting of government and university scientists, industry representatives, and labor union officials to discuss the present state of knowledge with respect to this problem on June 21. Data was presented by investigators from the Mount Sinai School of Medicine in New York City indicating that workers engaged in the maintenance and repair of automobile and truck brake linings are exposed to potentially hazardous levels of airborne asbestos dust (*Current Report*, July 31, p. 298).

Specific brake servicing operations studied included blowout of automobile drum brake assemblies, grinding of used truck brake linings, and bevelling of new truck brake linings. Average peak asbestos air concentrations for these three activities based on personal samples taken within 10 feet of the operator were, respectively, 10.5, 3.75, and 37.3 fibers greater than five microns in length per milliliter. Analysis of samples of brake drum dust revealed that almost all of the asbestos fibers were found shorter than 0.4 microns in length.

Previous Studies

Previous studies of the extent of asbestos emissions from automotive brake lining wear showed that only a very small fraction of the original asbestos content of the brake lining is found in brake drum dust. It was presumed that this is due to thermal degradation of the fibers during braking. The present findings indicate that enough asbestos is preserved to produce significant exposures during certain brake servicing procedures.

The full extent of asbestos-related disease in brake servicing personnel is not known at present because this particular occupational group has not been studied systematically up to now. However, a review of the scientific literature on the association between asbestos exposure and mesothelial tumors of the pleura and peritoneum has revealed at least four cases of these rare tumors in persons who were employed in jobs involving automobile brake servicing, the alert said.

The environmental studies of brake lining servicing together with observations of mesothelial tumors in persons so employed affirms the necessity for instituting and maintaining recommended control measures in this industry so that the health hazards of asbestos are minimized, according to the alert.

Recommended Procedures

Following are interim procedures recommended by NIOSH to minimize exposure to asbestos dust during brake and clutch servicing:

- If possible, an area shall be designated for all brake and clutch repairs. Entrances into this area shall be posted with an asbestos exposure warning sign as follows:

Asbestos
Dust Hazard
Avoid Breathing Dust
Wear Assigned Protective Equipment
Do Not Remain in Area
Unless Your Work Requires It
Breathing Asbestos Dust May Cause
Asbestosis and Cancer

- During brake servicing, an air purifying respirator, either single use or with replaceable particulate filter(s), as approved by the Mining Enforcement and Safety Administration (formerly Bureau of Mines) or NIOSH, shall be worn during all procedures starting with the removal of the wheels and including reassembly. During manual clutch servicing, such a respirator shall be worn during removal and cleaning of the clutch, pressure plate and housing assembly and during installation of the new clutch assembly.
- Dust shall first be cleaned from brake drums, brake backing plates, brake assemblies and clutch assemblies using an industrial type vacuum cleaner equipped with a high efficiency filter system (greater than 99 percent efficiency for 0.3 um diameter aerosols). After vacuum cleaning, any remaining dust shall be removed using a rag soaked in water and wrung until nearly dry. Under no circumstances shall compressed air or dry brushing be used for cleaning.
- During arcing and riveting operations, an approved respirator, as described in (2) above, shall be worn. Grinding (arcing) machines shall be provided with local exhaust ventilation such that worker exposures are maintained at least below the 1976 OSHA asbestos standard (29 CFR 1910.1001). At a minimum, the dust bag of the arcing machine shall be removed and replaced with the hose of the high efficiency industrial vacuum described in (3) above.
- Industrial vacuum cleaner bags containing asbestos dust and cloths used for wiping brake and clutch assemblies shall

be sealed in plastic bags and labeled with the following warning label printed in letters of sufficient size and contrast to be readily visible and legible:

Caution
Contains Asbestos Fibers
Avoid Breathing Dust
Breathing Asbestos Dust May Cause
Asbestosis and Cancer

All asbestos waste shall be disposed of in accordance with the OSHA asbestos regulation, 29 CFR 1910.1001 (h). During removal of vacuum bags, an approved respirator, as described in (2) above, shall be worn.

▸ All floor cleaning in areas where brakes and clutches are repaired shall be done with the high efficiency industrial vacuum cleaner as described in (3) above. Grinding (arcing) machines shall also be cleaned with such a vacuum cleaner and any remaining dust wiped with a damp cloth. An approved respirator, as described in (2) above, shall be used during this cleaning.

▸ Although adherence to the above procedures should minimize any contamination of work clothing, it is required that the appropriate portions of the OSHA regulations on asbestos (29 CFR 1910.1001 (d) (3) and (4)) concerning special clothing, change rooms, etc. be followed.

Note: Strict adherence to the above procedures should minimize exposures to mechanics during brake and clutch servicing. These are interim recommendations and are subject to revision pending results of ongoing NIOSH research.

Health Hazards

NIOSH RECEIVES REPORT ON EFFECTS OF OCCUPATIONAL EXPOSURE TO LEAD

A biomedical standard for blood lead (PbB) of .07 milligrams of lead per 100 milliliters of blood for workers was recommended in a report submitted to the National Institute for Occupational Safety and Health.

The report, entitled "Behavioral Effects on Occupational Exposure to Lead" was prepared under contract to NIOSH by John D. Repko, Ben B. Morgan, Jr., and John Nicholson of the Performance Research Laboratory, University of Louisville, Louisville, Ky.

Five measures of body burden and 80 behavioral measures of task performance were obtained from 316 experimental and 112 control subjects. The experimental subjects were volunteers from among workers exposed to inorganic lead at their jobs in three storage battery manufacturing companies. The controls were volunteers from five firms involved in various types of light manufacturing.

The data obtained from the subjects indicate that PbB is not a sensitive measure of changes in functional performance capacity. Aminolevulinic acid dehydrase in the blood (blood ALA-D) was found to be the most sensitive predictor of task performance.

Recommendation Rationale

Because most industrial hygienists and government regulatory agencies employ PbB as an index of the extent of exposure, the report said, any specified changes in biomedical monitoring criteria must include this specific measure.

Once the recommended level of PbB is exceeded, the report stated that the worker should be examined to determine:

▸ The occurrence of deterioration in medical status.
▸ The occurrence of deterioration in functional capacity.
▸ The specific level of ALA-D.

If any of these additional examinations are positive, the worker should be removed from his current level of exposure, the report said.

Other Recommendations

Other recommendations made in the report are as follows:

▸ Based on the behavioral data and the relationship between PbB and ALA-D, a biomedical standard of 21 units of ALA-D was recommended.

▸ Functional measures should be utilized in routine health-monitoring programs.

▸ Industrial tests developed for monitoring programs should meet certain criteria such as validity, sensitivity, engineering feasibility, reliability, and flexibility.

Sensory-perceptual Functions

According to the report, loss of hearing, as evidenced by an increase in auditory threshold, was correlated significantly with decreases in ALA-D. In addition, initial increases in hearing level were evidenced at PbB levels between .07 and .079 milligrams of lead per 100 milliliters for all frequencies tested.

There also was a significant correlation between decreases in the audible duration of a tone and increases in PbB, which provided "some suggestive evidence of auditory pathology."

In the past, where auditory dysfunctions were attributed to lead intoxication, the actual effects were unclear. The results of this study confirm that hearing losses may occur at all frequency ranges, particularly at high levels of body burden of lead.

The report stated that not only do increases in threshold hearing levels (between 1,000 and 8,000 Hz) bear a relationship to decreases in ALA-D, but hearing levels at 500 and 1,000 Hz correlated positively with urine lead (PBU) and at 4,000 and 8,000 Hz hearing levels correlated positively with PbB.

Changes in watchkeeping, vigilance, and attentive as well as visual functions were not indicated by the data.

Biomedical Measures

The study data suggest that PbB is "neither reliably stable nor sufficiently related to the effect of exposure to provide a sensitive measure of changes in functional capacity."

Blood ALA-D was found to be the strongest clinical measure of changes in the functional capacities assessed. The usefulness of ALA-D is based on two facts:

▸ ALA-D is a quantitative measure of the effect of lead on body biochemistry.

▸ Inhibited ALA-D activity is detectable in the absence of urinary responses and at extremely low concentrations of PbB.

Intellectual Functions

The report noted that significant differences in intellectual functions between study groups or between PbB were not found in the experiment.

However, the report added, this should not be taken to mean that all intellectual functions are unaltered in exposure to lead. Additional research in this area is needed, the report said.

New research should concentrate on the ability of "leaded subjects" to learn new skills or to improve performance through practice and to the performance of intellectual functions "under stressful conditions," according to the report.

Neuromuscular Functions

According to the report, the strongest relationships between body burden of lead and functional capacity occurred with neuromuscular function tests.

On the basis of correlations between performances and decreases in ALA-D, the data showed a decrease in func-