

PRELIMINARY SURVEY REPORT:  
EVALUATION OF BRAKE DRUM SERVICE CONTROLS

AT

Ohio Department of Transportation  
Maintenance Facility  
Lebanon, Ohio

REPORT WRITTEN BY:  
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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
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PLANT SURVEYED: Ohio Department of Transportation  
District 8 Headquarters  
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SIC CODE: 7538

SURVEY DATE: March 4, 1986

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## I. INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH) is the primary Federal agency engaged in occupational safety and health research. Located in the Department of Health and Human Services (formerly DHEW), it was established by the Occupational Safety and Health Act of 1970. This legislation mandated NIOSH to conduct a number of research and education programs separate from the standard setting and enforcement functions carried out by the Occupational Safety and Health Administration (OSHA) in the Department of Labor. An important area of NIOSH research deals with methods for controlling occupational exposure to potential chemical and physical hazards. The Engineering Control Technology Branch (ECTB) of the Division of Physical Sciences and Engineering has been given the lead within NIOSH to study the engineering aspects of health hazard prevention and control.

Since 1976, ECTB has conducted a number of assessments of health hazard control technology on the basis of industry, common industrial process, or specific control techniques. Examples of these completed studies include the foundry industry; various chemical manufacturing or processing operations; spray painting; and the recirculation of exhaust air. The objective of each of these studies has been to document and evaluate effective control techniques for potential health hazards in the industry or process of interest, and to create a more general awareness of the need for or availability of an effective system of hazard control measures.

These studies involve a number of steps or phases. Initially, a series of walk-through surveys are conducted to select plants or processes with effective and potentially transferable control concepts or techniques. Next, in-depth surveys are conducted to determine both the control parameters and the effectiveness of these controls. The reports from these in-depth surveys are then used as a basis for preparing technical reports and journal articles on effective hazard control measures. Ultimately, the information from these research activities builds the data base of publicly available information on hazard control techniques for use by health professionals who are responsible for preventing occupational illness and injury.

This plant was visited as part of a study of asbestos control during the maintenance and repair of vehicular brakes. The study will evaluate the effectiveness of various control technologies designed to reduce asbestos exposure to brake mechanics. Ultimately, this project will result in a proposed journal article describing the effectiveness of such controls.

## II. PLANT AND PROCESS DESCRIPTION

### PLANT DESCRIPTION

This facility repairs all the Ohio Department of Transportation equipment in the eight counties of Southwest Ohio. The garage is responsible for maintenance of 170 large trucks, 250 pick-up trucks, 90 passenger cars, 25 vans, and 25 loaders. The garage is a large heated building with approximately 25-foot high ceilings with overhead hoists large enough to raise

one end of a vehicle. There are about 12 large bays for conducting repair work. Approximately 400 to 500 brake jobs are performed each year.

#### PROCESS DESCRIPTION

Brakes are serviced using a Clayton brake cleaning unit. This garage has been using the Clayton for six weeks. Prior to purchase of the Clayton, brakes were washed with a brush and the mechanic wore a protective mask, no air pressure was used. In the demonstration, we observed the Clayton was rolled from the storage locker to the vehicle to be serviced. The rear of the vehicle, a Ford Van, was hoisted up so the rear axle rested on two jacks. This van has a 15-inch wheel and an 11-inch brake. The Clayton was rolled to the wheel and enclosed the top, sides, and bottom of the wheel, while a 4-way flap was used to cover the back of the wheel. The mechanic hooked up the air hose and turned on the vacuum. Using the gloves in the Clayton, he pulled off the wheel drum which in this case stuck; so a hammer was inserted through the back of the Clayton. The back flap was closed to maintain the integrity of the enclosure. With the gloves, the mechanic used the hammer to knock off the drum. The wheel and the inside of the drum are vacuumed first, then air pressure at about 125 psi is applied with the vacuum still running, creating a dark dust cloud in the enclosure which gradually dissipates. It requires 3 to 5 minutes to vacuum and blow off the dust using the Clayton. (No wetting is used in conjunction with the Clayton.) The Clayton was removed from the wheel, and the brakes were serviced.

#### POTENTIAL HAZARDS

Available evidence indicates that exposure to asbestos can occur during the cleaning, maintenance, and repair of vehicular brakes. The human toxicological significance for the inhalation of asbestos fibers is well documented; and instances of mesothelioma in auto repair workers have been identified.

### III. CONTROLS

#### PRINCIPLES OF CONTROL

Occupational exposures can be controlled by the application of a number of well-known principles, including engineering measures, work practices, personal protection, and monitoring. These principles may be applied at or near the hazard source, to the general workplace environment, or at the point of occupational exposure to individuals. Controls applied at the source of the hazard, including engineering measures (material substitution, process/equipment modification, isolation or automation, local ventilation) and work practices, are generally the preferred and most effective means of control both in terms of occupational and environmental concerns. Controls which may be applied to hazards that have escaped into the workplace environment include dilution ventilation, dust suppression, and housekeeping. Control measures may also be applied near individual workers, including the use of remote control rooms, isolation booths, supplied-air cabs, work practices, and personal protective equipment.

In general, a system comprised of the above control measures is required to provide worker protection under normal operating conditions as well as under conditions of process upset, failure, and/or maintenance. Process and workplace monitoring devices, personal exposure monitoring, and medical monitoring are important mechanisms for providing feedback concerning effectiveness of the controls in use. Ongoing monitoring and maintenance of controls to insure proper use and operating conditions, and the education and commitment of both workers and management to occupational health are also important ingredients of a complete, effective, and durable control system.

These principles of control apply to all situations, but their optimum application varies from case to case. The application of these principles are discussed below.

#### ENGINEERING CONTROLS

The ODOT District 8 garage uses the Clayton (CAI) brake cleaning unit for servicing of all vehicular drum brakes. This system has been designed to contain and collect asbestos fibers which are liberated when the brake linings are serviced. Each Clayton includes a brake enclosure hood and a HEPA-filtered dust collector. The hood consists of a see-through material similar to Plexiglas® on the top, front, and sides; a 4-way cloth flap in the back; and a metal base on the bottom. The compressed air gun and vacuum nozzles are inside the hood and a pair of gloves are accessed through the front of the hood. The hood is 24 inches deep, which is wide enough for all sizes of brakes. The ODOT services wheel sizes from 13 to 22-1/2 inches with brake sizes from 8 to 15 inches in diameter and up to 6 inches wide.

Additional features of the Clayton are two vacuum motors; plenty of cord to roll the unit where it needs to go; movable hood enclosure that can be raised up or down to allow the service of vehicles either on a rack or at floor level; and a secondary filter (Tri-pleat) that is 50 to 55% efficient. The bag that collects the asbestos dust is replaced when it is half full. The bag is disconnected from the Clayton unit, rolled up, and put in a plastic bag for disposal. The cost of the Clayton unit was \$3,100.

One disadvantage of the Clayton unit mentioned by the ODOT mechanic was that it was bulky and would have preferred a smaller unit be available for smaller brake drums.

#### WORK PRACTICES

The vendor provides the initial training in the use of the Clayton. The ODOT mechanic used fairly good work practices techniques during the demonstration such as using the glove box even when hammering the brake drum. However, work practices could be improved at this garage in one area and that is to operate the vacuum when placing the Clayton over the wheel. The garage was quite clean, not cluttered, comfortable temperature, and well lit.

#### MONITORING

No medical monitoring is conducted.

## PERSONAL PROTECTION

ODOT provides safety glasses which are required for certain jobs tasks such as grinding. Dust masks and half-mask cartridge respirators are provided and used for certain tasks. No respirator was worn during the demonstration of the Clayton.

## OTHER UNIQUE PRACTICES

The mechanic demonstrating the Clayton serviced brakes for 30 years, and has been certified by ASE (Automotive Service Excellence) for 15 years.

## IV. CONCLUSIONS AND RECOMMENDATIONS

The Clayton control device appeared to do an excellent job of containing and collecting brake dust. The mechanic who demonstrated the Clayton believed it "gets" 99% of the dust. Except for some minor drawbacks, such as "being bulky to work with," the Clayton is well liked by the mechanics and is used for all brake jobs.

The Clayton appears to be a good state-of-the-art device for control of asbestos dust from brake servicing operations, and should be evaluated. Furthermore, the ODOT garage at Lebanon, Ohio, is only a 45-minute drive from the NIOSH - Ridge Facility, which would permit the ECTB sampling team flexibility in scheduling sampling dates. This is important because a minimum number of brake jobs are required each sampling day. The survey team can be flexible and drive up to the plant on days when there are a sufficient number of brake jobs. For these reasons, this facility is recommended for an in-depth survey.