PRELIMINARY SURVEY REPORT:

CONTROL TECHNOLOGY OF ASBESTOS REMOVAL INDUSTRY

AT

Baseline Junior High School
Boulder, Colorado

REPORT WRITTEN BY:
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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
Division of Physical Sciences and Engineering
Engineering Control Technology Branch
4676 Columbia Parkway
Cincinnati, Ohio 45226

PLANT SURVEYED:	Baseline Junior High School Boulder, CO
SIC CODE:	1799 (Contractors for Insulation of Pipes and Boilers
SURVEY DATE:	August 8 and 9, 1984
SURVEY CONDUCTED BY:	Bruce A. Hollett, P.E., CIH Paul E. Caplan, P.E., CIH
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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, several 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, which can be used by health professionals responsible for preventing occupational illness and injury.

The objective of this pilot study is to determine the state-of-the-art of asbestos removal control technology and to what extent it has been successfully applied in various industries. It will provide an assessment of the need for research and/or validation of existing capabilities and their potential for transfer to other industries. The purpose of this visit was to explore the use of this technology in the asbestos removal industry.

II. BACKGROUND OF SURVEY

On August 8, 1984, a meeting was held with representatives of the Boulder Valley School District and with Mr. Tom Butts of Asbesco, Inc., to discuss the planning and implementation of this District's Asbestos Abatement and Hazard Control Program. Plans for this meeting had been arranged previously through the cooperation of Mr. Butts and Dr. Melvin Wiesley, District Assistant Supertindent for Operations.

The Boulder Valley School District had initiated a comprehesive asbestos abatement program in accordance with a survey conducted in 1981, under the direction of Mr. George Bigger. The report of that survey, Asbestos Control Program, dated August 5, 1983, indicated that 43 of 46 schools in the District contained asbestos in its construction. Two new schools, constructed since 1983, do not contain asbestos. Priorities for abatement requirements (by removal or containment) were established and a management system was implemented to monitor and control the abatement activities involving the remaining asbestos in the facilities. Mr. Clarence Mascarenas was given responsibility for the management of the Asbestos Control Program, under the EH&S Divsion of the District. This position is a unique job assignment in this region.

In 1981, Asbesco, Inc., conducted the first removal project at the Junior High School hallway and tunnel. Mr. Butts' operations are insured by the U.S. Fidelity and Guarantee Company, of Denver, Colorado. Approximately $100,000 was spent in 1984 for asbestos removal and encapsulation projects.

III. SITE AND PROCESS DESCRIPTION

Site Description

On August 9, a site visit was made to the Baseline Junior High School (Grades 7 through 9), where Front Range Asbestos Removal, Inc., was conducting asbestos removal operations. In one end of the Industrial Arts and Crafts room, a nine-man crew was removing asbestos pipe lagging from overhead pipes. Two work shifts per day conduct this removal operation. This site had been prepared for removal, the previous day, by the setting up of a mobile, 3-compartment Detoxificaion (Detox) unit and plastic barriers to seal off the Industrial Arts and Crafts room. A sealed connection passage was then installed between the work enclosure and the Detox unit.

Process Description

No direct observations were made of removal operations in the Industrial Arts and Crafts room, since the use of air-supplied respirators (Type C) was required for all personnel (including visitors) in the removal area. Operations involved the removal of "Air-sealed" lagging material from overhead steam pipes. Workers were required to climb on step ladders to reach pipes for lagging removal. Material was thoroughly wetted, prior to removal, by spraying with amended water, containing Nancol No. 611*. Removed asbestos was hand scraped into plastic bags for subsequent removal as an industrial waste.

*Nancol No. 611, m,anufactured by Nancol Enterprises, P.O. Box 52742, Houston, Texas 77052, is stated to be a non-toxic, bio-degradable wetting agent. It was diluted, one gallon to 100 gallons of water, prior to spraying.

IV. POTENTIAL HAZARDS

The carcinogenic potential of asbestos is no longer in doubt; however, there is some uncertainty about the toxicological, morphological and other properties which determine the carcinogenic potency of various fibers. NIOSH believes that, on the basis of available information, there is no scientific basis for differentiating between asbestos fiber types for regulatory purposes.

NIOSH has recommended that asbestos be controlled to the lowest detectable limit, which by present analytical methods is 0.1 fibers per cubic centimeter of air (f/cc). It is our contention that there is no safe concentration of exposure to asbestos. Data available to date provide no evidence for the existence of a threshold level. Virtually all levels of asbestos exposure studied to date demonstrated an excess of asbestos-related disease. Any standard, no matter how low the concentration, will not ensure absolute protection for all workers from developing cancer as a result of their occupational exposure. However, lower concentrations of exposure carry low risks.

NIOSH also believes that both asbestos and smoking are independently capable of increasing the risk of lung cancer mortality. When exposure to both occurs, the combined effect, with respect to lung cancer, appears to be multiplicative rather than additive. From the evidence presented, we may conclude that asbestos is capable of causing lung cancer and mesothelioma, independent of smoking.

Although the present Permissible Exposure Limits (PEL) of OSHA is 2 f/cc as a Time-Weighed Average (TWA) concentration, with a Ceiling Limit (CL) of 10 f/cc, deliberations are, at present, underway at OSHA to reduce this limit to the order of 0.1 to 0.5 f/cc as a TWA.

V. CONTROL OF EXPOSURES TO ASBESTOS

Principles of Control

There are two health-related objectives of asbestos control. One is to protect the public from a hazardous pollutant. The other is to reduce or eliminate worker exposures. It is often the case that the most effective means of achieving one of these objectives may cause difficulties in meeting the other. These two objectives must be met by an integrated approach to the control solution. The primary objective of this project, however, is the evaluation and development of effective and feasible methods of control of worker exposures to asbestos during its removal from buildings.

Worker Protection Controls

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 work practices and engineering measures (material substitution, process/equipment modification, isolation or automation, local ventilation) are generally the preferred and most effective means of control both in terms of occupational and environmental exposures. 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. These may include the use of (remote air curtains, air-conditioned work areas) and personal protective equipment.

In general, a system, comprised of various combinations 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 providingfeedback concerning effectiveness of the controls in use. Maintenance of controls, to insure proper use and operating conditions, plus the education and commitment of both workers and management to occupational health are also important ingredients of a complete and effective control system.

These principles of control apply to all situations, but their optimum application varies from case to case. The application of these principles in the Front Range Asbestos Removal processes is discussed below.

VI. HAZARD CONTROL OBSERVATIONS AND FINDINGS

A. Administrative Controls

During the meeting at the Boulder Valley School District office and at the Baseline School work site, several hazard control programs and plans were discussed. These are described below.

When the Asbestos Control Program was formulated in 1983, Mr. Mascarenas was named manager of the program. Some of his areas of responsibility are as follows:

1. He identifies areas where asbestos removal or abatement is required.

2. He performs periodic and spot check inspections of abatement operations.

3. He provides current information on asbestos to parents, district personnel, building users, maintenance workers and contractors.

4. He provides semi-annual inspections of all sites where asbestos remains in the facilities.

5. He oversees renovation projects where asbestos may be present.

6. He provides budgeting information for removal and/or control of asbestos.

Mr. Butts has been attempting to develop a licensing program for contractors in Colorado, so that the burden of proof of competence rests with the contractor. He carries a liability insurance policy and bond with the United States Fidelity and Guarantee Insurance Company (USF&G).

In 1984, he completed the training course on Asbestos Abatement at Georgia Institue of Technology, Atlanta, GA.

In the removal contracts, in this District, it is not stated that an on-site industrial hygiene consultant (for the Client School District) shall have authority to shut down operations in the event of unsafe or unhealthful working conditions or operations. This contractual authority has been found valuable at other asbestos removal operations.

B. Engineering Controls at the Work Site

A three component Detox unit for worker clean-up, which is similar to those manufactured by Evergreen Industries, was installed directly outside the enclosed area. Plastic barriers were constructed to seal off the work area from the rest of the school. A two-speed Aromax(TM) negative air unit, with a HEPA filter, was placed in the work area to maintain a slight negative pressure, so that air leakage would always be into the work area. The effectiveness of this system was not evaluated during this visit. Approximately $50,000 has been invested in the Detox equipment trailer and the air control equipment by the removal contractor. A Ground Fault Circuit Interrupter (GFCI) was installed on the shower in the Decon Unit to minimize the possibility of inadvertent stray electric currents in that unit. Similar units are being purchased for connection to the other electrically powered filter units in the work areas.

Two types of wetting (amended water) agents were added to the water spray to improve the coalescense of fibers before removal. These were Acra-gro® (recommended by EPA) and Nancol® No. 611. The copious use of amended water has been found to be very effective in reducing fiber dust levels, during the removal of many types of asbestos.

C. Personal Protective Equipment

All workers in the "controlled" work areas are required to use air-supplied (Type C) respirators at all times. (Since NIOSH investigators did not have such equipment, we did not enter the controlled area after removal began). A Sears, Roebuck Co. compressed air system, with a manifold for six air lines, provided breathing air for the five workers. Air into this compressor passed through an air filter, Model 41-A, manufactured by E.D. Bullard Co., of Saucillito, CA. At other operations, outside the controlled area, half-mask respirators, Model R-56, with absolute filters are worn. These are manufactured by American Optical Company. Workers reported that in the normally humid environment, full-face filter respirators and full face air-supplied respirators fog up, more than half-mask dust respirators. The air-supplied respirators are used in accordance with Denver Regional OSHA Regulations. The comment was made that lack of uniformity of regulations at the Federal (OSHA, EPA, NIOSH) State and County levels, often makes compliance difficult.

Disposable coveralls, hoods, and booties were also worn inside the work area to minized body contamination with asbestos.

D. Work Practices

Since NIOSH personnel were unable to observe work operations in the removal area, work practices were reviewed and evaluated only indirectly. The contractors discussed their practices with us and expressed an interest in our observations of their work and others that we had seen. They also mentioned the lack of effective governmental guidelines in planning their work operations.

All workers were required to shower at the end of work, before leaving the controlled work site. Normally, a full work shift was completed inside the control area, so that donning work clothes, disrobing and

showering were performed only once per shift. The enforcement of safe work practices was the responsibility of the contractor's superintendent, Mr. Ronald Cutshaw. Neither Mr. Hubbard, the Company Treasurer, nor Mr. Cutshaw had any written guidelines for work practices or training purposes.

Mr. Mascarenas of the School District had overall responsibility for monitoring this and other worksite contracted operations, but was not at the worksite continuously.

E. Environmental Monitoring

Air samples were collected by the contractor and analyzed for fiber dust concentration by Hager Laboratories in Denver. Only Phase Contract Microscopey (PCM) analyses are performed at Hager. Since this operation had just started, no exposure dust levels had been collected. No ambient air sampling or monitoring had been conducted at the Baseline Junior High School, prior to removal operations, to serve as clearance comparisons. The contractor discussed with us the results of his environmental monitoring tests during asbestos removal operations at the U.S Mint, Denver, CO. During most work operations, levels were of the order of the 3 to 4 f/cc. Ambient dust levels (outside the controlled work area) in Denver were of the order of 0.02 f/cc.

VII. CONCLUSIONS AND RECOMMENDATIONS

1. The comprehensive Asbestos Control Program of the Boulder Valley School District appears to be well planned and executed, based on observations during the site visit. Worthy of particular mention is the written documentation of the Program, dated August 5, 1983. Additionally, the assignment of a trained full-time manager of the Asbestos Abatement Program, Mr. Clarence Marcarenas, seems to be a very sound concept.

   A position similar to that of Mr. Mascarenas would be a worthwhile addition in many facility owners' asbestos management programs. Without such a central dedicated control element, there is probably a greater danger of exposure to maintenance and renovation workers, as well as occupants in facilities where asbestos is present.

2. The Front Range Asbestos Removal Company appears to be representative of a small removal contractor. The formal training of their crew in hazard identificaton and good work practices, as demonstrated by a worker certification program, was not apparent. This company, as well as other contractors, have indicated the need for such a program.

3. We were not able to evaluate directly either their work practices or the effectiveness of their hazard control procedures. However, their general awareness of hazards and their concepts of dust control and other hazards controls, including the use of copious quantities of amended water for dust suppression, seemed to be appropriate.

4. This contractor should be considered in the future, should an opportunity for an in-depth survey present itself, based on the type of removal technology that they are using.