WALK-THROUGH SURVEY REPORT:

CONTROL TECHNOLOGY FOR ASBESTOS REMOVAL INDUSTRY

AT

COLUMBUS EAST HIGH SCHOOL
COLUMBUS, INDIANA

REPORT WRITTEN BY:
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REPORT DATE:
AUGUST 1985

REPORT NO.:
147-11a

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:	Columbus East High School 230 S. Marr Road Columbus, Indiana 47201
SIC CODE:	1799
SURVEY DATE:	July 17, 1984
SURVEY CONDUCTED BY:	Bruce A. Hollett, C.I.H., P.E. Paul E. Caplan, P.E., C.I.H. Dennis M. O'Brien, P.E., C.I.H.
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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. When the perceived need for research requires further definition, a pilot study is undertaken to assess the need for bench research and/or validation of existing capabilities. If it is determined that field studies are needed, a series of walk-through surveys is 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.

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. SITE AND PROCESS DESCRIPTION

Site Description:

The information in this section was extracted from the January 1984 PEDCo Environmental, Inc., report to the school district.* The Columbus East High School includes the main school building, a gymnasium, and a pool building. It was designed by Mitchell/Giurgola Architects of Philadelphia, Pennsylvania, starting in 1968. Construction was completed in 1972 at a cost of $12,200,000. The academic building contains 280,625 square feet, and the gymnasium contains 60,530 square feet. The structures are steel, masonry, and reinforced concrete. Heat is provided by a steam boiler and refrigeration by a steam absorption chiller and a reciprocal chiller. The air-moving system includes 32 air handlers (7 multizone and 25 single zone), 282 fan coil units, convectors, and unit heaters. Air is supplied by a ducted supply air system, and return air is provided by a ceiling plenum system.

The PEDCo survey identified three types of friable materials in the Academic Building. The most prevalent friable material found was fireproofing insulation that had been spray-applied to steel beams and columns on the first, second, and third floors and in mechanical areas. It was judged "moderately friable" and was found to contain approximately 30 to 60 percent chrysotile asbestos. Due to overspray, this material was also on the corrugated steel deck pan between the treated beams. The treated beams are largely concealed by a suspended ceiling. The other friable materials found around structural beams, enclosed in drywall, and in acoustical plaster material were found not to contain asbestos. No asbestos was found in the swimming pool building.

Process Description:

The school system's initial evaluation of this facility for asbestos was complicated by a number of factors, including disparities in analytical results and conflicting public statements by EPA officials and expert consultants. A high level of concern in the local community required a decisive documentation and a plan of action. In September 1983, PEDCo's laboratory did analyses on 10 bulk samples to verify the presence of asbestos. Mr. Mark Karaffa, a certified industrial hygienist, and Mr. Jeff Marshall, supervisor of construction, then conducted a complete assessment of the facilities to determine the extent and condition of the asbestos material and to ascertain the need for corrective measures. The findings of this survey were used as a basis for developing long-range abatement plans by Paris-Bingham, Inc., Architects, Columbus, Indiana, and R.E. Diamond and Associates, Inc., Consulting Engineers, Indianapolis, Indiana, with the technical assistance of Mr. Marshall and Mr. Karaffa.

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* Inventory Of Friable Asbestos-Containing Materials In Columbus East High School With Recommendations For Corrective Action by PEDCo, Cincinnati, Ohio, January 1984.

In addition, the school board required that airborne asbestos monitoring be accomplished to obtain a preliminary indication of the concentrations of asbestos fibers within the building. Seven sampling locations were monitored with five sets of samples from 12 noon, December 19, until 3 p.m., December 20, to get an indication of the airborne asbestos fiber concentrations during the school day and during the night when the school was unoccupied. This monitoring was accomplished by Pollution Control Science, Inc., using PCM. The results and conclusions were reported as tentative and subject to confirmation. The average fiber levels per location appeared to be higher (0.03 to 0.117 f/cc) during the day time periods compared to (less than 0.005 to 0.009 f/cc) in night time. They concluded that this indicated a possible reservoir of asbestos fibers in the carpet and on surfaces that were dispersed by student and staff activity. It was also noted that there was a trend for higher averaged concentrations on the second and third floors. Because of the small number of samples taken from a limited number of sample locations, two on the second floor and one on the third floor, the levels found may not reflect the true range of levels present. However, the average day time levels were approximately 0.1 f/cc compared to the first floor concentrations of approximately 0.05 f/cc.

Potential Hazards:

The carcinogenic potential of asbestos is no longer in doubt; however, there is some uncertainty about the toxicological and morphological properties which determine the carcinogenicity 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. It is our contention that there is no safe concentration of exposure to asbestos. 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 lower risks.

NIOSH continues to believe 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 a carcinogen capable of causing, independent of smoking, lung cancer and mesothelioma.

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.

III. CONTROLS

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.

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 engineering measures (i.e., 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 hazardous agents 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 ensure their proper use and operation, 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 in the Circle "B" asbestos removal process is discussed below.

OBSERVATIONS

Engineering Controls:

The containment barrier control method recommended by EPA guidelines was in use at this facility. It was reported that the additional use of "amended" water to wet the asbestos prior to removal and the use of an area HEPA exhaust to maintain the enclosure under negative pressure were used in most of the enclosures. However, in the enclosure where active removal was in progress during this visit, neither of these controls was in effect. The use of water

had been avoided due to the presence of sensitive electronic equipment. Dry removal from a high bay ceiling and beams was in progress. A HEPA filtration unit was operating within the enclosure to reduce the airborne asbestos fiber concentration by recirculation of filtered air, however, it did not provide negative pressure control or dilution air.

Work Practices:

Work activity was incumbered by the necessity to position Hi-jack work platforms between a metal angle iron ceiling grid. Asbestos material, scraped from the ceiling, was allowed to fall to the floor to be cleaned up later.

Monitoring:

Interior and exterior monitoring was in progress with battery-powered sampling pumps and standard 37 mm open-faced cassettes. PEDCo Environmental, Inc., provides on site PCM analytical support. The practice is to provide personal and area monitoring in each active removal area daily.

Personal Protection:

The removal workers wore disposable coveralls and half-face cartridge respirators. Walk-through decontamination showers were located at the entrance to the enclosure.

Other Observations:

Due to a manpower shortage in the local laborers' union, it was necessary to hire workers from other jurisdictions. They were required to join the local union. This arrangement made it difficult to manage the selection and training process. Due to the large number of contractors with union workers on site it was not possible to hire non-union workers.

IV. CONCLUSIONS AND RECOMMENDATIONS

Since this was the NIOSH survey team's first on-site visit to an asbestos removal operation, it is not possible to draw many meaningful conclusions. It was considered to be a suitable operation for consideration if further studies of this type of work are contemplated. The limited activity of a rather atypical nature observed on this visit is not a good indicator of the type of controls which this contractor is capable of implementing. Exposure records indicated a very consistent control well below 2.0 f/cc in all work areas. In retrospect, based on further knowledge from two subsequent field trips, it is noted that the on-site industrial hygiene control system here appeared to compare favorably with others observed. The primary element of control that was not present was use of electron microscopy for initial evaluation and final clearance. This is not yet a required control element, however, EPA is developing clearance criteria and will likely recommend EM analysis. NIOSH is recommending the use of supplemental EM for mixed fiber environments and new or changing processes to better define the workers' fiber exposure environment. A primary impediment to the widespread use of EM is the lack of a standardized procedure. Developing economically feasible EM procedures will be a major concern of the ongoing NIOSH research in this coming year.

The EPA will be studying this facility following the removal activities to evaluate post clearance exposure levels. They will collect samples for duplicate PCM, SEM, and TEM analysis.