PRELIMINARY SURVEY REPORT:

CONTROL TECHNOLOGY FOR ASBESTOS REMOVAL INDUSTRY

AT

Gateway High School
Aurora, 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:	Gateway High School 1300 South Sable Boulevard Aurora, Colorado 80012
SIC CODE:	1799 (Contractors for Insulation of Pipes and Boilers
SURVEY DATE:	August 6, 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, 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. BACKGROUND OF SURVEY

On the morning of August 6, 1984, a meeting was held at the Aurora Public Schools (APS) administrative offices to discuss the design and operation of the asbestos removal/renovation project at the Gateway High School. Aurora Public Schools had contracted with ARIX Construction Managers, Inc. to provide overall management of the Gateway High School renovation project. The asbestos removal and renovation operations were to be completed by January 1, 1985.

The removal operations were being conducted by Major Insulators, under a prime contract between APS and Major Insulators. Environmental monitoring and hazard control supervision were provided to ARIX by HWS of Lincoln, Nebraska and by Mark Schorzman, using Hager Laboratory of Denver, Colorado, for analytical laboratory support. Tom Major (Major Insulators) also conducted personal dust exposure monitoring of his own employees using in-house resources.

The school district hired an attorney to write the removal contract specifications. The draft specifications were reviewed by EPA, OSHA, Denver City/County Health Department and Major Insulators.

III. SITE AND PROCESS DESCRIPTION

Site Description

On the afternoon of August 6, 1984 a site visit was made to Gateway High School to observe asbestos removal and clean-up operations. At the time of this survey, removal operations were limited to one small equipment room. A three-man crew was removing sprayed-on fire proofing material from overhead beams and the ceiling during the second shift, starting at 2:00 p.m.

A portable, modular air lock, shower, and dressing room facility (manufactured by Evergreen Industries, Mobile Decontamination Division) was positioned outside the high school building. Plastic barriers were constructed to form an enclosed material staging area and to isolate the equipment room from the rest of the school building. A plastic barrier and walk tunnel was constructed to connect the equipment room to the decontamination facility.

A tour was also made through other areas of the high school, where removal and clean-up had already been completed.

Process Description

Removal of asbestos in the equipment room required very deliberate care by the workers to minimize the spilling of removed asbestos onto the floor. The intricate contours of the equipment room required workers to climb on step ladders and over equipment, often in very cramped quarters, in order to get to the asbestos to be removed. Material was thoroughly wetted by a hose before it was hand scraped into plastic bags.

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, since there appears to be no safe concentration of exposure to asbestos. 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.

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 lung cancer and mesothelioma, independent of smoking.

Data available to date provide no evidence for the existence of a threshold level.

Although the present Permissible Exposure Limits (PEL) of OSHA is 2 fibers per 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. NIOSH's recommended standard (RS) for all forms of asbestos is 0.1 f/cc, based on the lowest level of detection by the presently recommended PCM analytical technique.

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 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 in Major's asbestos removal process is discussed below.

VI. PLANNED CONTROLS

During the meeting at the Aurora School District Headquarters, several hazard control programs and plans were discussed:

A. Administrative Controls

Major has an agreement with Local 28 of the Heat and Frost Insulators and Asbestos Workers Union to provide a trained manpower pool. Major normally has betweem 40 to 60 active workers on the payroll, although he may have as many as 200 men on the payroll. All of his workers receive certification by the Local Union through training, in conjunction with Major and the Colorado State University, Construction Health Hazards Education Program. Major has authority to fire employees for infractions of the safety rules and/or poor work practices.

A significant concern of Major Insulators and the OSHA Denver Staff is the interpretation of the OSHA Code 29 CFR 1910.1001(d)(2)(iii) on the use of "Type C" supplied air respirators (continuous flow or pressure demand.) According to OSHA, supplied air respirators are mandatory during all removal operations, since the airborne concentrations, during such operations, are so unpredictable, in spite of prior and intermittent monitoring procedure results below the PEL. Major and other contractors have maintained that their monitoring programs have "reasonably" demonstrated that neither ceiling levels or 8-hour TWA exposure levels have exceeded 10 times the OSHA Standards of 2 and 10 fibers per cubic centimeter, respectively. Therefore, his workers have routinely used "absolute" dust filter respirators during most removal operations.

Reportedly, the Denver Regional OSHA office has taken a position which requires all removal work to be done in supplied air respirators. They also require that all removal workers be monitored for a full shift. They contend that this is the proper literal interpretation of the

regulation on asbestos demolition. Major has been attempting to get some recognition of their well controlled, low exposure work environment, as justification for allowing selection of some lesser respiratory protection. However, the regional office has taken the position that the work exposure environment is not sufficiently controlled or documented to support this judgment, in spite of the fact that Major has conducted extensive on-site monitoring.

There appears to be a need for recognized, explicitly stated levels of performance, to be required by OSHA, for uniformity of compliance with standards. According to Tom Majors, there is need for informed supervision (both by the removal contractor and by the client school district) to ensure that workers comply with safe operational requirements.

Monitoring Controls

Tom Major reported that he conducts air monitoring prior to removal activities. Background levels at this school (ambient air), using Phase Control Microscopy (PCM), ranged from 0.002 to 0.006 f/cc. Work areas, outside the asbestos removal site, are required to be kept below 0.01 f/cc, as analyzed by PCM. If higher levels are observed, any one near the area is required to wear a respirator. Continuous monitoring is conducted outside the controlled removal area. Clearance criteria are to be "at or below" background. Air samples are analyzed by Hager Laboratory, Denver (at approximately $26.00 per sample).

Personal samples are collected on workers, at the rate of at least one sample per shift, at each location.

Engineering Controls

A decontamination unit for clean-up, manufactured by Evergreen Industries, has been installed directly outside the school building.

This portable, modular, air lock, shower, and dressing facility is used to ensure proper clean-up of workers following work at the removal sites. Plastic barriers were constructed to form a material staging area and walk tunnel between the decon unit and the removal work areas.

A HEPA exhaust unit was used to maintain a negative air pressure in the containment work area. Since the small work room had no air inlet, a duct was positioned from the room to the outside of the building to provide make-up air.

D. Work Practices

According to the Major Insulators' Operational Procedures Manual, automatic dismissal (will occur) if a worker:

1. removes respirator in work area
2. wears work clothes home
3. does not shower (after work)
4. does not maintain his respirator
5. does not maintain the decon unit.

Several removal procedures, which are emphasized in their training course, include:

1. Never work with asbestos dry.
2. Find the seams and wet, when cut; use wetting agent.
3. Seal the area when possible; tell other trades what you are doing.
4. Vacuum material, that falls away, with wet/dry vacuum.
5. Always wear your respirator (one that fits).
6. NEVER wear home the clothes you have worked in.
7. Shower before leaving job site, when possible.

Other specific work operational procedures are described in the Major manual.

VII. OBSERVATIONS AND FINDINGS

A. Work Practices

Prior to ripout operations, walls were washed down. Background air samples, collected during that operation by Major, averaged about 0.002 f/cc. Removal operations involved sprayed-on asbestos fire proofing on the ceiling and overhead beams. It required workers to climb on step ladders and over equipment and, often to work in cramped quarters between equipment and ceiling. Work was deliberate and workers used care to assure the material was thoroughly wetted before scraping it into plastic bags. Workers were conscientious, allowing as little material to fall as possible, since clean-up is more difficult in the intricate contours of the equipment room.

B. Personal Protective Equipment

All workers in the rip-out area were observed to be wearing half-face respirators, with high-efficiency dust filters (MSA or Norton). Additionally, disposal coveralls, booties and head covers were worn by all workers in the area. Respiratory protection procedures were followed, as outlined in their operations manual.

Equipment Controls

The provided air movement attempts to develop approximately one air change per minute, in order to maintain airborne fiber concentrations at a low level. This high exchange rate is normally not possible, with the use of one or two power air pumps, which move about 1000 to 2000 cfm per pump.

Monitoring

Air samples were collected by NIOSH in two work areas. Eight area samples were collected primarily for analytical research and development purposes in the DPSE laboratory involving SEM analytical procedures.

VIII. CONCLUSIONS AND RECOMMENDATIONS

1. This removal activity appeared to represent one of the better work practices/dust control procedures observed to date based on observations during the survey.

2. The asbestos removal work at the Aurora School District is scrutinized by several levels of management. In spite of all efforts, the professional consultants have failed to provide sufficiently well-defined safe working conditions to avoid confrontation with OSHA over the adequacy of their control measures. There needs to be better definition and standardization of controls, monitoring, and performance levels to conduct a safe asbestos removal job.

3. When asked for recommendations for other reputable asbestos removal contractors, Mr. Major listed three contractors for us to observe:

   a. N.T. Stevens Construction, Houston, TX
      (Mr. Cody Bindwell)

   b. Seagull Environmental Co., Tampa, FL
      (Mr. Frank Hall)

   c. Spinazola Systems
      (Mr. Dave Spinazola)

4. The removal operations conducted by Major Insulators should be further studied, in-depth, as part of our CTA of asbestos removal operations.