PRELIMINARY SURVEY REPORT:

CONTROL TECHNOLOGY FOR THE CERAMICS INDUSTRY

AT

Ohio Brass Company
Barberton, Ohio

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:	Ohio Brass Company Barberton, Ohio
SIC CODE:	3264 - Porcelain Electrical Supplies
SURVEY DATE:	September 29, 1982
SURVEY CONDUCTED BY:	Frank W. Godbey
EMPLOYER REPRESENTATIVES CONTACTED:	Clarence Tople, Director of Environment and Safety
EMPLOYEE REPRESENTATIVES CONTACTED:	Pat Madden, President, Local 747, United Electrical Workers
PURPOSE OF SURVEY:	To perform a preliminary assessment of the methods used in controlling potential health hazards in the manufacture of ceramic electrical insulators and to determine the advisability of conducting an in-depth survey of this plant.

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 manufacture of ceramic electrical insulators involves worker exposure to a variety of potentially harmful chemical and physical agents. Some of the agents of concern are; silica, glazes, temperature extremes, and noise. Our literature review and contacts with people in the ceramic electrical insulator manufacturing industry indicates that there is control technology in place in the industry to prevent the overexposure of workers to these agents.

The Engineering Control Technology Branch of the Division of Physical Sciences and Engineering, NIOSH, is conducting a research study to assess and document the control technology being used to minimize worker exposure in the ceramics industry. Exposures to the above-mentioned harmful chemical and physical agents have been documented as a cause of a variety of health problems. This walk-through survey was conducted to obtain information on the use of health control technology when manufacturing ceramic electrical insulators and to determine the advisability of conducting an in-depth survey of this plant.

The primary contact was the company's Director of Environment and Safety, Clarence Tople. During our walk-through survey, we met briefly with other management personnel and talked to a number of personnel physically involved in the manufacture of ceramic electrical insulators.

II. PLANT AND PROCESS DESCRIPTION

PLANT DESCRIPTION

Ohio Brass Company produces ceramic electrical insulators from feldspar, kaolin, alumina, locally mined flint, and ball clays from Georgia, Tennessee, and North Carolina. The company employs 550 workers and operates one shift each day, from 7:30 a.m. to 4:00 p.m., five days a week. The plant area occupies about 22 acres and consists of several brick and sheet metal office and production buildings.

PROCESS DESCRIPTION

Production-size clay raw materials are brought to the plant in railroad freight cars and stored in large silos or bins in the batching gallery. A batch mixture is formed by computer-controlled selection of ingredients from the various storage bins. The batch mixture is combined with water, mixed, and filtered through a 120-mesh screen to form slip. The slip, stored in holding tanks, is moved by high-pressure pumps to filter presses where a large portion of the water is removed converting the slip into workable clay presscakes. The presscakes are charged into a pugmill that shreds, remixes, and deaerates the clay. The clay is extruded from the pugmill in a continuous cylinder where it is cut by a fine steel wire into appropriate lengths (wads). A conveyor system transports the wad to an overhead vertical mill where it is again shredded, deaerated, and reblended to ensure a smooth, homogenous consistency throughout. The mill extrudes a metered length of material which is automatically cut into blanks containing enough clay to produce one insulator. The blank is automatically placed onto a forming machine where, through a succession of steps, it is automatically formed and trimmed into a fully formed insulator body. The fully formed insulator bodies are automatically placed on conveyorized drying racks where all remaining moisture is removed from the clay. The completely dried ware is automatically conveyed to the glazing area where glaze is applied to most insulators by automatic dipping. Larger parts are hand dipped or sprayed while the part is turned on a rotating table. The glazed insulator, when assembled with metal components, is joined with portland cement. To get a good joint, the assembly surface is treated with small granules of clay that fire in the kiln into hard, sharp porcelain particles. The finished ware is placed on kiln cars and automatically conveyed through a tunnel kiln where it is fired for approximately two and one-half days up to a temperature of 2,200°F. Large ware is fired in the traditional intermittent or beehive kiln. The cooled insulators are visually inspected, electrically tested, and assembled with the cap and pin. The completely assembled insulators are cured in tunnels where they are exposed to live steam for a period ranging from 30 to 48 hours. After curing, the insulators are transported to a machine that automatically cleans and electrically tests each unit. The finished product is inspected, packaged, and shipped to the consumer.

HEALTH AND SAFETY PROGRAM

The health and safety program is conducted by the joint union/mangement health and safety committee and the Director of Environment and Safety who performs monthly inspections of the plant operations and holds monthly committee meetings. Plant foremen conduct monthly departmental health and safety meetings. The Director conducts initial health and safety training for new employees and performs periodic industrial hygiene sampling of selected operations. An outside contractor performs dust sampling of selected operations every six months. The personal protective equipment program includes the use of safety glasses, hearing protection, and respirators in specific areas, and the promotion of safety shoes.

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.

The company has installed local exhaust ventilation systems in the clay charging area, at the mixer operation, at the turning lathes, and other dry machining operations, at the sanding operation, in the kiln plant, in the electrical testing area, and at the glazing operations that appear to be effective in protecting potentially exposed employees. The personal protective equipment program appears to be effective for eye, ear, foot, and respiratory protection.

IV. CONCLUSIONS AND RECOMMENDATIONS

Although the Ohio Brass Company has many controls that appear to be effective, they are not recommended for an in-depth study since they do not have the operation (raw material crushing and grinding) being studied in this project.