

PRELIMINARY CONTROL TECHNOLOGY ASSESSMENT

OF

Didier Taylor Refractories Corporation
South Port, Kentucky

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 Visited: Didier Taylor Refractories Corp, South Port, KY.

Date of Visit: October 28, 1981

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Purpose to Survey: To become more familiar with refractories,
investigate the state of the art controls for
chemical and physical agents in the refractory
processes, and to determine the plant's
suitability for an in-depth control technology
survey.

ABSTRACT

A walk-through control technology survey of a nonclay refractory facility was conducted at Didier Taylor in South Port, Kentucky on October 28, 1981. This plant starts with a variety of raw materials; mixes, dries, crushes, grinds, presses or molds them into shape; and kiln fires it to yield a variety of products. A preliminary assessment of control technology including engineering controls, work practices, and personal protective equipment was made during the visit. Based on the results of this preliminary survey, a detailed survey is planned for this plant.

INTRODUCTION

The Engineering Control Technology Branch of the Division of Physical Sciences and Engineering, NIOSH is conducting a research study to assess and document control methods for minimizing worker exposure in the ceramics products industry. Exposures to various harmful chemical and physical agents including silica, noise, and heat have been documented as a cause of a variety of health problems. The survey was conducted to obtain information on control technology including engineering controls, work practices and protective equipment, and to determine the suitability of this plant for a detailed survey.

PLANT DESCRIPTION

The manufacturing facilities are located on a 23 acre site consisting of ten to twelve buildings. The buildings are one and two story structures, except for the Grain Storage Building, which is nearly ten stories. The operation dates from the mid-1800's with the oldest building, brick and concrete, being approximately 80 years old. Most of the buildings (concrete block, steel, steel substructures and concrete) were constructed in the 1960's. There are approximately 200 employees (145 hourly represented by the Steel Workers Union and 50 plus salaried) normally operating two shifts per day.

This facility produces over 5,000 specialty type nonclay refractory products in a variety of sizes and shapes. Refractory products are "...heat-resistant materials that provide the structure or linings for high-temperature furnaces and reactors. In addition to being resistant to thermal stress and other physical phenomena induced by heat, refractories are usually required to withstand physical wear and corrosion by chemical agents." The basic raw materials used are aluminum compounds; bauxite or alumina (Al_2O_3) and Mullite ($3Al_2O_3 \cdot 2SiO_2$). Some of the other materials used are chromium, titanium, zircon, magnesia, phosphate, and kaolin.

PROCESS DESCRIPTION

The raw materials are received in bulk and bag by rail (20%), truck (80%), and occasionally barge. Powdered bulk materials received in closed railroad hopper cars are pneumatically unloaded into storage bins. Powdered bag materials are broken into a hopper having exhaust ventilation. The empty bags are bailed and sold to a paper recycler. The powdered raw material is transported by covered conveyor to a mixer where water (3% by weight) is added. The damp material passes through a roll compactor to a bin. From the bin, it passes through a rotary kiln, cooled, and loaded in Lorry cars to be transported to the jaw crusher. The material, conveyed by covered conveyor belt, goes to surge bins to feed dry pans (roller crushers), then gyratory crushers, screens, and into bins (a variety of bins holding different products). A closed container car moves the selected material from the appropriate bins and bottom dumps into a Muller Mixer. The mix is dumped into hoppers that are transported by forklift to the presses (Boyd and Impact). The product from the presses are loaded onto kiln cars and passed through the tunnel kiln drier (temperatures reaching 2800°F). The dried products are cooled and placed in stock until shipped. Besides using presses to shape many of the products, Slip Casting, Drain Casting, Gel Casting, and Dry Air Tamp into wooden and plaster molds are used to form the more unusual shaped items. Some of the final products are bagged, palletized and covered with shrink wrap. Most of the remaining product is palletized and shrink wrap applied. Finish products are shipped by railroad and truck.

ENGINEERING CONTROLS, WORK PRACTICES AND PERSONAL PROTECTIVE EQUIPMENT

A pneumatic system is used to unload bulk powdered raw material. Local exhaust ventilation is used at the bag emptying area, rotary kiln, jaw crusher, Muller Mixers, and covered conveyors. General exhaust ventilation is provided in most of the buildings. Closed Lorry Cars are used to transport dry powdered material from Grain and Vendor storage bins to the mixers. Closed, vibrating conveyors transfer the screened material to the Grain storage bins. Most of the other conveyors are covered.

Workers are provided with hard hats, safety glasses without side shields, a variety of hearing protectors (all with a similar safety factor), safety toe shoes, respirators, gloves, and heat protective clothing. All workers are required to wear safety toe shoes. The other safety gear provided is required only in the posted areas.

Housekeeping is considered to be very important at this facility. Employees stop work 15 minutes before the end of shift to police their work areas. Also, a regular preventive maintenance schedule is carried out.

HEALTH AND SAFETY PROGRAM

The company does their own air monitoring as well as periodic visits by OSHA. Three environmental Kentucky OSHA inspections have been conducted in the past four years and all have found the plant to be in compliance. Also, Didier Taylor uses the Industrial Health Foundation and their insurance company loss control specialists to do air quality surveys.

All new employees are given physicals followed by annual chest x-rays and audiograms.

CONCLUSIONS/RECOMMENDATIONS

This refractory facility is recommended for an in-depth survey. There are a number of operations with the potential for causing high worker exposures. These include chromium metal, heat, noise, and nuisance dust. Local exhaust ventilation is provided at key points, closed Lorry Cars, closed conveyor belts, and pneumatic conveying are in use. Protection from noise and heat are in effect. Most refractories tend to be very dirty. At Didier Taylor, the operation appears to be quite clean. In the past four years, they have not been cited for dust.