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WALK-THROUGH SURVEY REPORT:

CONTROL TECHNOLOGY FOR SOLID MATERIALS HANDLING

AT

GNB Batteries
St. Paul, Minnesota

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:	GNB Batteries 803 Berry Street St. Paul, Minnesota 55114
SIC CODE:	3069 (Battery Boxes, Jars, and Parts)
SURVEY DATE:	August 23, 1983
SURVEY CONDUCTED BY:	William A. Heitbrink William N. McKinnery
EMPLOYER REPRESENTATIVES CONTACTED:	R. C. Anderson, Plant Manager (612) 641-6491
EMPLOYEE REPRESENTATIVES CONTACTED:	Ernie Gillard International Association of Machinist of Aerospace Workers Local 129 1399 Eustis Street St. Paul, Minnesota 55114

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.

This plant was visited as part of a study of dust control during bag opening, dumping, and disposal. Significant dust exposures can occur during these operations. Although dust can be controlled during bag opening and dumping, bag disposal is a significant source of worker dust exposure. Ultimately, this project will result in a concise article describing dust control techniques during bag opening, emptying, and disposal. This article should provide valuable information for those who are responsible for controlling the workers' dust exposure.

II. PLANT AND PROCESS DESCRIPTION

Plant Description:

The plant is presently being operated by Gould Incorporated's Metal's Division, however, according to Mr. Anderson, part of Gould will become a privately held company to be known as GNB Batteries. This plant formulates solid materials mixtures to make battery plates. A total of six people are employed at this plant. The plant was built in 1971.

Process Description:

The purpose of this visit was to observe the operation of the Whirl-Air-Flow automatic bag opener. This device was installed in the plant 2 to 3 years ago and is used to open bags of powdered materials. These materials include carbon black, barium sulfate, and ligimite. The process is as follows:

1. Worker lifts bag and places the bag on a conveyor.

2. The conveyor feeds the bag onto a conveyor inside the bag opener.

3. The bag opener's conveyor uses spikes to hold the bag.

4. This conveyor feeds the bag into a circular knife which saws the bag in half.

5. The bag's contents fall into a screw conveyor for transport elsewhere.

6. After beaters knock loose powder from the bags, the bags are fed into a trash compactor.

Two to three minutes were required to empty each bag.

Potential Hazards:

Bag opening involves numerous dust emission sources. These include:

1. Dust on the outside of the bag. Bag handling can cause this dust to be dispersed. Also, this dust can make the conveyor belt dirty and cause the conveyor belt to be a source of emissions.

2. Bag opening, emptying, and disposal. This creates dust which the equipment is designed to contain.

3. Equipment malfunction. Bags often hang up on the bag opener's spiked conveyor. This happens when the spiked conveyor feeds the empty bag into a chute which leads to the compactor. The bag does not always come off this conveyor. As a result, the worker needs to open the enclosure and manually remove the bag from the conveyor. The worker reported that one bag out of ten will not come off of the spiked conveyor.

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 ensure 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 at this plant are discussed below.

Engineering Controls:

The Whirl-Air-Flow automatic bag opener is an example of equipment selection which isolates the worker from dust generated by bag opening, emptying, and disposal. The ventilation for the machine causes an airflow of 50 to 100 fpm into the inlet. Dust emissions were not observed coming from the inlet opening. With the exception of the inlet and the openings for the trash compactor, this device is basically a complete enclosure.

The cost information for this device is not available. The device was selected for two reasons: 1) increased productivity and 2) dust control.

Work Practices:

The worker carefully puts the bags on the conveyor.

Monitoring:

The corporate industrial hygienist periodically conducts periodic dust sampling at this plant.

Personal Protection:

The worker uses a quarter-face respirator most of the time in the area.

Discussion:

The Whirl-Air-Flow automatic bag opener we observed was generally successful at containing the dust generated by bag opening, emptying, and disposal. Unfortunately, the bags frequently did not come off of the conveyor. Correcting the problem probably increases the worker's dust exposure because he must reach into the enclosure. According to the manufacturer, this equipment has been modified to correct this problem. Therefore, a study of a modified Whirl-Air-Flow automatic bag opener would be more appropriate.