

PRELIMINARY SURVEY REPORT:  
CONTROL TECHNOLOGY FOR FILLING OF CONTAINERS

AT

Corn Products Company  
Summit, Illinois

REPORT WRITTEN BY:  
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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
Division of Physical Sciences and Engineering  
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PLANT SURVEYED: Corn Products Company  
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SIC CODE: 2046

SURVEY DATE: December 12, 1985

SURVEY CONDUCTED BY: Thomas C. Cooper

EMPLOYER REPRESENTATIVES CONTACTED: Richard A. Bye, Process Engineer

EMPLOYEE REPRESENTATIVES CONTACTED: Robert McDonald, Union Steward  
(Not contacted during the survey due to  
the shortness of the visit.)\*

\* Report to be sent to Willie Osborne, Union Steward, Building 16, c/o Corn Products Company.

## 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 the loading of bulk dry materials into open and closed containers including trucks and railroad cars. The study will evaluate the effectiveness of various control technologies designed to reduce dust exposures to personnel in the bulk loading area. Ultimately, this project will result in a proposed journal article describing the effectiveness of such controls.

## II. PLANT AND PROCESS DESCRIPTION

### PLANT AND PROCESS DESCRIPTION

Corn Products Company, a subsidiary of CPC International, has been located on a 40- to 50-acre site in Argo, Illinois, near Chicago since the early 1900's. The company wet mills corn using a physical separation process to break the corn kernel down into germ, fiber, gluten, and starch. The starch, which is

70% of the corn kernel, is recovered as a slurry. About 60% of this starch is chemically converted to corn sugars while the remainder is dried and used in the food and paper industries. The fiber is dewatered, dried and sold as dairy feed. The germ is used to make corn oil and the gluten is used in animal feeds such as chicken feed. The present operation employs 1,000, however, a new plant is being constructed at this site which will employ 400 and is scheduled to go into operation near the end of 1986. The employees are represented by Union Oil Chemical Workers and Atomic Workers International Union, Local 7-507.

The bulk loading station is located in an open drive through area between a building and the control room for the loading station. The room is located ten feet above the ground over looking the truck or railcar being filled. during the site visit, open trucks were being loaded.

#### POTENTIAL HAZARDS

At the bulk loading station, respirable nuisance dust is the main potential health hazard.

### 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.

#### ENGINEERING CONTROLS

CPC uses DCL's (Dust Control and Loading Systems) Model 24-14, 14-foot travel loading spout to load trucks and railroad cars with the fiber product. The spout and accessories (skirt, ventilation, and level sensor) costs approximately \$7,000 and is designed to fill open trucks at a rate of 60 tons per hour. The spout lowers to the bottom of the truck and is automatically retracted as the truck fills. The skirted attachment around the spout and 1,000 cfm exhaust of the spout are designed to contain and remove dust emissions during loading.

The company reports that the retractable dust collecting spout was very effective when initially used with a captive fleet of trucks. These trucks did not have any ribs running over the top of the truck. However, the spout is now being used to load open trucks that do have such ribs running across and down the center of the open truck. These ribs prevent the spout from being lowered to the bottom of the truck. As a result, the product free falls 6 to 8 feet into the truck creating dust emissions estimated by the company to be over 0.2% by weight of the product being loaded. The company also reports that the spout does not affectively control the dust during the loading of railroad hopper cars. The railroad cars have slotted openings covered by doors on the top of the car through which the spout can not be lowered. During filling, the product free falls 8 to 10 feet into the railcar, generating considerable dust. In both cases, the spout is not being used as it was designed, to fill open-type containers. The present loading spout is operated from an enclosed control room and requires little to no manual labor to position the spout during operation.

When the new plant goes into operation, a similar DCL spout with north-south travel will be used to load open trucks and railroad hopper cars. The system will be designed to overcome the present shortcomings and more effectively control the dust during loading operation. The low cost of the system is easily justified by reducing workers' dust exposures, recovering product, and reducing sewer fees charged for the dust being washed into the sewer system.

#### WORK PRACTICES

The operator works from an enclosed control booth overlooking the loading operation. Truck drivers remain in their trucks and on signal from the operator, driving forward a few feet to fill the truck.

#### PERSONAL PROTECTION

Personal protection in the bulk loading area includes safety shoes and for workers on top of the railroad cars, a safety line.

#### IV. CONCLUSIONS AND RECOMMENDATIONS

The present loading station is a temporary facility. It was designed to load open trucks by lowering the spout to the bottom of the truck and automatically retracting as the truck filled. Even though the system is reported to be effective under the conditions for which it was designed, the present system is ineffective as used, in reducing dust emissions during loading operations. The company realizes this and is taking steps to correct these shortcomings in the design of the new loading station which will go into operation near the end of 1986.

When the new facility goes into operation, an in-depth study could be of value to determine the spout's effectiveness on a nuisance type dust.