WALK-THROUGH SURVEY REPORT

AT

Minerals Division/Grefco, Inc.
Lompoc, California

SURVEY CONDUCTED BY:
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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

PURPOSE OF STUDY: To perform a preliminary survey of the diatomaceous earth bagging operations at Minerals Division/GREFCO, Inc.

PLANT ADDRESS: Minerals Division/GREFCO, Inc.
1515 East Chestnut
Lompoc, California 93436

EMPLOYER REPRESENTATIVES: Grant O. Jennings, Plant Manager
Merlin D. Arbruster, Division Environmental and Safety Manager

EMPLOYEE REPRESENTATIVES: Bill DePrater, Chairman of Safety Committee

STANDARD INDUSTRIAL CLASSIFICATION: SIC 3295

ANALYTICAL WORK PERFORMED BY: UBTL, Three bulk samples to determine crystalline silica content.

ABSTRACT

A preliminary survey was conducted at Grefco's diatomaceous earth operation near Lompoc, California in conjunction with a NIOSH study evaluating measures used to control occupational health hazards associated with the packaging processes used for dry chemicals. A large number of workers in a variety of industries are involved in the packaging process. The company has some engineering controls worth noting. However, most of the controls, though adequate, are not considered to be exemplary. An in-depth study at this operation may be desirable.

I. INTRODUCTION

The Engineering Control Technology Branch of the Division of Physical Sciences and Engineering, NIOSH, is conducting a research study to assess and document the exemplary technology available for the control of airborne dust in dry chemical bagging and filling operations. The control technology studies will be described in sufficient detail to allow the information to be used to prevent or reduce the generation and transmission of the dust in similar industrial operations. The results of the assessment will be disseminated in a manner that will maximize the application of demonstrated control technologies in the workplace.

A survey, primarily of the packing (bagging) operation, was conducted to determine the suitability of this plant for an in-depth study. Engineering control technology observed included: engineering controls, work practices, and protective equipment. Grefco Inc. did have some controls worth noting and is considered as a possible site for an in-depth study.

II. PLANT DESCRIPTION

Grefco Inc., a subsidiary of General Refractories Company, has its corporate headquarters in Torrence, California. The company's Lompoc California operation produces a variety of diatomaceous earth (DE) products which are used, among other things, as filter aids and mineral fillers. These filter aids and mineral fillers are used in water and food processing, pigments, insulation, cleansers, carriers for insecticides and catalyst, match heads, and many other uses.

The plant is located in a rural area on the eastern outskirts of Lompoc and has been in production since 1952. The facilities consist of several structures with the building housing the packaging operation being of primary interest in this study. This building is a 50 to 75 foot high open structure (steel frame with corrugated metal sides) has a

concrete floor, no basement and approximately 30,000 square feet of floor space. The packaging operation occupies approximately a 40 feet by 80 feet area in one corner of the building. The exposed ground surfaces beneath and between the structures on the plant site are paved or covered with concrete.

Grefco ships 85% to 90% of their product in bags with the remainder being shipped in bulk. This union plant (United Steel Workers of America, Local 14406) employs 90 hourly and 20 salaried employees. The mill (packaging) crew consist of 10 employees, 7 of which are in the packaging area. The mill crew rotates every two hours between the packing, palletizing, and bag cleanup operations.

III. PROCESS DESCRIPTION

Approximately 100,000 tons of crude diatomite (considered to be a small operation) are processed annually. The diatomite, an amorphous silica, is mined from two open quarries located 4 and 7 miles from the plant. The crude ore is trucked to the plant site, crushed, screened, and placed in storage bins. The crude ores are blended and fed to the mill. During milling, the ore is dried (drying separates the individual diatom skeletons), refined (to remove coarse and extraneous material such as chert and clay), and sized. The diatomite is then processed to produce one of three basic products; natural, calcined, and flux calcined DE. The "natural" powder has a crystalline silica content of less than 1%. The "calcined" DE (crystalline silica content of 25% to 35%) has been heated to 1600 to 1800^{o}F to produce a straight-calcined (pink) product. The "flux-calcined" DE (crystalline silica content of 30% to 60%) has been heated to approximately 2000^{o}F while being mixed with a flux such as sodium carbonate to yield flux-calcined (white) product. These three products (natural, pink and white) are then classified to size as either "main" or "bag house" products and prepared for bulk shipment or bagging.

The packaging operation consist of two independent systems, "main" system for bagging 2 to 3 micron, 7 micron, and 12 to 15 micron particle size products and "baghouse" system for bagging 1 1/2 micron size particles. (Figure 1) The "main" system consist of two banks of 10 (6 units and 4 units) force flow packers manufactured prior to 1952 by Food Machinery Corporation (FMC). (These packers had been transfered from another Grefco operation). The "baghouse" system has two banks of two units each, St. Regis 105 empeller packers installed in 1952. All fourteen packers are manually operated using only hand tuck valve bags manufactured by International Payer, St. Regis, Crown, Zellerbach, and other suppliers. The bags are designed to hold 50 pounds of a product whose density is 12 to 25 pounds per cubic foot. The operator places the bag on the packer spout, activates the unit, removes the bag, hand tucks the valve, and drops the bag onto one of two chain conveyors located beneath the packer platform. (Figure 2)

Each chain conveyor transports the bags to a palletizing (press pit) station. A major portion of these pits are located below the floor level. (Figure 3) (This permits the palletizing operator to drop the bags into the pit without having to lift them much above their waist.) Switches activate rams to raise and lower the pallet load and open and close the pit lid. The palletizing operator manually lifts the bags from the chain conveyor and drops them on a pallet in the press pit. After the pallet is loaded, the lid is closed and the ram presses the load into the lid, thereby compacting the load. The pressure is released, the lid opened, the ram raises the load to the top of the pit, and the operators pushes the loaded pallet onto roller conveyors. An empty pallet is placed on the ram and lowered to the bottom of the pit. From the roller conveyors, the palletized loads are transported by fork lift either to the shrink wrap station (70 to 80% of all loads are shrink wrapped) or directly to storage until shipped.

Product in damaged bags is recycled in stations located outside of the building. These stations are in open areas between buildings and consist of open top hoppers (4 feet by 4 feet openings) with windbreaks errected on two (opposite) sides of the hopper. The material is usually recycled a pallet load at a time. The bags are slit open and the contents dumped into the hopper returning the product to the process stream. The emptied bags are tossed into waste bins which are periodically hauled off by forklift and buried.

IV. DESCRIPTION OF PROGRAMS

All employees are required to have pre-placement and periodical physicals which include x-rays and audiograms. Employees working in dusty areas are given annual physicals. Monitoring through air samples, both personal and area, are taken quarterly for both respirable dust and its crystaline silica content. Personal protective equipment required are safety shoes, safety glasses, hard hats, and respirators (in posted areas).

The company also provides a laundry service for coveralls. Safety training follows MSHA's program. Housekeeping is performed daily with emphasis on prompt clean up of spills.

V. SAMPLE DATA FROM PRELIMINARY PLANT SURVEY

Three bulk samples of finished product were provided by the company to determine crystalline silica content. These samples were sent to Utah Biomedical Testing Laboratory (UBTL).

VI. DESCRIPTION OF CONTROL STRATEGY FOR THE BAGGING OPERATIONS

With the present engineering controls in the bag packaging area, Grefco has been able to meet OSHA standards. Exhaust ventilation is provided at each packer and inside the press pit. The exhaust ventilation in the

press pit captures airborne dust generated during pallet loading and compacting (pressing). Beneath the packer platform, a trough with water sprays removes product that falls from the packers and during bag handling (filling, bag valve closing, and dropping bags onto conveyor) operations. This trough system replaced a screw conveyor that had been used to remove this spillage while still a dry powder. The water sprays significantly reduced the airborne dust concentrations that had resulted from this screw conveyor. The floors inside the building are kept clean by using a combination of wet washing (hosing) and vacuum sweeping (riding floor vacuum sweeper). This replaced a centralized vacuum system which was found to be inadequate. The outside grounds, between building and under the structures has been paved or covered with concrete. These grounds are kept clean by immediately sweeping up spills and frequently washing down with water. Wet washing is considered to be the primary means of keeping the area clean.

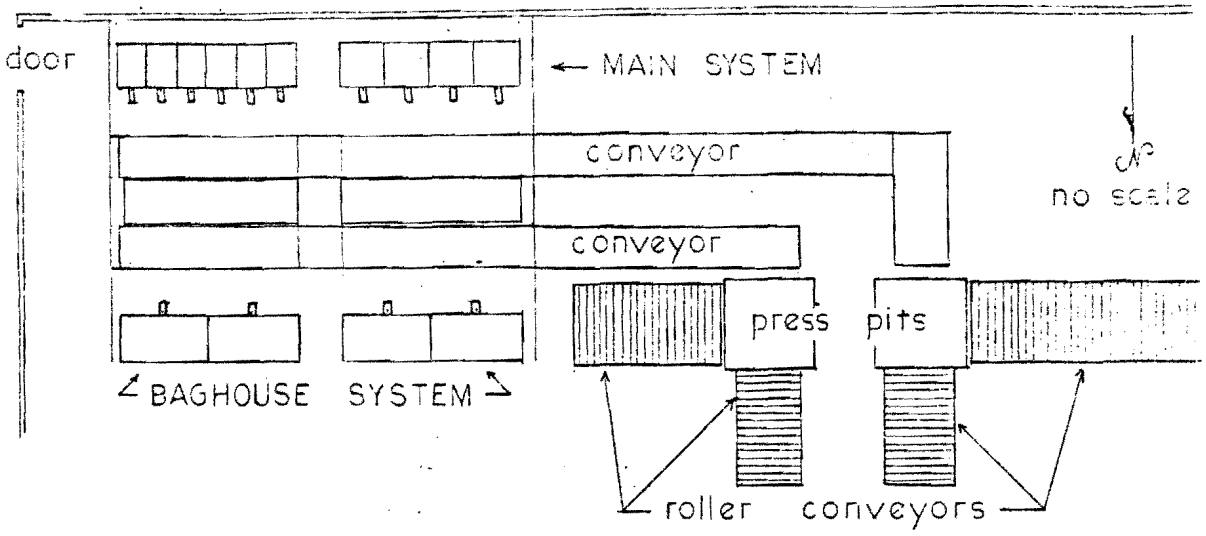
Monitoring, mainly through personal samples for respirable dust, is done quarterly in dusty areas. Three to four mill operators along with a few area samples are normally sampled. Other areas are sampled less frequently.

In the area of the recycle hoppers, wind breaks have been installed. Additional work is in progress to try and further reduce the dusting effect during recycling operations.

VII. CONCLUSIONS AND RECOMMENDATIONS

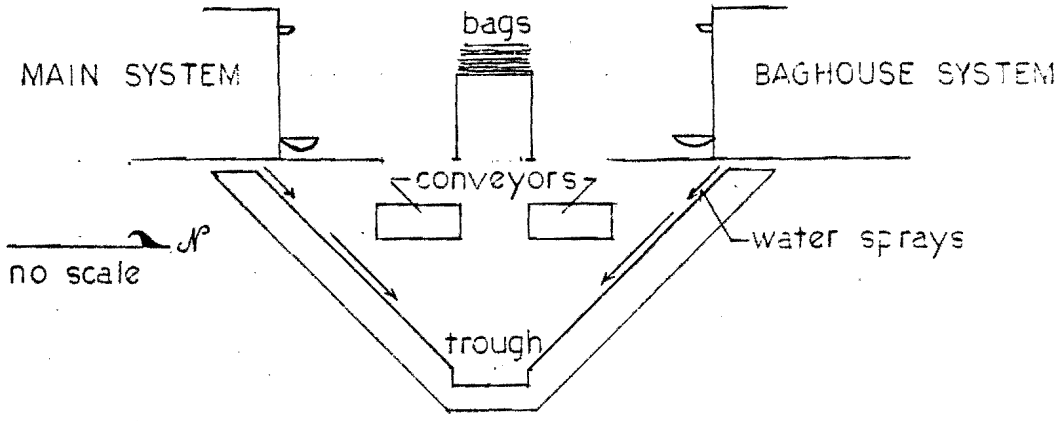
The company has a couple engineering controls worth noting; the water wash beneath the packer platform and the press pit (palletizing) station. Other controls, such as exhaust ventilation around the packers may be considered adequate but not exemplary. The company continues to work to improve their dust controls by replacing inadequate systems with improved systems. An in-depth study at this operation may be desirable.

Figure 1



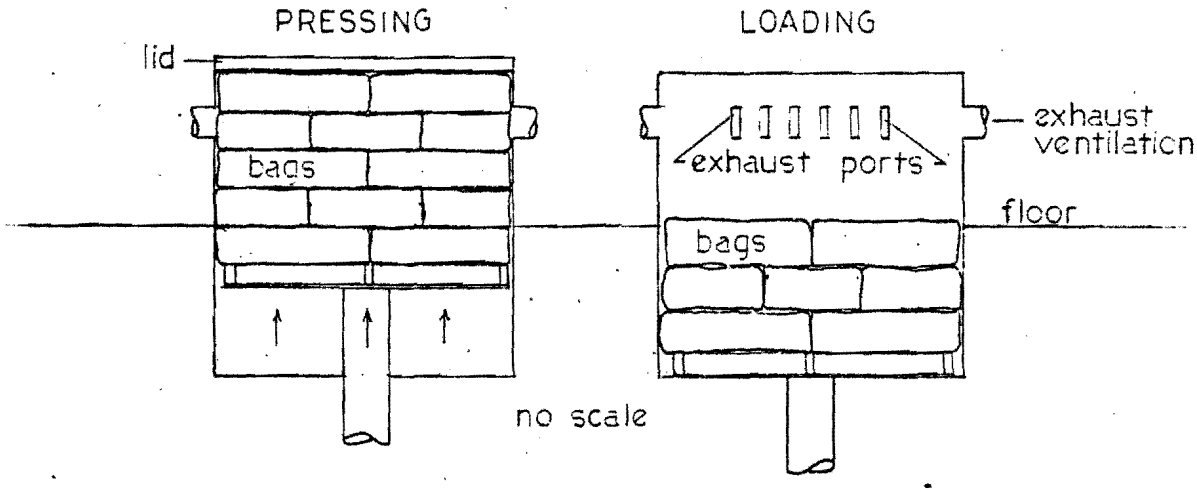
PACKAGING AREA

Figure 2



CONTINUOUS WASH

Figure 3



PRESS PITS