

PRELIMINARY SURVEY REPORT:  
CONTROL TECHNOLOGY SUPPORT FOR SENSOR

AT

The Morie Company  
Mauricetown Plant  
Mauricetown, New Jersey

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NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
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PLANT SURVEYED: The Morie Company, Inc.  
Mauricetown Plant  
A South Jersey Industries Company  
1201 N. High Street  
Millville, New Jersey 08332

SIC CODE: 1446

SURVEY DATE: September 13, 1988

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(send report to Emerson Blizzard,  
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Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

## 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 the Department of Health, Education, and Welfare), 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 conducted 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 hazard 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. The objective of each of these studies has been to document and evaluate effective techniques for the control of 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.

In 1987, NIOSH initiated the SENSOR program (Sentinel Event Notification System for Occupational Risks), a cooperative federal-state effort designed to develop local capability for the recognition, reporting, follow-up, and prevention of

selected occupational disorders. Under this program, the state health department (or other agency) launches three types of actions upon notification of a case of occupational disease: first, disease management guidelines will be made available to the health care provider; second, medical evaluations of co-workers who may be at risk of developing similar disorders will be conducted; finally, action directed to reduce work site exposures will be carried out. To assist the states in developing model intervention plans for exposure reduction, ECTB will conduct a pilot engineering assistance project with selected states participating in SENSOR. This assistance may include specific control recommendations for an individual plant identified and selected by the state, or for an entire industry that would be selected based on the state disease records, with the intent of developing guidelines for the elimination of occupational disease in the entire industry. In either case, follow-up studies may be conducted after the intervention plans have been implemented to determine the success of the program through measurement of the exposure reductions achieved.

The New Jersey Department of Health (NJDH) is participating in the SENSOR program for occupational asthma and silicosis. Health Department data indicate the largest number of silicosis cases in the state exists in the sand mining and processing, foundry, and pottery (sanitary ware) industries. ECTB will conduct at least one study in a facility in each of these industries to establish base line exposure data for that plant, to develop specific control recommendations to eliminate future cases of disease, to train state personnel in the application of engineering controls, and to develop a model protocol for the identification and control of exposure sources.

This report describes a walk-through survey conducted as a part of this federal-state effort at the Mauricetown, New Jersey, plant of the Morie Company. The purpose of this survey was to determine the need for improved engineering controls in a sand mining operation.

## II. PLANT AND PROCESS DESCRIPTION

### Plant Description:

The Mauricetown site of the Morie Company has been mined for approximately 60 years, producing glass, foundry, and multipurpose sands. Although the site no longer contains sand suitable for use in glass manufacture, foundry and multipurpose sands of a wide range of sizes are produced. Sand is shipped from the plant via truck in bulk or in bags. The Morie Company is a subsidiary of South Jersey Industries, the regional natural gas utility. The plant employs 85 workers (25 salaried, 60 hourly) and operates on three shifts, although the third shift is a curtailed operation.

### Process Description:

Sand is dredged from ponds and pumped to a holding tank. The sand is washed, then classified according to size by a flume, which transfers the sized product into storage piles. Sand from storage is moved by front-end loader to one of two drying plants.

Dryer #1 is a fuel oil-fired rotary kiln equipped with a wet scrubber. Sand from dryer #1 is classified by one or more of 12 vibrating screens, discharged to bins located below the screens and above the loading area. A blending site is also located beneath the bins adjacent to truck loading. Sands are blended by the manual opening of slide gates, allowing one or more size sands to fall onto a belt conveyor. An infinite range of sand sizes in the final product are possible. The blended sand is conveyed to hoppers and loaded into trucks by gravity feed. The blending and loading operation at dryer #1 is a major source of sand (quartz) emissions at this plant.

Dryer #2 consists of a series of three fluidized bed dryers discharging to one of two vibrating screens. Screened sand is conveyed to one of five silos and loaded into trucks using a ventilated loading spout, enclosed in a separate, drive-through enclosure. Alternatively, dried sand can be conveyed to the screening operations located by dryer #1. Air from the fluidized beds is cleaned in a bag house, and the waste dust pneumatically transported to a dust disposal station. (A ventilated loading spout is used at the disposal station.)

Sand is also furnished in 100-pound, pasted-valve bags. Sand is bagged on a four spout St. Regis packer, the bags palletized, and the pallet shrink-wrapped.

## Potential Hazards:

The major hazard associated with this operation is crystalline silica. Overexposure to the crystalline forms of silica causes the lung disease silicosis; symptoms include cough, shortness of breath, chest pain, weakness, and wheezing. Silicosis usually occurs after years of exposure, but may appear in a shorter time if exposure concentrations are very high. This latter form is referred to as rapidly-developing silicosis, and its etiology and pathology are not as well understood. Silicosis is usually diagnosed through chest X-rays, occupational exposure histories, and pulmonary function tests. The manner in which silica affects pulmonary tissue is not fully understood, and theories have been proposed based on the physical shape of the crystals, their solubility, toxicity to macrophages in the lungs, or their crystalline structure.<sup>(1)</sup> Since the dredging and processing operations are performed wet, the greatest silica exposure hazard appears to occur in drying and loading.

### III. EXPOSURE CONTROLS

Occupational exposures can be controlled by the application of a number of well-known principles, including engineering measures, ventilation, work practices, personal protection, and monitoring. Operations up to and including the processing plant possess inherent safety, because they are performed wet. Our survey, therefore, concentrated on dust control measures in use on dry processes at this facility. These controls included primarily local exhaust ventilation, isolation of operators in control rooms, and housekeeping.



Ventilation:

A 25,000 cfm wet scrubber (in addition to the wet scrubber used for the rotary kiln) provides dust collection for the screens, bin room (sand bin covers were also added), and bulk loader conveyor in dryer plant #1. In dryer plant #2, the same bag house that exhausts the dryers provides local exhaust for the belt conveyor transfer points and the two vibrating screens. In both areas, air-conditioned (window units) control rooms provide isolation for part of the work shift.

A ventilated loading spout is used for bulk loading in dryer plant #2. This spout is isolated in a separate building and an automatic sampling system is employed to minimize exposure in that operation. The loading spouts consist of a central flexible hose, approximately 12 inches in diameter which serves as a conduit for the sand. It is surrounded by a larger hose which terminates in a funnel. The funnel can be lowered into a rail car or tank truck hatch, and provides a source of exhaust for air entrained/displaced by the loading process. For open truck loading, the funnel could function as a capture hood, although its effectiveness would diminish. One company-owned dump truck has been retrofitted with a custom-designed load cover to close in an otherwise open truck.

No local exhaust is provided in the bagging area; however, the bagging operator works in a filtered air shower, the "OASIS" system developed by the Bureau of Mines. No fresh makeup air is provided anywhere else in this building.

In all three areas, centralized vacuum systems assist in housekeeping. HEPA-filter equipped vacuum cleaners are available to clean operator control rooms in both dryer plants.

**Medical:**

The company physician evaluates the capacity of individuals to wear respirators during the initial employment physical. Biennial medical screening is provided by a contractor who subcontracts X-ray interpretation to a "B" reader. Company policy is to move individuals who are rated with 1/1 (ILO) silicosis to job classifications with low dust exposures within the plant; those rated 1/0 are not moved. No silicosis-related job transfers have occurred in the past 3 years.

**Industrial Hygiene:**

Sampling of the work environment is performed by company personnel with laboratory analysis by a contractor. The sampling frequency is determined by the exposure determined on the previous evaluation. The sampling period varies from once per month (for jobs with exposures in excess of  $200 \mu\text{g}/\text{m}^3$ ) to once per year (for jobs with exposures less than  $50 \mu\text{g}/\text{m}^3$ ). MSHA regularly conducts compliance monitoring at the plant.

## Respiratory Protection:

Workers are required to wear respirators in designated areas. Areas are designated by warning signs and include bin room, rotary kiln, bulk loader #1, dryer #2 (except control room), upper floor - bulk loader #2. Respirators are optional in other plant areas. North half-mask respirators with dust pads are provided.

## IV. CONCLUSIONS AND RECOMMENDATIONS

Cases of silicosis have been noted by the New Jersey Health Department in the sand mining and processing industry in New Jersey. Although dust exposure is unlikely in the wet processing areas in this plant, the drying and loading operations are areas of potential overexposure in this and other plants within the industry.

The plant currently appears to have an excellent health and safety program, that has made significant progress in reducing dust exposures. Particularly noteworthy, is the excellent housekeeping and the local exhaust in the screening area of dryer plant #1, and the use of ventilated loading spouts in bulk loading and bag house dust disposal. However, dust control is primitive in other plant areas where respirator use is now required, requiring additional improvements in material handling, local exhaust, and fresh air supply.

The bulk loading area in dryer plant #1 is particularly troublesome. Unvented truck loading, conveyor transfer points, and blending points are located in a small, confined area. Real-time analysis of dust exposure for this location may prove useful to prioritize sources for control. The plant is referred to reference 2 for information on these techniques. These techniques may also be useful in worker training in good work practices and in identifying exposure patterns for maintenance workers.

The plant health and safety staff indicates that improved exhaust ventilation in the bagging operation may be installed in the coming year. The plant is referred to references 3-6 for more information on successful bagging dust controls. Several design "oddities" (90 degree mitres, awkward junctions) were observed in the ventilation systems designed by the staff engineers. The plant is referred to reference 7 for information on accepted design practices.

The plant is steadily improving and adding engineering controls and appears to have the capability and resources to address current deficiencies in exposure control. No further study of this plant by ECTB is suggested at this time; continued surveillance by the NJDH of the plant's progress in their dust control program is anticipated.

## V. REFERENCES

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