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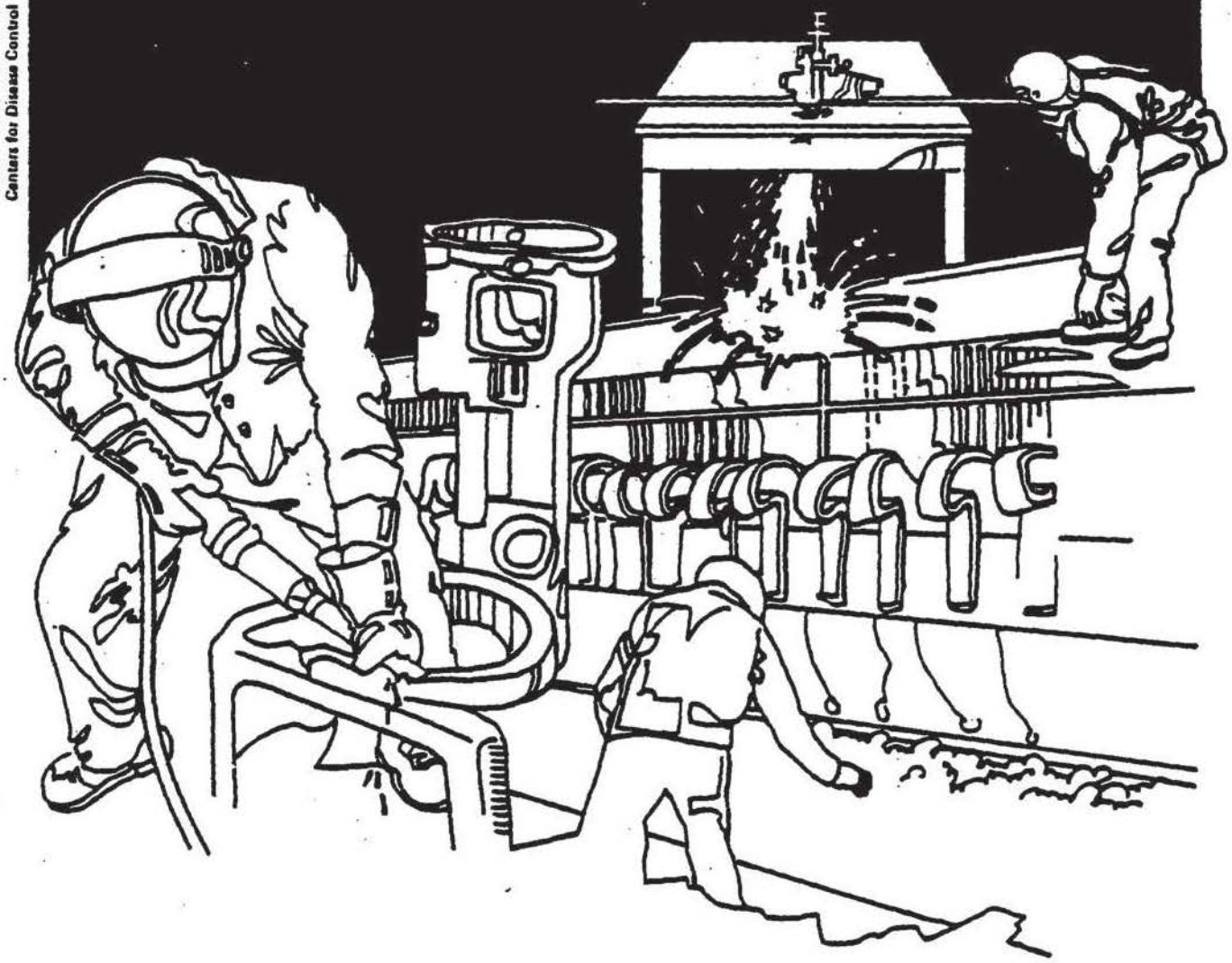

Health Hazard Evaluation Report

HETA 85-029-1675
J.R. SIMPLOT COMPANY
HELM, CALIFORNIA

PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following a written request from any employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

The Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

HETA 85-029-1675
March 1986
J.R. SIMPLOT COMPANY
HELM, CALIFORNIA

NIOSH INVESTIGATOR:
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I. SUMMARY

In October, 1984 the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate employee exposures to total nuisance dust (ammonium phosphate fertilizers) while working at J.R. Simplot Company located in Helm, California.

On January 16, 1985 an initial industrial hygiene survey was conducted at J.R. Simplot Company, area C, where bulk fertilizers (ammonium phosphate and ammonium sulfate) are handled. Four environmental air samples were collected during the fertilizer bagging and bulk loading operation. The total nuisance dust air concentrations ranged from none detected to 0.38 milligrams per cubic meter of air (mg/m^3)and the pH of each filter was measured to be 7.0. A follow-up environmental survey was delayed until June 1985 when fertilizer production was at its peak. Six total nuisance dust air samples were collected which ranged from 2.55 to 11.1 mg/m^3. One of the air samples exceeded the CAL-OSHA standard (10.0 mg/m^3). The pH of the filters were measured to be 6.5.

Based on environmental air monitoring results and observations of employees' work practices, a potential health hazard was found to exist - one overexposure to total nuisance dust was measured on the dates of this survey. Recommendations to further reduce exposures are included in section VIII of this report.

KEYWORDS: SIC 2874 (fertilizer manufacturing and bagging, ammonium phosphate, ammonium sulfate)

II. INTRODUCTION

In October 1984, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from a representative of the International Chemical Workers Union, local 97, Kerman, California. The representative was concerned about excessive dust exposures due to the inadequate mechanical ventilation in the fertilizer warehouse. The union representative noted that the company made attempts to correct the dust problem, but the representative was uncertain whether these changes were effective in reducing the dust levels.

In January 1985 NIOSH conducted an initial environmental survey of the shipping area i.e. the fertilizer bagging and bulk loading operation. A follow-up survey was delayed until late June when fertilizer production and the potential for exposure was greatest. Environmental air sampling results were telephoned to the union when they became available.

III. BACKGROUND

J.R. Simplot Company is a manufacture of fertilizers such as ammonium phosphate and ammonium sulfate. The company has been operational since 1959 and currently employs about 250 workers.

In 1984, the California Occupational Safety and Health Administration (CAL-OSHA) conducted an investigation at J.R. Simplot Company. Total nuisance dust air samples collected during the bagging and bulk loading operation ranged in concentration from 6 to 60 milligrams per cubic meter of air (mg/m^3).

The company has attempted to improve dust control of ammonium phosphate since 1978. Approximately 19 different actions have been implemented to control total nuisance dust. The three most recent changes implemented subsequent to the CAL-OSHA investigation were the introduction of an improved dust control agent, some improvements in the transfer points on the conveyor system and the addition of screens to remove fine dust.

Approximately 15 employees (laborers, maintenance workers and front end loaders) work in the storage area during one of 3 shifts. Employees generally work 8 hours a day five days a week. Employees who work in the dry loading area are required to wear a disposable respirator and safety glasses.

The fertilizer is a prill containing nitrogen, phosphorus, and potassium in various percentages. After the prill has been formulated, it is passed through a process screen and a fine screen to remove the fine dust. Next, the product is coated with a wax to help control dust generation as the product is being moved in a screw conveyor to storage bins. As different prills are needed, a front end loader is used to pick up the fertilizer and dump it into a floor grating. The screw conveyor either directs the product to the bagging machine or it is bulk loaded. It usually takes about one hour to load the bag trucks which are usually scheduled, and it takes 30 to 45 minutes to load the bulk trucks which are not scheduled. Bag filling is done during the day shift only, whereas bulk truck filling is done during any of the shifts. Prior to bulk loading, the fertilizer is sprayed with a wax atomizer solution (Tri-N-32®) to control the dust. The spray system must be manually turned on prior to loading the bulk material.

IV. EVALUATION DESIGN AND METHODS

In order to evaluate the total nuisance dust air concentrations, air samples were collected using a sampling train (calibrated vacuum pump and appropriate collection medium) through which a known volume of air is passed. The total nuisance dust weight of each sample was determined by weighing the sample plus the filter on an electrobalance and subtracting the previously determined tare weight of the filter. The tare and gross weighings were done in duplicate. In addition, the pH of each sample collected was measured.

Since it was believed that the relative humidity plays an important role in reducing the general dust burden during the winter, temperature and relative humidity measurements were taken during both surveys using a psychrometer.

V. EVALUATION CRITERIA

A. Environmental Criteria

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below

these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent become available.

The primary sources of environmental evaluation criteria for the workplace are: 1) NIOSH Criteria Documents and recommendations, 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and (3) the U.S. Department of Labor (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLV's are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLV's usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based primarily on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet only those levels specified by an OSHA standard.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high short-term exposures.

TABLE A

SUBSTANCE	Permissible Exposure Limit 8-Hour Time-Weighted Exposure Basis	Source
Total Nuisance Dust	10 mg/m^3	CAL-OSHA, ACGIH

1. mg/m^3-milligrams of a substance per cubic meter of air

B. Toxicological.

1. Total Nuisance Dust: Ammonium phosphate and ammonium sulfate are currently considered a nuisance dust. Apparently these dusts have little adverse health effects on the lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control. Excessive exposure may reduce visibility and may result in deposits in the eyes, ears, and nasal passages or cause injury to the skin or mucous membrane by chemical or mechanical action. (1)

VI. RESULTS AND DISCUSSION

Environmental air monitoring was conducted during the initial and follow-up survey to measure total nuisance dust air concentrations (Table I and II) during fertilizer bagging and bulk loading. Four environmental air samples collected during the initial survey ranged in concentration from none detected to 0.38 mg/m^3. None of these exceeded the CAL-OSHA standard. The pH of each sample was measured to be that of the water used for extraction. It should be noted that production was very low during this time of the year and the weather was quite moist, i.e. foggy, which appeared to reduce the total airborne dust concentration. A follow-up survey was conducted in June, 1985 when production is described to be at its peak and weather conditions are described to be very dry and hot (greater than 90°F) which makes the presence of the dust more noticeable. Six environmental air samples were collected which ranged from 2.55 to 11.1 mg/m^3. Only one of the air samples exceeded the CAL-OSHA nuisance dust standard. The pH of each sample was measured to be 6.5. The production level during the follow-up survey was reported to have been equivalent to the other days of the week. Approximately six bulk trucks and two bag trucks were loaded during the follow-up survey. The greatest potential for exposure appears to occur when the front end loader operator quickly dumps the fertilizer from the loader onto the floor grating creating a dust cloud (as opposed to slowly dumping the fertilizer from the loader shovel).

One problem with the dust control spray system is that the front end loader operator must remember to turn the mist spray system on before loading the bulk trucks and turn the system off when finished loading. On a couple of occasions, the spray system was inadvertently left off while loading a truck.

Based on observations of the work practices, the design of the warehouse, and the current exposure data, it does not appear economically feasible or reasonable to try to adapt engineering controls (exhaust ventilation) along the conveyer belts or transfer points to

further reduce the dust levels from those measured by NIOSH. The use of the wax coating material appears to have reduced the airborne dust levels (based on the reported CAL-OSHA data as compared to the NIOSH exposure data). Also, workers indicated that since the use of the new wax coating atomizer system, the visibility is much better just so long as the loader operator remembers to turn the system on during bulk loading.

It should be noted that the disposable respirators are readily available and that employees are instructed how to properly wear them. However, employees are not fit tested for these; consequently, it is unknown whether the respirators are properly sealing the employees face.

VII. CONCLUSIONS

Based on the environmental air sampling results collected during the follow up survey, we concluded that a potential health hazard exists due to one air sample exceeding the CAL-OSHA standard.

VIII. RECOMMENDATIONS

1. The front end loader should be reminded to slowly dump the fertilizer onto the floor grating to help control dust generation.

2. When the conveyor line is turned on to do bulk loading of fertilizer, a method should be devised, e.g. flashing beacon, to remind the operator to turn off the wax atomizer spray system to control dust exposure.

3. Workers should be reminded to close the screen doors after inspecting or cleaning the screens.

4. Employees who wear the disposable respirator should be qualitatively fit tested to assure a good face to piece seal.

IX. REFERENCES

1. American Conference of Governmental Industrial Hygienists. Threshold limit values for chemical substances and physical agents in the workroom environment and biological exposure indices with intended changes for 1984-85. Cincinnati, Ohio: ACGIH, 1984.

2. American Conference of Governmental Industrial Hygienists. Documentation of the threshold limit values. 4th ed. Cincinnati, Ohio: ACGIH, 1980.

3. National Institute for Occupational Safety and Health. Occupational diseases: a guide to their recognition. Revised ed. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1977. (DHEW (NIOSH) publication no. 77-181).

4. National Institute for Occupational Safety and Health. NIOSH manual of analytical methods, 3rd ed., Cincinnati, Ohio. 1984, DHHS (NIOSH) publication no. 84-100.

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XI. DISTRIBUTION AND AVAILABILITY OF REPORT

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days, the report will be available through the National Technical Information Service (NTIS), 5285 Port Royal, Springfield, Virginia 22161. Information regarding its availability through NTIS can be obtained from NIOSH Publications Office at the Cincinnati address. Copies of this report have been sent to:

1. International Chemical Workers Union, Local Number 97.
2. J.R. Simplot Company, Helm, California.
3. CAL-OSHA.
4. NIOSH, Region IX
5. U.S. Department of Labor, Region IX

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

Table I

Air sampling results collected
for total nuisance dust

J.R. Simplot Company
Helm, California

HETA 85-029
January 16, 1985

Sample Number	Job Classification	Sampling Period	Total Dust (mg/m^3)[1]
2	#4 bulk line, general area	0849-1255	ND*
4	#4 bulk line, general area	0850-1255	0.38
5	#4 bulk line, loader operator	0847-1255	0.04
9	#3 bulk line, loader operator	0857-1253	ND

Evaluation Criteria:

	Total Dust
NIOSH (8-hour TWA)	—
CAL-OSHA (8-hour TWA)	10 mg/m^3

1. mg/m^3-milligrams of a substance per cubic meter of air.
2. ND - None Detected

Table II

Air sampling results collected
for total nuisance dust

J.R. Simplot Company
Helm, California

HETA 85-029
June 11, 1985

Sample Number	Job Classification	Sampling Period	Total Dust (mg/m^3)[1]
4286	line #3-loader operator	0823-1522	7.1
4285	bagging line-loader operator	0829-1526	11.1
4294	line #4-loader operator	0832-1519	2.24
4293	bagging line-area sample near operator	0835-1516	6.8
4292	bagging area-supervisor	0839-1300	2.96
4297	line #4-general area sample	0841-1518	2.55

Evaluation Criteria:

	Total Dust
NIOSH (8-hour TWA)	—
CAL-OSHA (8-hour TWA)	10 mg/m^3

1. mg/m^3-milligrams of a substance per cubic meter of air.