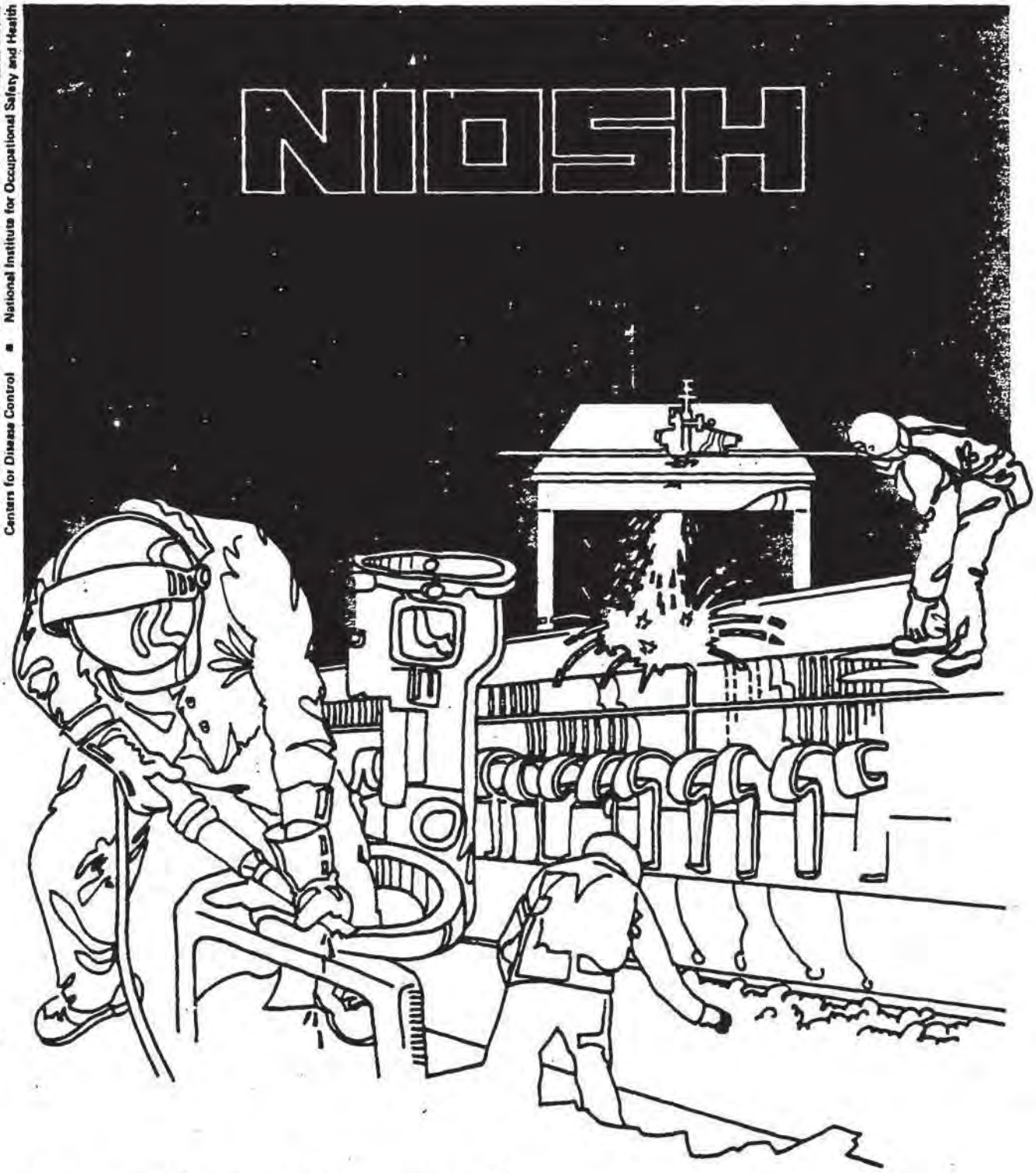
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health

NIOSH



Health Hazard Evaluation Report

HETA 84-394-1577
ROBERT HALL CO., INC.
ENCINITAS, CA

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 84-394-1577
April 1985
ROBERT HALL CO., INC.
ENCINITAS, CA

NIOSH INVESTIGATORS:
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I. SUMMARY

On April 4, 1984, the National Institute for Occupational Safety and Health (NIOSH) received a request to evaluate possible worker exposure to Temik and other pesticides while working in the nursery at the Robert Hall Co., Inc. Encinitas, California.

On June 14, 1984 NIOSH investigators conducted an initial survey. The NIOSH industrial hygienist and the medical officer met with representatives of the employer, the United Farm Workers Union AFL-CIO which represents the workers at Robert Hall, and the commercial pesticide applicator firm which handles most of the applications at Robert Hall to review the chemicals used and the schedule and method of application. A walk-through survey was then conducted of all growing, storage, pesticide mixing and loading, and other work areas.

During the week of July 24, 1985, the NIOSH industrial hygienist and medical officer conducted a follow-up site visit. The industrial hygienist observed the contractors pesticide application and the posting of signs thereafter, interviewed irrigators about respirator training and the use of other protective equipment, and evaluated irrigators work practices when handling and mixing chemicals. The medical officer interviewed irrigators, propagators and other workers employed in the cultivation of the plants regarding their concerns about potential pesticide exposure and symptoms related to their work, and conducted patch testing for chrysanthemum sensitization on 22 workers.

Based on the industrial hygienist's interviews and observation of work practices, several potential hazards were identified. The irrigators are exposed to pesticides by not wearing respiratory protection when entering houses that have been recently sprayed. One irrigator was not wearing the proper protective equipment when mixing chemicals. The greenhouse re-entry time was not always entered on the signs posted on the nursery houses after a pesticide application, allowing workers to enter the house prior to the recommended re-entry period. In addition, recent methyl bromide application was reported by the workers under circumstances and utilizing work practices which may have represented a health hazard.

Medical findings at Robert Hall were predominantly dermatitis related to mixtures of pesticides used in dips and in spray applications. Twenty-two workers were patch tested for sensitization to chrysanthemums; only one worker had evidence of sensitization. It was concluded that allergic contact dermatitis to this plant is not the predominant cause of dermatitis among the workers at Robert Hall. Direct contact irritation due to the pesticide dips and spray applications, in combination with the wet work and continuous contact with soil, was most consistent with the pattern of symptoms reported.

Physical findings included irritation of the hands, forearms, face and throat, with cracking of the palms and fingers and small vesicles on the dorsal surface of the hands and forearms.

NIOSH investigators concluded that a health hazard existed at Robert Hall due to the following: inadequate posting information after spraying a house, deficiencies of irrigators' work practices when handling and mixing chemicals, entering houses recently sprayed without the proper protective equipment, workers' lack of understanding regarding the proper use and care of respiratory protection, reported applications of methyl bromide under potentially hazardous conditions, and dermatologic symptoms among the employees. Recommendations for the improvement of these deficiencies and for improvements in worker education are made in Section VII.

KEY WORDS: SIC 0721 (aldicarb, nurseries, dermatitis, neurologic symptoms, enclosed spaces, agriculture, pesticides, chrysanthemums)

II. INTRODUCTION

In April, 1984, the National Institute for Occupational Safety and Health (NIOSH) received a confidential request for a health hazard evaluation on behalf of the nursery and greenhouse workers at Robert Hall Co. Inc., Encinitas, California. Nursery workers were concerned about their potential exposures to Temik and other pesticides used in the cultivation of commercial plants. The workers were particularly concerned about re-entry into treated greenhouses in which the signs posted outside the entrances did not give full information on the name of the chemical, the date and hour applied, and the safe date and time for re-entry

On June, 14, 1984 NIOSH investigators conducted an initial environmental and medical survey at Robert Hall Company. A follow-up environmental and medical survey was conducted during the week of July 24, 1984. The general findings of the investigators were presented to the company and union representatives at the end of the survey. In addition, guidelines relating to respiratory protection were sent to the company representatives. The results of skin patch tests to determine sensitization to the chrysanthemum flower were reported to the workers when the patch test was read.

III. BACKGROUND

The cultivation of plants for commercial sale in most nurseries involves the use of agricultural chemicals at many stages: in the preparation of the bed, in treatment of the seedlings, of roots as the seedlings are transplanted, of soil and of the growing plants. The chemicals used may include herbicides, insecticides, fungicides, growth regulators. Because many growing houses are completely or partially enclosed, chemicals applied may remain in the air or on the foliage for a longer period than if applying pesticides to open fields, and rates of environmental decay may be significantly altered.

There are no re-entry periods specified by the EPA for application in enclosed areas such as nurseries, mushroom plants, or poultry barns; re-entry periods established for field crops are interpreted by many agricultural agencies to apply equally to enclosed areas. Workers may be in the same general area of the growing house while a chemical is being applied, or they may enter soon enough after application to detect an odor or a residue on the plants. At Robert Hall Co., the workers were concerned about the adequacy of protection afforded them by the work and re-entry practices associated with chemical applications. Because of the particular characteristics of agricultural pesticide use in enclosed spaces, and the lack of research regarding these potential hazards, we conducted an extensive evaluation of worker health and safety in these nurseries.

A further problem common to agricultural work in nurseries is the high prevalence of sensitization to plants, resulting in difficulty in

distinguishing between plants and chemicals as the causes of allergic contact dermatitis among the workers.

Robert Hall Co., Inc. , established in 1953, has about 20 acres of greenhouse. The nursery staff is primarily Hispanic, with little turnover, and usually ranges from 40 to 50 employees. At the time of this study there were 38 workers (13 women and 25 men). Employees work from 7:00^{am}-4:30^{pm} five and one-half days per week.

Robert Hall primarily grows chrysanthemums with 2-3 acres of carnations and snap dragons, originally for the purpose of retail sales. Pesticide application had been originally done by the nursery workers; however a pesticide applicator has been contracted for the last seven years to do most of the pesticide application (Table 1). Every Monday, the contractor representative (usually the spray crew foreman) meets with the ranch manager to decide on the spray schedule for the entire week. A written record is prepared specifying the house to be treated, material used, and rates of application; on the job, the applicators add a record of the hour of application and total amount applied. Copies of all records go to the ranch manager. A copy of the pesticide application schedule is posted on the bulletin board in the ranch manager's office.

There are generally two applicators at the nursery at any one time, but sometimes there are as many as 4 pesticide applicators. The applicators are required to post all greenhouses before spraying with the date, name of chemical applied, and re-entry information. Pesticides are mixed on site in a 200 gallon spray rig. Materials are obtained from the manager on the day before or that morning; if extra chemical is left at the end of the day it is sprayed out. It should be noted that during the initial walk through survey the re-entry times were not posted on the signs.

There are three irrigators and three substitutes. The irrigators may enter the houses before the re-entry time has elapsed in order to secure the house, open or close the vents, or to irrigate. They also are responsible for changing the signs after the re-entry time has elapsed. The irrigators are supposed to wear respirators when entering the house but several workers reported that the signs are not complete so they do not know when they need to wear respirators.

The irrigators apply fertilizers and several pesticides. They wear rubber boots, coats, gloves and a respirator (either a half-mask respirator with a high efficiency particulate filter or a disposable dust respirator). Workers are trained by the assistant ranch manager how to use their respirator, but these workers must maintain them. The fertilizers used by the irrigators are calcium nitrate, ammonium nitrate, potassium nitrate, manganese chelate, phosphoric acid, and sodium molybdate. The fungicides applied by the irrigators are Subdue, Lesan, and Benlate. These pesticides are used as a drench to new cuttings when the ground has not been fertilized.

Methyl bromide was previously used for preparation of all soil beds, but it is no longer applied by the contractor. Steam heat is now used in all but three houses; steam pipes are run approximately 6" below ground and covered with a tarp for a prescribed time to sterilize the soil.

During the walk-through, workers reported to the NIOSH staff that methyl bromide was still being applied by Robert Hall employees in three houses, as recently as the week before the site visit. NIOSH staff were shown methyl bromide tanks attached to the injection rig, and the application method was described by an employee. A worker with no training in methyl bromide application drives the rig which injects methyl bromide into the soil. A team of 8-10 workers follow behind the rig pulling a plastic cover over the mulch bed with wooden poles. The rig operator is provided cotton gloves and a respirator which had not been fit tested. The other workers received no protective equipment. During a telephone conversation subsequent to the initial survey, the ranch manager indicated that the ground is watered the night before fumigating so that the damp soil will contain the pesticide longer, that the shanks are buried approximately 8 inches under the soil, and that the injection lines are blown out with nitrogen while the shanks are in the soil. Also, the rig operator wears a gas mask with the appropriate cartridges, and that the workers follow from 30 to 50 feet behind the tractor rig. It should be noted that two of the three houses that are treated with methyl bromide were partially enclosed with plastic and the third was totally enclosed.

The nursery workers are not required to wear any special personal protective equipment; however they are provided cotton gloves for cutting flowers and other general nursery work.

Other than the training for workers who apply pesticides, the nursery workers do not receive periodic training regarding the potential health hazards of agricultural chemical exposures or the potential for plant-related dermatitis.

IV. DESIGN AND METHODS

A. Environmental

During the initial survey, the NIOSH investigators conducted a walk through survey of the growing, storage, chemical mixing and loading area and other areas. Greenhouses recently sprayed were checked for posting of signs and completeness of information. During the follow-up survey, the industrial hygienist observed the contractors pesticide application and posting of signs, interviewed irrigators and substitute irrigators about work practices and use of respirators and other protective equipment, and observed a chemical mixing operation.

The California Department of Food and Agriculture was contacted to determine if there were any guidelines regarding the application of methyl bromide in a greenhouse or other partially enclosed structure.

B. Medical

Workers were interviewed for symptoms potentially associated with exposure to agricultural chemicals employed or plants cultivated at this worksite; the interviews emphasized neurologic and dermatologic effects. Dermatologic examinations of the face, neck, forearms and hands were conducted on all workers interviewed. Several workers reported dermatitis of the feet and their feet were examined as well. A patch test for sensitization to chrysanthemum foliage was offered to all employees. Informed consent was obtained from participating workers. Chrysanthemum leaves from plants in the growing houses were washed and dried. The skin of the upper forearm was prepared with alcohol swabs and dried with sterile cotton. A 2 centimeter cutting of leaf was crushed and applied directly to the skin, and covered with a sterile bandage. The patch was removed and the skin reaction noted at 48 hours after application.

V. EVALUATION CRITERIA

A. Environmental

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 life time 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 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 at various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based solely 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 8-10-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 exposure.

TABLE A
ENVIRONMENTAL EXPOSURE LIMIT (ppm)[1]

SUBSTANCE	TIMEWEIGHTED AVERAGE	CEILING
Methyl Bromide (CAL-OSHA)	15	50
Methyl Bromide (ACGIH)	5	15

CAL-OSHA-California Occupational Safety and Health Administration.
ACGIH -American Conference of Governmental Industrial Hyeienist.

B. Adverse Health Effects

Because of the great variety of pesticides used at Robert Hall Inc., as in most nurseries, the following discussion of the potential toxic effects of exposure is simplified. The pesticides are listed in Table I, with their EPA Category indicating relative acute toxicity. Absorption of pesticides under field conditions is primarily dermal (skin), although inhalation during spray applications may occur.

It should be remembered that in addition to the acute effects mentioned below, many pesticides and/or their hydrocarbon vehicles may cause dermatitis (direct irritant and in some cases allergic contact). A more detailed discussion of the health effects of pesticides may be found in references (2) and (3).

1. Organophosphate Pesticides

Organophosphate insecticides produce their effect by inhibition of acetylocholinesterase at cholinergic synapses, resulting in an exaggeration of the muscarinic, nicotinic and central nervous system actions of acetylcholine. Diagnosis of acute organophosphate poisoning is made by a history of exposure and clinical signs and symptoms, and may be confirmed by response to a test dose of atropine; treatment should not await laboratory confirmation. For moderate exposure, symptoms include headache, dizziness, weakness, nausea and vomiting, eyelid and skin fasciculations, miosis and blurred vision, and sweating. More toxic exposures may cause abdominal cramps, muscular tremors, dyspnea, and ultimately death from respiratory paralysis.

Confirmation by laboratory analysis depends upon demonstration of depressed levels of plasma or erythrocyte (red blood cell, RCB) cholinesterase activity. Plasma (serum) cholinesterase is more labile than RBC cholinesterase; it is generated in the liver and therefore may be affected by any factor or disease process which interferes with liver function. RBC cholinesterase, because it is analogous to the enzyme active in nerve tissue, is the preferred index of toxicologic effect.

Chronic exposure to organophosphates over a prolonged time period may result in extreme inhibition of cholinesterases in the absence of symptoms; on the other hand, a more rapid but smaller inhibition may provoke moderate but disabling symptoms, and symptoms may occur in the absence of detectable inhibition (5). Workers who are re-exposed to organophosphates before cholinesterase regeneration is complete are at greater risk of poisoning because their threshold is depressed.

2. Carbamate Pesticides

The symptoms and mechanism of action of carbamate pesticides are similar to those of organophosphate pesticides, with the exception that carbamate pesticides are much more rapidly inactivated in the human body. As a result, carbamate poisonings are usually of much shorter duration, and cholinesterase measurements are often unreliable as a means of diagnosis because the levels regenerate so rapidly. Nevertheless, excessive exposure to carbamates in the absence of prompt recognition and treatment can be serious and even life-threatening.

3. Permethrin Pesticides

The permethrins are of very low toxicity, and are not well absorbed through the skin. No symptoms other than dermatitis have been reported among workers evaluated after moderate exposure.

4. Fungicides

The category of fungicides includes many distinct chemical families. Among those used at Robert Hall Company, the only recognized acute health effects at low levels of exposure are dermatitis, including irritant and allergic contact dermatitis. Benomyl has been associated with reproductive effects in animal tests.

5. Herbicides

Like fungicides, herbicides include a wide variety of chemicals. Of those used at Robert Hall Company, skin, eye, nose and throat irritation is a common health effect.

6. Growth Regulators

Although these plant hormones have been used for many years, no symptoms other than mild skin irritation have been reported, and there are no known long-term health problems known to be associated with their use.

C. Medical

As noted above in V-1, many of the pesticides used at Robert Hall are potential dermatologic irritants and/or sensitizers; low level acute and chronic exposure to some are also associated with non-specific central nervous system effects. Evaluation of the workers' reported symptoms sought to correlate these symptoms with the potential for and timing of exposure to these chemicals. As also noted in V-1, the chrysanthemums are also irritants and sensitizers. As it was impractical to test for the wide variety of chemicals used, this evaluation sought to determine the likelihood that sensitization to chrysanthemums represented a major proportion of reported dermatitis at Robert Hall.

VI. RESULTS AND DISCUSSION

A. Environmental

The workers were particularly concerned about re-entry into treated greenhouses in requesting this Hazard Evaluation. Workers

reported that houses were frequently treated but the signs posted outside the entrances did not give full information on the name of the chemical, the date and hour applied, and the safe date and time for re-entry. In many cases the irrigators reported that they had to enter the houses early in the morning to ventilate and/or irrigate, when the houses had been treated late in the afternoon of the previous day, and that the strong chemical odor persisted.

During the initial survey, greenhouses which were recently sprayed were checked for posting of signs. It was found that the name of the chemical sprayed and the date of application was provided, but the hour of the application and the re-entry period was not posted. We recommended at the conclusion of the initial survey that the hour of the spraying and the re-entry time be included for completeness of information. During the follow-up survey, it was observed that the applicator included all of the information recommended by NIOSH on the posting of signs.

Interviews with two irrigators and one substitute irrigator revealed that one worker uses a half-mask pesticide respirator which consists of an organic vapor cartridge and pre-filter. The other two workers only wear a disposable type respirator which is used for dust control; however, the disposable dust mask described was not a NIOSH approved respirator i.e. it only had one strap. Workers reported that they had not received any formal respirator training i.e. they were not taught how to properly inspect, clean and maintain their respirator. Furthermore, none of the workers have been fit tested. One worker reported that he never uses a respirator when entering a house that is recently sprayed, but that he simply holds his breath walks into the house to do what is needed and walks back out.

One irrigator was observed mixing fertilizers in a 55 gallon container which is then diluted and metered to the greenhouses. The worker was pumping phosphoric acid to the container, however, no protective gloves or face shield was worn by the worker eventhough they were available. In talking to the worker, it appears as if he did not understand the potential for acid burns.

The methyl bromide fumigation operation was not observed. According to discussions with the California Department of Food and Agriculture (CDFA), there are no specific guidelines related to the methyl bromide application in greenhouses. As a minimum, the most recent Environmental Protection Agency (EPA) recommendations effective January, 1985 regarding protective equipment requirements should be followed when methyl bromide exposures exceed 15 ppm concentrations. The environmental levels of methyl bromide in this operation have not be determined.

B. MEDICAL

Medical care is provided by a private physician with an office nearby. No pre-employment or periodic medical examinations are performed, except for cholinesterase baselines obtained on pesticide applicators.

The most frequent work-related injuries reported to the nursery managers are musculoskeletal injuries, occasional cases of nausea, and some dermatitis particularly in association with a small plot of snap dragons cultivated each winter.

Skin irritation was reported by many workers, particularly those involved in cutting flowers, dipping and transplanting seedlings, and debuttoning the plants. The Subdue and Lesan drench, the combination of Dursban, Orthene and Pounce, and the mixture of B-9, Dipel and Pentac were specifically identified as frequent sources of irritation. Workers demonstrated dried and erythematous skin on palms and fingers, with occasional cases of moderate desquamation or small vesicles.

Physical findings included irritation of the hands, forearms, face and throat, with cracking of the palms and fingers and small vesicles on the dorsal surface of the hands and forearms.

Patch testing for sensitization to chrysanthemum foliage was carried out for a total of 22 workers. On examination 48 hours after application of the patches, 1 worker was found to have moderate erythema and itching at the site of application. Eight workers reported that the patches had fallen off after approximately 24 hours, but exhibited no signs of sensitization. It was concluded from this that allergic contact dermatitis was not the predominant cause of reported dermatitis among the workers at Robert Hall. Direct contact irritation due to the pesticide dips and applications to soil and plants, in combination with the wet work and continuous contact with earth, was most consistent with the pattern of symptoms reported. It is possible that one or more of the pesticides have provoked sensitization in some of the workers as well; further investigation of this possibility would require more extensive patch testing than was feasible in this evaluation.

In cases of allergic sensitization in which it is not clear whether the offending agent is a plant or a chemical, or which chemical is the problem, patch testing may be helpful in determining what must be avoided. The use of face shields, goggles, gloves and other protective equipment intended to prevent

exposure to pesticides will actually create more severe problems by holding the plant pollen, juice or other parts against the skin or eyes.

For workers experiencing problems primarily due to the heat and humidity of the work, the use of talcum powder and cotton glove liners or socks under light plastic long-sleeved gloves and high rubber boots may be of help. Permeable shoes worn because of the heat are probably less comfortable than impermeable boots worn with adequately absorbent lining socks and powder.

The lack of worker education regarding the potential for pesticide- plant-related health effects creates a great deal of concern on the part of the workers. It is recommended that periodic brief educational programs be presented, allowing the workers the opportunity to voice their concerns and obtain answers, and that simple charts of the relevant chemicals and health effects be posted. Each division has a daily pesticide application schedule; providing access to these schedules for the worker representatives (shop stewards or health and safety committee members) would allow the representatives to answer questions from the workers, identify potential problems and forestall unnecessary concern.

VII. Conclusion

NIOSH concluded that a health hazard existed at Robert Hall Company based on interviews with workers, inadequate posting of information after spraying a house, observations of the work area and work practices and on the medical evaluation of dermatological symptoms of employees

VIII. RECOMMENDATIONS

1. The company should institute a formal respirator program in accordance with the Occupational Safety and Health Act (OSHA) requirements outlined in 29 CFR Part 1910.134. The respirators program should include the following: proper respirator selection, training and education of the user, fit testing, maintenance of equipment, proper and adequate storage, periodic inspection, surveillance of work area condition, periodic inspection of program to determine continued effectiveness and medical determination of user.

2. Each person requiring the use of a respirator should have a specific respirator assigned them.

3. Proper protective equipment i.e. face shield, protective gloves and apron should be worn when handling phosphoric acid to prevent skin and eye injury.

4. Workers with dermatitis should wear long sleeved shirts buttoned down to prevent the flowers and the juices from coming in contact with the skin; also employees should be encouraged to wear rubber boots with cotton socks and talc if having foot dermatitis

5. It is recommended that periodic brief educational programs on health and safety be presented, allowing the workers the opportunity to voice their concerns and obtain answers, and that simple charts of the relevant chemicals and health effects be posted.

6. It is recommended that copies of spray schedules be provided to worker representatives (shop stewards or health and safety committee members) to allow the representatives to answer questions from the workers, to identify potential problems and to alleviate workers concern.

7. It is recommended that posting of sprayed houses be done in english and spanish and include the following information:, name of chemical, date and hour applied, date and hour to re-enter

8. It is recommended that the new procedures, outlined by the EPA under the label improvement program for fumigants, including methyl bromide and methyl bromide plus 2 percent or less chloropicrin, be followed when applying this fumigant. A copy of Attachment A copied from PR Notice 84-5 is enclosed for your information.

9. The health and safety committee should be provided with copies of educational materials and trained in the use and interpretation of the weekly application schedules.

IX. REFERENCES

1. State of California Department of Food and Agriculture. 1982 Extracts from the Food and Agricultural Code and Title 3 Administrative Code Pertaining to Pesticides and Pest Control Operations. Division of Pest Management, Environmental Protection and Worker Safety, 1220 N. Street, Sacramento, California 95814.

2. NIOSH. Occupational Diseases: A Guide to Their Recognition. US/DHEW/PHS/CDC, 1977. Publication No. 77-181.

3. Hayes, Wayland J. Pesticides Studied in Man. Baltimore: Williams & Wilkins, 1982.

4. A guide to Industrial Respiratory Protection, HEW Publication No. (NIOSH) 76-189.

5. Labor Occupational Health Program. Fruits of Your Labor: A Guide to Pesticide Hazards for California Field Workers. University of California, Berkeley: Institute for Labor Relations, 2151 Channing Way, Berkeley, California 94720

6. Current Intelligence Bulletin No. 43, DHHS (NIOSH) Publication No. 84-117 , September 27, 1984.

X. AUTHORSHIP AND ACKNOWLEDGEMENTS

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IX. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After 90 days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publication Office, at the Cincinnati address.

Copies of this report have been sent to:

1. United Farm Workers Union, AFL-CIO.
2. Robert Hall Company Inc.
3. NIOSH - Region IX.
4. Cal-OSHA.
5. Federal-OSHA.
6. California Department of Food and Agriculture, Sacramento and San Diego Offices.

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

TABLE 1

PESTICIDES USED AT ROBERT HALL COMPANY

Commercial Name	Use	Chemical Family	Category*
Agri-Strep	fungicide	antibiotic	III
Bacillus Thuringienses	insecticide	biologic control	III
B-Nine	growth regulator	vitamin	III
Benlate	fungicide	benomyl	III
Dursban	insecticide	organophosphate	II
Kocide	fungicide	copper hydroxide	III
Lannate	insecticide	carbamate	I
Lesan	fungicide	fenaminousulf	II
Milban	fungicide	dodemorph acetate	I
Orthene	insecticide	organophosphate	III
Pro-Gibb	growth regulator	gibberellin	III
Pencap	insecticide	organophosphate	II
Pounce	insecticide	permethrin	I
Roundup	herbicide	glyphosate	II
Subdue	fungicide	alanine methyl ester	I
Temik	insecticide	carbamate	I
Vydate	insecticide	carbamate	I

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* EPA Toxicity Categories:

I	= DANGER	LD/50	50 mg/kg (rat)
II	= WARNING	LD/50	500 mg/kg (rat)
III	= CAUTION	LD/50	5000 mg/kg (rat)

ATTACHMENT A

REQUIRED LABEL STATEMENTS FOR METHYL BROMIDE AS SOLE ACTIVE INGREDIENT

AND

METHYL BROMIDE PLUS 2% OR LESS CHLOROPICRIN

I. Spanish warning statement (to be located on front panel)

PRECAUTION AL USUARIO: Si usted no lee Ingles, no use este producto hasta que la etiqueta le haya sido explicada ampliamente.

II. Front panel signal word. The English and Spanish signal words DANGER and PELIGRO are required. The word POISON and the skull and crossbones symbol are also required.

III. Human Hazard Precautionary Statements (to be located on the front or side panel under the heading "Hazards to Humans" and in any supplemental labeling, such as instruction booklets or manuals)

DANGER

Extremely hazardous liquid and vapor under pressure. Inhalation may be fatal or cause serious acute illness or delayed lung, nerve or brain injury. Do not breathe vapor. Liquid or vapor can cause serious skin or eye injury which may have a delayed onset. Do not get liquid on skin, in eyes or on clothing.

[If the product is 100% methyl bromide]

Methyl bromide vapor is odorless and non-irritating to skin and eyes during exposure. Exposure to toxic levels may occur without warning or detection by the user.

[If the product contains chloropicrin as a warning indicator (at levels of 2% or less)]

This product contains chloropicrin as a warning odorant. Chloropicrin may be irritating to the upper respiratory tract, and even at low levels can cause painful irritation to the eyes, producing tearing. If these symptoms occur, leave the fumigation area immediately.

IV. Practical Treatment Statement (to be located on front panel and in any supplemental labeling such as instruction booklets or manuals)

In all cases of overexposure, get medical attention immediately. Take person to a doctor or emergency treatment facility.

If inhaled: Get exposed person to fresh air. Keep warm. Make sure person can breathe freely. If breathing has stopped, give artificial respiration by arm lift method, not mouth-to-mouth resuscitation. Do not give anything by mouth to an unconscious person.

If on skin: Immediately remove contaminated clothing, shoes, jewelry, and any other item on skin. Wash contaminated skin area thoroughly with soap and water.

If in eyes: Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes.

V. Note to Physician [may be located with human hazard statements (but in a separate paragraph) on the label, or may be placed solely in supplemental labeling, such as accompanying booklets or manuals]

Early symptoms of overexposure are dizziness, headache, nausea and vomiting, weakness and collapse. Lung edema may develop in 2 to 48 hours after exposure, accompanied by cardiac irregularities; these effects are the usual cause of death. Repeated overexposures can result in blurred vision, staggering gait and mental imbalance, with probable recovery after period of no exposure. Blood bromide levels suggest the occurrence, but not the degree, of exposure. Treatment is symptomatic.

[The remaining items may appear on the label, but are strongly recommended to be included in supplemental labeling, such as a separate instruction manual.]

VI. Use Directions

This fumigant is a highly hazardous material and should be used only by individuals trained in its proper use. Before using, read and follow all label precautions and directions.

All persons working with this fumigant should be knowledgeable about the hazards, and trained in the use of required respirator equipment and detector devices, emergency procedures, and proper use of the fumigant.

When used for fumigation of enclosed spaces [houses and other structures, warehouses, grain bins or elevators, vaults, chambers, greenhouses, trucks, vans, boxcars, ships, and other transport vehicles, and tarpaulin-covered areas or commodities], two persons trained in the use of this product must be present at all times during introduction of the fumigant, testing and aeration periods.

Do not fumigate with this product when commodity temperature is below 40°F.

[Specific directions for use follow. The registrant must provide complete directions for use of the product for fumigation of specified spaces, commodities, or structures.]

VII. Protective Clothing

Wear full-body clothing that is cleaned after each wearing, or disposable protective clothing. Do not wear gloves or boots when handling. Methyl bromide is heavier than air and may be trapped inside and cause skin injury. If full-face respiratory protection is not required, wear goggles or full face shield for eye protection when handling liquid. Do not reuse contaminated clothing or shoes until cleaned.

VIII. Respiratory Protection

If the concentration of methyl bromide in the working area, as measured by [a direct-reading detector device], does not exceed 15 ppm (60 mg/M^3), no respiratory protection is required. [The registrant must identify one or more detector devices suitable for use with the product and provide or reference instructions on its use.]

If this concentration is exceeded at any time, all persons in the fumigation area must wear a [NIOSH/MSHA approved self-contained breathing apparatus (SCBA) or combination air-supplied/SCBA respirator]. [The registrant may instead identify a specific respiratory protection device to be used with the product.]

IX. Placarding of Fumigated Areas

The applicator must placard or post all entrances to the fumigated area with signs bearing, in English and Spanish:

1. The signal word DANGER/PELIGRO and the skull and crossbones symbol.
2. The statement, "Area under fumigation, DO NOT ENTER/NO ENTRE"
3. The date of fumigation
4. Name of fumigant used
5. Name, address, and telephone number of the applicator.

Only the applicator may remove placards, and only when the concentration of methyl bromide in the treated area is below 15 ppm.

X. Aeration and Reentry

After fumigation, treated areas must be aerated until the level of methyl bromide is below 15 ppm. Do not allow entry into the treated area by any person before this time unless provided with a respiratory protection device (SCBA or combination air-supplied/SCBA).

XI. Storage and Handling

Store in dry, cool, well-ventilated area under lock and key. Post as a pesticide storage area. Do not contaminate water, food, or feed by storage.

Store cylinders upright, secured to a rack or wall to prevent tipping. Cylinders should not be subjected to rough handling or mechanical shock such as dropping, bumping, dragging, or sliding. Do not use rope slings, hooks, tongs or similar devices to unload cylinders. Transport cylinders using hand truck, fork truck or other device to which the cylinder can be firmly secured.

Do not remove valve protection bonnet and safety cap until immediately before use. Replace safety cap and valve protection bonnet when cylinder is not in use.

When cylinder is empty, close valve, screw safety cap onto valve outlet, and replace protection bonnet before returning to shipper. Only the registrant is authorized to refill cylinders. Do not use cylinders for any other purpose. Follow registrant's instructions for return of empty or partially empty cylinders.

XII. Disposal Statements

[Label statements must conform to requirements of PR Notice 83-3, March 29, 1983.]

XIII. Spill and Leak Procedures

Evacuate immediate area of spill or leak. Use SCBA or combination air-supplied/SCBA respirator for entry into affected area to correct problem. Move leaking or damaged cylinders or containers outdoors or to an isolated location, observing strict safety precautions. Work upwind if possible. Allow spill to evaporate. Do not permit entry into spill area by unprotected persons until concentration of methyl bromide is determined to be less than 15 ppm.

Contaminated soil, water, and other cleanup debris is a toxic hazardous waste. Report spill to the National Response Center (800-424-8802) if the reportable quantity is exceeded.