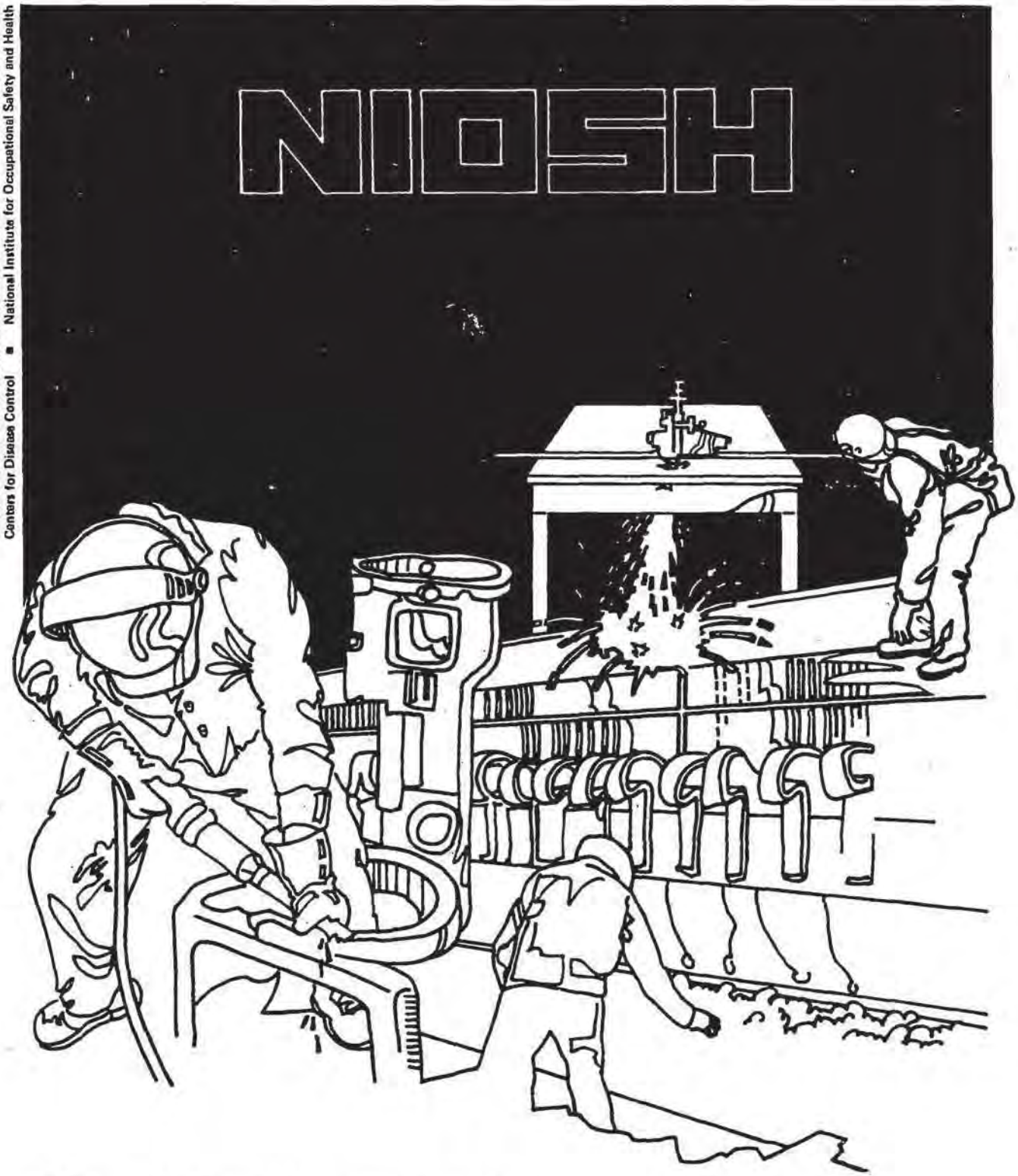
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health



Health Hazard Evaluation Report

HETA 82-028-1249
MORTON CHEMICAL CORPORATION
NEW IBERIA, LOUISIANA

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.

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MORTON CHEMICAL CORPORATION
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I. SUMMARY

In November 1981, the National Institute for Occupational Safety and Health (NIOSH) was requested by employees at Morton Chemical, New Iberia, Louisiana, to evaluate the possible health hazards to workers exposed to toluene at this plant. At the time of the study, about 90 workers were employed in producing uncured epoxy resins in the E-30 department, and tebuthiuron (a pesticide) in the DBT/MTSC department. Toluene is used in both areas.

On May 12-13, 1982, NIOSH investigators conducted industrial hygiene sampling, biological sampling, and employee interviews at the plant. Twenty-two personal breathing-zone air samples were collected for toluene and epichlorohydrin. Pre-shift and post-shift urine samples were collected from 52 workers and analyzed for hippuric acid as an indicator of toluene exposure. Eighty-one workers were interviewed to collect information on occupational history and symptoms possibly related to chemical exposure.

Workers were found to be exposed to toluene concentrations ranging from 1.4 to 280 mg/M^3 with a mean of 44 mg/M^3. The recommended standard for toluene is 375 mg/M^3. Workers in the E-30 Department were also found to have exposure to epichlorohydrin. Ten personal breathing-zone air samples for epichlorohydrin ranged from non-detectable to 0.7 mg/M^3 with a mean of 0.3 mg/M^3. The recommended standard for epichlorohydrin is 2 mg/M^3.

Data on hypertension and blood-pressure readings showed that 12 out of 69 workers developed raised blood-pressure after they began work in their present departments. These 12 workers were not confined to any one department. The production department (E30 & DBT/MTSC) workers with raised blood-pressure were younger than those from other departments. A review of skin signs and symptoms showed that 27% of workers had dermatitis or chemical burns from direct contact with chemicals at work. The chemical most commonly involved was toluene. Toluene absorption was assessed by measuring its metabolite - hippuric acid, in the urine. All but one worker had acceptable end-of-shift levels (below 5 mg/ml). Production department workers had statistically significantly higher pre- to post- shift increases in urinary hippuric acid, compared to other workers. Symptoms of headache, sore throat and drowsiness, experienced were not related to changes in urinary hippuric levels.

Based on the results of this evaluation, NIOSH concluded that no hazards due to overexposure to and systemic absorption of toluene and epichlorohydrin existed at the time of the NIOSH investigation. There was, however, evidence of direct skin contact with these and other liquid chemicals causing dermatitis. Recommendations for further reduction of exposure to these substances are presented in Section VIII of this report.

KEYWORDS: SIC 286 (Industrial Organic Chemicals), toluene, epichlorohydrin, hippuric acid, hypertension, mucous membrane irritation, dermatitis, neurological effects.

II. INTRODUCTION

In November 1981, NIOSH received a request for a health hazard evaluation at the Morton Chemical - Weeks Island Plant, New Iberia, Louisiana. The request was submitted by three workers at the plant who were concerned about the possible health hazards associated with the manufacture of tebuthiuron and an epoxy resin. The main health concerns expressed by the employees were rashes, high blood pressure, and toluene exposure.

III. BACKGROUND

Morton Chemical produces two main products: uncured epoxy resins in the E-30 Department, and a pesticide (tebuthiuron) in the DBT/MTSC Department. Production of these compounds takes place in closed systems, however, exposures can occur during bagging, drumming, laboratory work, and maintenance. The organic solvent toluene is used in both departments. These areas are situated in geographically separate sections and are some distance away from the office building. About 90 workers are employed altogether. On the basis of their work areas, these workers can be grouped into five departmental categories:

a. E-30 - This is the department producing uncured epoxy resins from epichlorohydrin and other ingredients.

b. DBT/MTSC - This refers to the department producing dibutyl tebuthiuron (DBT) from methyl thiosemicarbazide (MTSC) and other ingredients. Toluene is used both in this department and in Department E-30.

c. Maintenance - Employees in this department include electrical and mechanical maintenance workers who would have occasion to work in either or both E-30 and DBT/MTSC, depending on what maintenance work was required. They would, therefore, be exposed to the working environment in both these departments for varying periods of time.

d. Office workers are in a separate building unexposed to chemicals used in the production departments.

e. "Others" include those who may have some occasional and variable exposure to a wide range of workplace chemicals. This includes the laboratory personnel, waste treatment operators, and warehousemen.

IV. EVALUATION DESIGN AND METHODS

A. Environmental

NIOSH collected 22 personal breathing-zone and four area air samples on May 12-13, 1982, to evaluate workers' exposures to

toluene and epichlorohydrin. Activated charcoal was used for adsorbing the air samples, which were subsequently desorbed with carbon disulfide and analyzed by gas chromatography according to NIOSH Method No. P&CAM 127.[1]

Two area air samples for cresol and formaldehyde were taken near the mixing tanks in Department E-30 to determine if these vapors were being emitted. Cresol was collected on silica gel and analyzed by gas chromatography using NIOSH Method S-167[2]. Formaldehyde was collected on Chromosorb and analyzed by gas chromatography according to NIOSH Method No. P&CAM 354[3].

All of the air samples were collected using calibrated personal sampling pumps drawing 0.1 liters of air per minute for 6 to 11 hours for personal samples and 2 to 7 for area samples.

B. Medical

Eighty-two workers were seen altogether. This included almost all of the employees in this facility. Eighty-one workers completed a questionnaire on symptoms, chemical exposure, and occupational history. Clinical examination of exposed areas of the skin (face, neck, arms, and hands) was done in addition to measurement of blood pressure. Blood pressure determinations were taken with the blood pressure cuff on the right arm and the individual sitting down after a period of rest. Fifty-three of these workers provided valid beginning-of-shift and end-of-shift urine samples for hippuric acid analysis. Urinary hippuric acid is used as an indicator of toluene exposure. The urine samples were collected in 120 ml plastic bottles, preserved with thymol, and maintained at reduced temperatures while in transit and in storage before analysis. An aliquot of each sample was diluted 1:30 with distilled water and analyzed for creatinine by a centrifugal analyzer (GEMSAEC). Hippuric acid determination was by a modification of the method described by Matsui, et al (1978)[4].

V. EVALUATION CRITERIA

A. Toluene

Toluene (or methyl benzene) is a clear aromatic organic solvent. It can cause irritation of the eyes, respiratory tract, and skin. It also produces acute narcotic effects in high concentrations causing dizziness, drowsiness, headaches, nausea, and vomiting (NIOSH, 1981[5]; International Labor Office, 1971)[6]. Hematologic and myelotoxic effects linked to toluene exposure are thought to be due to benzene present as a contaminant in commercial toluene. Toluene may be absorbed systemically via the skin and respiratory tract. It is metabolized in the liver by conversion to benzoic acid, which is then conjugated with glycine to form hippuric acid.

Hippuric acid is excreted in the urine. Dietary sources containing benzoic acid also contribute to urinary hippuric acid. This includes canned and bottled drinks and some preserved foods. Urinary hippuric acid in individuals not exposed to toluene range from 0.4 to 1.4 mg/ml[7]. In workers exposed to 100 parts per million (ppm) of toluene (the threshold limit value), the end-of-shift hippuric acid level is about 4 mg/ml. NIOSH (1973)[8] recommends that an end-of-shift level of more than 5 mg/ml is unacceptable and indicative of toluene exposure at an average of 200 ppm. The NIOSH recommended standard for toluene is 100 ppm (375 mg/cu m) of air determined as a time-weighted average (TWA) exposure for an 8-hour workday with a ceiling of 200 ppm for a 10-minute sampling period.

B. Epichlorohydrin

Epichlorohydrin is highly irritating to the eyes, skin, and respiratory tract. Skin contact may cause delayed blistering and allergic contact dermatitis. Immediate symptoms of overexposure to epichlorohydrin include nausea, vomiting, abdominal pain, labored breathing, coughing, and cyanosis. Chemical pneumonitis can occur several hours after exposure ($H_2C-CH-CH_2Cl$). The OSHA

permissible exposure limit for epichlorohydrin is 19 mg/M^3. NIOSH recommends a TWA exposure limit of 2 mg/M^3.

Epichlorohydrin has chemical structural similarity the liver carcinogen - methyl chloride monomer ($H_2C=CH$),and has been

considered a suspected carcinogen on this basis (NIOSH, 1977)[9].

C. Tebuthiuron
(1-[5-(1,1-Dimethyl)-1,3,4-Thiadiazol-2-4C]-1,3-Dimethylurea)

Tebuthiuron is a thiourea pesticide with a low order of toxicity in animals[10]. It is extensively metabolized and its metabolites are rapidly excreted in the urine in experimental animals[11]. The compound and its metabolites therefore do not accummulate in these animals. Reversible pancreatic cell changes have been described in rats given tebuthiuron orally[12]. No documented human toxicity has been reported. NIOSH has no recommended environmental standard for tebuthiuron.

VI. RESULTS

A. Environmental

Twenty-two personal breathing zone air samples for toluene ranged from 1.4 to 280 mg/M^3 with a mean of 44 mg/M^3 in all of the departments where workers were sampled (Table I). Average toluene

exposures were 51 mg/M^3 in the E-30 Department and 42 mg/M^3 in the DBT Department. The recommended standard for toluene is 375 mg/M^3.

Epichlorohydrin was detected in the personal breathing zones of E-30 Department workers. Ten samples ranged from non-detectable to 0.7 mg/M^3 with a mean of 0.3 mg/M^3. The evaluation criterion for epichlorohydrin is 2 mg/M^3.

No cresol or formaldehyde were detected in the area samples taken near the mixing tanks.

B. Medical

The characteristics of the 81 workers who completed the questionnaire and were examined are as follows:

Department	No. of Workers	Age	Sex	Race	Smoking Status
E-30	18	21 to 42 yrs Mean = 31 yrs	13 males 5 females	7 whites 11 non-whites	9 smokers 9 non-smokers
DBT/MTSC	16	21 to 39 yrs Mean = 29 yrs	15 males 1 female	3 whites 13 non-whites	9 smokers 7 non-smokers
Maintenance	20	23 to 60 yrs Mean = 38 yrs	19 males 1 female	9 whites 11 non-whites	10 smokers 10 non-smokers
Office	17	23 to 62 yrs Mean = 42 yrs	12 males 5 females	15 whites 2 non-whites	5 smokers 12 non-smokers
Others	10	23 to 57 yrs Mean = 36 yrs	8 males 2 females	6 whites 4 non-whites	2 smokers 8 non-smokers

1. Dermatological Problems

Twenty-two of the 81 workers (27%) gave a history of having had a rash or dryness of the skin following direct contact with liquid chemicals at work. Of these 22 workers, 6 were from Department DBT/MTSC, 6 from E-30, 7 from maintenance, and 3 from other production departments. The chemicals specifically mentioned were toluene (8 workers), epichlorohydrin (2 workers), methyl thioisocyanate (2 workers), and one mention each of hot sulfur, cresol, paint cleaner, organic waste, oil,

sulfuric acid, acetone, and "caustic". The rashes or dryness tended to be mainly on exposed skin areas, appearing shortly after contact with the chemicals, and of varying duration. Some of the operations involved at the time of chemical contact include bagging, drumming, laboratory work, and maintenance and repair work. Of the 8 workers mentioning incidents with toluene, dryness of the skin lasting from a few hours to a few days following chemical contact and a burning sensation were the two commonest skin symptoms described.

On examination of exposed areas of the skin, 20 of the 81 workers (25%) had positive clinical findings. These include 9 cases of non-occupational conditions, such as tinea vesicolor, insect bites, and keloids. Four workers had a definite rash on the fingers and wrists. None of these four were from the production Departments E-30 and DBT/MTSC or maintenance. Six other workers had dryness of the skin of the fingers, hands, and forearms. They included two maintenance workers and one each from Departments E-30, DBT/MTSC, laboratory, and the office.

2. Blood Pressure Readings

Fourteen of the 81 workers interviewed gave a history of currently being on medication for hypertension. Five additional workers with no history of hypertension had blood pressure readings of 140/90 mm Hg or more. This gives a total of 19 out of 81 workers (23%) with raised blood pressures on history or physical examination. The characteristics of these 19 workers are as shown in the following table:

Department	No. of Workers With Raised Blood Pressure	Total No. of Workers Examined	Mean Age	Sex	Race	Smoking Status
E-30	5	16	32 yrs	3 male 2 female	2 white 3 non-whites	3 smokers 2 non-smokers
DBT	2	18	30 yrs	2 male	2 non-whites	2 non-smokers
Maintenance	3	20	43 yrs	3 male	1 white 2 non-whites	1 smoker 2 non-smokers
Office	6	17	55 yrs	5 male 1 female	6 white	1 smoker 5 non-smokers

(continued)

Department	No. of Workers With Raised Blood Pressure	Total No. of Workers Examined	Mean Age	Sex	Race	Smoking Status
Others	3	10	55 yrs	2 male 1 female	1 white 2 non-whites	1 smoker 2 non-smokers

Compared to the characteristics of the rest of the 81 workers seen, (see page 5) these 19 workers are slightly older, with camparable sex, race and smoking status distribution.

Epidemiologic studies of blood pressure readings in large populations have shown that in 14 communities with persons aged 30 to 69 years of age, 25.3% had diastolic blood pressure readings at 90 mm Hg or more (Last, 1973)[13]. Hence, the prevalence of hypertension in these Morton Chemical Company employees is probably not significantly different from that determined by these epidemiologic studies.

By excluding 7 workers who gave a history of hypertension before beginning work in their present departments, the number of people with elevated blood pressures are:

Department	No. of People With Raised Blood Pressure	Total No. of People Examined
E-30	3	13
DBT	1	17
Maintenance	0	20
Other	3	7
Office	5	12
TOTAL	12	69

The prevalence of raised blood pressure in employees, occurring after they have started working in their present departments, is not confined to any one particular department. Those in the "office" and "others" department are older individuals aged 51 years to 59 years (mean age = 56 years; 6 whites and 2

non-whites). Those in the production departments (E-30 and DBT) are younger (age range = 26 years to 41 years; mean age = 33 years; 2 whites and 2 non-whites). The mean age when hypertension was first detected in the above production department workers is 32 years, and in the non-production department workers is 55 years. Though the numbers involved are too small for detailed epidemiological analysis of risk factors in the production departments, the occurrence of these cases of young hypertensives should be noted. It would be useful to monitor the blood pressure of these workers and others in the production departments on a regular basis.

3. Toluene Absorption

a. Urinary Hippuric Acid Levels

Fifty-two workers provided valid beginning and end-of-shift urine specimens for hippuric acid analysis. Incomplete urine samples and samples not collected in accordance with instructions given have not been included in these results. The characteristics of the 52 workers are summarized below:

Department	No. of Workers	Mean Age	Sex	Race
E-30	10	29 yrs	7 males 3 females	4 whites 6 non-whites
DBT/MTSC	10	29 yrs	9 males 1 female	3 whites 7 non-whites
Maintenance	13	39 yrs	12 males 1 female	4 whites 9 non-whites
Others	9	37 yrs	7 males 2 females	5 whites 4 non-whites
Office	10	42 yrs	6 males 4 females	8 whites 2 non-whites

The mean urinary hippuric acid levels in these 52 workers are as shown below:

Department	No. of Workers	Mean Urinary Hippuric Acid in mg/gm Creatinine		
		Beginning of Shift	End of Shift	Difference
E-30	10	155	798	+653
DBT/MTSC	10	214	557	+343
Maintenance	13	151	413	+262
Others	9	193	407	+214
Office	10	209	348	+139

The results show no significant difference between departments for beginning of shift urinary hippuric acid levels (analysis of variance; $F[4,47]=1.20$). The production departments - "E-30" and "DBT/MTSC" combined have a mean end-of-shift minus beginning-of-shift difference statistically significantly higher than the non-production departments - "office" and "others" combined (student's "t" test; $p<0.05$). E-30 workers have end-of-shift urinary hippuric acid levels significantly higher than DBT/MTSC workers. E-30 workers also have the highest difference between beginning and end-of-shift hippuric acid levels.

These results indicate that the production department employees may have more toluene exposure than the other departments.

NIOSH (1973)[8] considers individual levels of urinary hippuric acid above 5 mg/ml as unacceptable. Only one out of the 52 workers had such a reading. This was also the only reading above 4 mg/ml, which is the level that might be expected in workers exposed to 100 ppm of toluene (TLV). This was an E-30 Department worker with a beginning-of-shift level of 0.3 mg/ml and an end-of-shift level of 5.15 mg/ml. Laboratory determination of urinary creatinine in the end-of-shift sample showed this to be a concentrated urine sample. Hence, the high end-of-shift hippuric acid reading in terms of mg/ml was due in part to the urine sample being concentrated.

Urinary hippuric acid levels may be affected by both toluene exposure and canned/bottled drinks consumption. Twenty-five workers from all departments had complete data on the following variables:

1) Individual toluene exposure levels (by personal samplers)

2) Canned/bottled drinks consumption

3) Pre- and post-shift differences in urinary hippuric acid levels

4) End-of-shift urinary hippuric acid levels

Examination of the distribution of these variables showed that none were normally distributed. Non-parametric statistics were therefore used to test whether urinary hippuric acid levels were correlated with toluene exposure or canned/bottled drinks consumption or both. A significant correlation was found between toluene exposure and pre- and post-shift differences in urinary hippuric acid levels (=0.36, p=0.02; Kendall tau-b correlation coefficient). The 25 workers were grouped into 2 groups (0,1) according to whether they drank any canned/bottled drinks on the survey day. No significant differences were found between groups for either the end-of-shift hippuric acid levels or the pre- and post-shift differences in hippuric acid levels using Wilcoxon's 2-sample test (p=0.07 and p=0.20, respectively).

From the correlation and Wilcoxon's test results, it is evident that canned/bottled drinks consumption did not contribute significantly to the urinary hippuric acid levels seen. It was therefore eliminated as a confounder in testing the effect of toluene exposure. Wilcoxon's 2-sample test was used to see if there were group differences between toluene exposed and non-exposed workers. The rank sums of the pre- and post-shift differences were significantly different between toluene-exposed and non-exposed workers (p=0.02).

b. Symptoms Experienced in Relation to Urinary Hippuric Acid Levels

From the questionnaire returns on symptoms experienced on the day of collection of the urine specimens, the number of workers reporting symptoms relavant to toluene exposure are as follows:

Symptoms	No. of People Reporting Symptoms	Percentage
1. Nausea	0	0
2. Vomiting	0	0
3. Eye Irritation	0	0
4. Dizziness	2	4
5. Stuffy or Runny Nose	2	4
6. Drowsiness	4	8
7. Sore Throat	5	9
8. Headache	9	17

Ten workers had only one of the above eight symptoms. Four had 2 symptoms and one had 4 symptoms.

The mean difference in hippuric acid levels (end-of-shift minus beginning-of-shift) and the mean end-of-shift hippuric acid levels for those with and those without symptoms are as follows:

Symptoms	No. of Workers	Mean Difference in Hippuric Acid Levels	Mean End-Of-Shift Hippuric Acid Levels
Without Symptoms	38	264 mg/gm creatinine	424 mg/gm creatinine
With at Least One Symptom	15	276 mg/gm creatinine	479 mg/gm creatinine

The difference in hippuric acid levels between the group without symptoms and those with at least one symptom is not significant (student's "t" test; $p>0.05$). There is, therefore, no indication that the presence of symptoms is related to any change in urinary hippuric acid levels and, by inference, to the daily amount of toluene exposure.

VII. DISCUSSION AND CONCLUSIONS

The data on skin complaints and examination of exposed areas of the skin did not show a clustering of skin problems in any particular department. Occupational skin conditions were primarily cases of irritant contact dermatitis or chemical burns due to direct contact with a variety of chemicals used in the workplace. The chemical most commonly involved was toluene.

The prevalence of raised blood pressure in the company, as defined by a history of being currently on treatment for hypertension or with a blood pressure reading of 140/90 mmHg or more, is not significantly different from the prevalence of hypertension indicated by other studies. Four workers in Departments E-30 and DBT/MTSC had raised blood pressures detected after they started work in their present departments. Three of these workers were aged 35 years or less. No information was available on whether they had any blood pressure checks and were normotensive before starting work in these departments. A diagnosis of hypertension should not be made on the basis of a single blood pressure reading. Several raised readings are needed. A review of the toxicological information on the chemicals used in these departments show no direct link between these chemicals and the development of hypertension. Nevertheless, modification of the existing system for blood pressure checks by the company safety coordinator/registered nurse to include production workers would be of use. This could be part of a program for systematic regular blood pressure monitoring, which may provide useful information. Follow-up studies may be needed if such a program indicated more cases of young hypertensives in the production workers.

The environmental and biological monitoring results show no exposure to or absorption of toluene in excess of NIOSH recommended occupational health standards. Toluene was, however, the most common chemical involved in direct skin contact resulting in primary irritant dermatitis. Measures to improve the handling of this solvent should reduce skin irritation and systemic absorption.

Neither end-of-shift nor pre- to post-shift changes in urinary hippuric acid levels were correlated with symptoms of toluene exposure. However, urinary levels of this metabolite correlated with mean toluene-in-air levels. Hence, urinary hippuric acid rather than symptoms, is more useful as an indicator of toluene exposure at levels below the NIOSH recommended standard. The urinary hippuric acid results from this study also show that end-of-shift urinary hippuric acid levels of more than 5 mg/ml may be obtained at exposures of much less than 200 ppm of toluene. Levels of urinary hippuric acid expressed in terms of mg per ml of urine are affected by urinary concentration. It is preferable to express such results in terms of mg per gm of creatinine since the daily quantity of creatinine formed and excreted in the urine is relatively constant and is independent of urinary volume.

VIII. RECOMMENDATIONS

General

1. Workers handling toluene and other liquid chemicals in the workplace should be provided with and use appropriate gloves and protective garments. Instructions regarding their use, care, and

regular replacement should be given. Workers should be aware of the need to wash off any chemical splashes with copious amounts of water immediately. With appropriate precautions, such splashes should be an uncommon event.

2. The procedures for bagging and drumming operations and maintenance work should be reviewed. Improvements in these procedures would include minimizing any direct handling or direct exposure to chemicals.

3. The company has personnel and equipment facilities for blood pressure checks, and previous records on occasional blood pressure readings have been kept. As such, a monitoring and health education program for hypertension can easily be implemented. A proper program would need to include well-kept health records documenting worker characteristics, occupational exposures, smoking status, and standardized blood pressure readings, which should be reviewed and updated on a regular basis. This program should include all workers in the production departments, and may be extended to other workers in the company.

Tebuthiuron (DBT) Production and Bagging Area

4. It should be understood that although the herbicide, tebuthiuron [1-(5-tert-butyl-1,3,4-thiadiazol-2-yl)-1,3-dimethylurea], possesses a low order of mammalian toxicity, it still possesses biological activity. Therefore, it is inappropriate to consider it an inert or nuisance dust.

5. It is readily apparent that the local exhaust ventilation system in place at Weeks Island for the control of DBT dust was not well designed. Rigid polyvinyl chloride composite tubing is used as ductwork where sheet metal is indicated. There are far too many tortuous and ninety-degree angles in the system as well as many unnecessary, unhooded, exhaust ducts. The air mover (fan) does not appear to have the capacity to move the volumes of air indicated for the operation. The actual bagging device is encumbered by flexible exhaust hoses, which were observed to be too long (that is, have a lot of dead space). Dust collected in the slack portions, greatly diminishing the capture velocities to the point where the system is useless. Side enclosures should be added to the slot exhausts on the fill platform. In summary, the idea for the local exhaust ventilation system is sound, although the manner in which the engineering design has been carried out renders the effort ineffectual. It is recommended that the entire system be reevaluated. If repair cannot correct the situation, another system should be installed.

6. The transfer of highly lacrimating and irritating methyl isothiocyanate (MS) can be made a safer and more efficient

operation from an industrial hygiene viewpoint by the addition of a hood on the end of the hose used for the exhaust of the MS vapors during reactor vessel filling. Additionally, it should be made policy that all available safety equipment, including the wearing of a fresh-air mask (air-line respirator), be used during the procedure. Two further considerations are also recommended at this time. The flexible exhaust hose should be secured to the drum being emptied by means of an easily workable clip or fastener. A similar type of clip should be put on the air-line respirator hose and connected to the belt of the person doing the transfer. In this manner, excessive tension or pull on the hose will be absorbed by the belt, thus ensuring that the mask will not be ripped off the face of the worker.

7. The MTSC drumming operation was found to have inadequate local exhaust ventilation. Although the exhaust equipment in place is well suited for the process, it must be put in working order for it to be effective. Hoses should fit properly, and must remain free of residual dust so that the exhaust velocities will be sufficient to carry fugitive MTSC dust to the dust collector. A preventive maintenance schedule would be ideally suited to this, and all local exhaust ventilation schemes in place at Weeks Island.

8. An attempt should be made to perform environmental monitoring for several impurities associated with the solvent stripping of MTSC. It is suggested that environmental levels of dimethyl disulfide, dimethyl sulfide, and dimethyl formamide be determined.

E-30 Resin Production Area

9. Respiratory protection for particulates should be provided during the regrinding of non-specification E-30.

10. Ventilation cross-connections should be checked between the roof and the laboratory.

11. Spill containment procedures should be outlined in written form and transmitted to all production personnel involved in the E-30 process.

12. Precaution must be taken to avoid all direct skin contact with epichlorohydrin and epoxy-resin, since these can act as skin irritants. Protective gloves and garments mentioned in the general recommendations would be particularly relevant for these chemicals.

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XI. DISTRIBUTION AND AVAILABILITY OF REPORT

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regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati address. Copies of this report have been sent to:

1. Morton Chemical Corporation, New Iberia, Louisiana
2. Employee Requestor
3. NIOSH, Region VI
4. OSHA, Region VI

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

Organic Vapor Concentrations

Morton Chemical Corporation
New Iberia, Louisiana
HETA 82-028

May 12-13, 1982

Job/Location	Sample Type	Sampling Period	Organic Vapor Concentration in mg/M^3			
			Toluene	Epichlorohydrin	Cresol	Formaldehyde
E-30 Production Chem 2	Personal	08:11-16:00	40	0.2	-*	-
E-30 Production Chem 2	Personal	08:13-15:51	74	0.4	-	-
E-30 Production Chem 1	Personal	08:14-15:44	20	N.D.**	-	-
E-30 Production Chem 1	Personal	08:22-15:43	16	N.D.	-	-
E-30 Production Supervisory	Personal	08:30-15:38	10	N.D.	-	-
E-30 Production Supervisory	Personal	11:52-23:10	135	0.7	-	-
E-30 Production Chem 1	Personal	16:24-23:30	45	0.3	-	-
E-30 Production Chem 2	Personal	16:26-23:30	150	0.7	-	-

(cor ed)

TABLE I (continued)

Job/Location	Sample Type	Sampling Period	Organic Vapor Concentration in mg/M^3			
			Toluene	Epichlorohydrin	Cresol	Formaldehyde
E-30 Maintenance	Personal	08:19-16:00	18	N.D.	-	-
E-30 Painting (Roof)	Personal	08:23-16:00	1.4	N.D.	-	-
DBT Chem 1	Personal	09:35-15:42	9	N.D.	-	-
DBT Chem 1	Personal	09:37-15:51	10	N.D.	-	-
DBT Supervisory	Personal	09:38-15:55	13	N.D.	-	-
DBT Chem 2	Personal	09:38-15:50	7	N.D.	-	-
DBT Waste Treatment	Personal	09:39-15:42	3	N.D.	-	-
DBT Supervisory	Personal	16:17-23:30	34	N.D.	-	-
DBT Waste Treatment	Personal	16:19-23:30	16	N.D.	-	-
DBT Chem 1	Personal	16:20-23:30	39	N.D.	-	-

(continued)

TABLE I (continued)

Job/Location	Sample Type	Sampling Period	Organic Vapor Concentration in mg/M^3			
			Toluene	Epichlorohydrin	Cresol	Formaldehyde
DBT Chem 1	Personal	16:21-23:30	280	N.D.	-	-
DBT Maintenance	Personal	08:14-16:00	9	N.D.	-	-
Lab Technician	Personal	08:12-16:00	32	N.D.	-	-
Maintenance Mechanic	Personal	08:28-16:00	13	N.D.	-	-
Upstairs Stripper Unit	Area	08:33-11:53	50	N.D.	-	-
V-207 Downstairs Drummer	Area	08:35-11:59	100	0.5	-	-
E-30 Mixer 201	Area	09:43-11:54	-	-	N.D.	
E-30 Mixer 201	Area	09:43-11:54	-	-	-	N.D.
DBT FV 1010	Area	16:30-23:50	95	N.D.	-	-
Main Office	Area	09:22-12:48	N.D.	N.D.	-	-
Evaluation Criteria			375	2.0	22	1.2 (30 min. ceiling)

*- . analyzed
** = none detected

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