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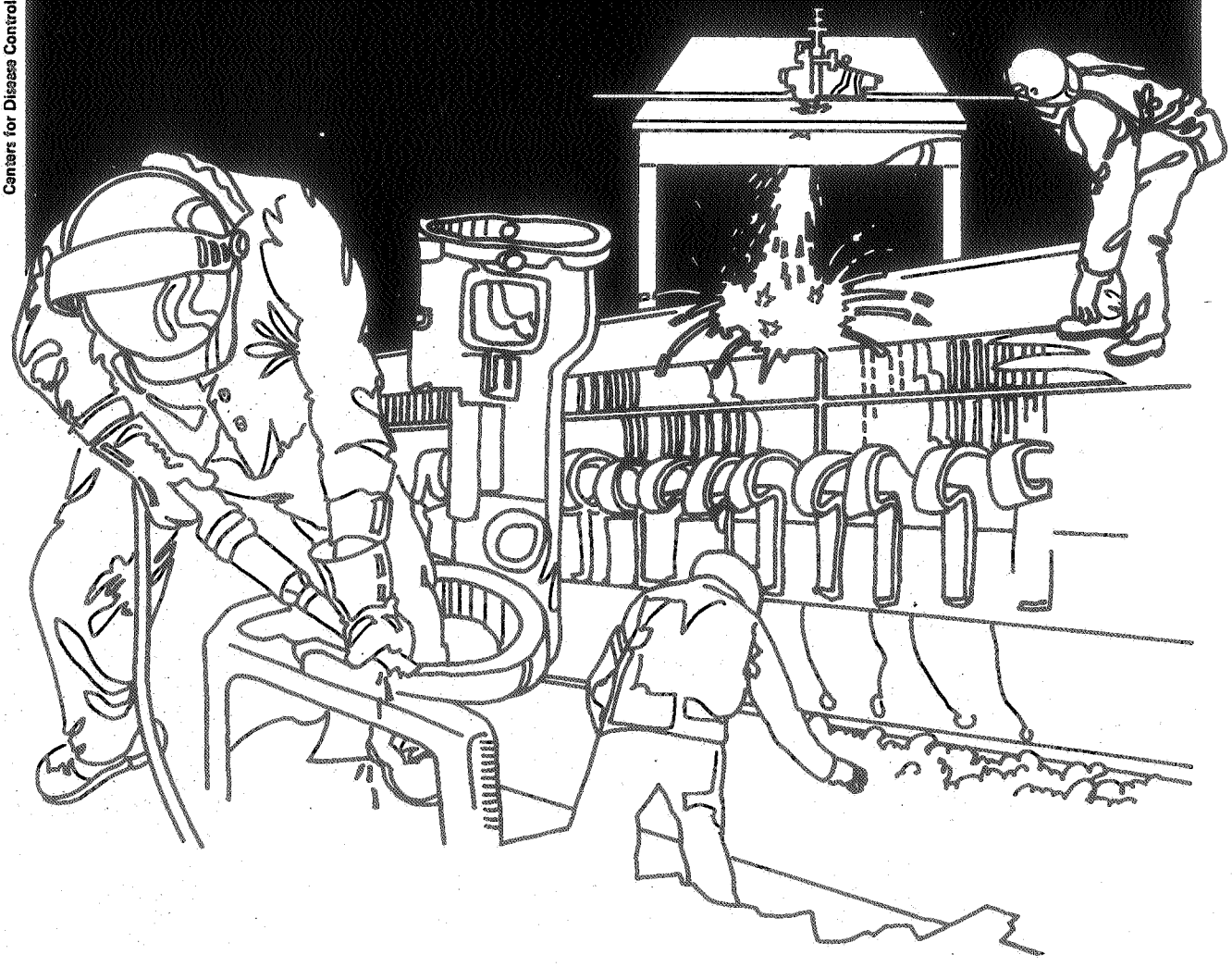

Health Hazard Evaluation Report

HETA 82-144-1255
GTE PRODUCTS CORPORATION
WINCHESTER, KENTUCKY

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 82-144-1255
JANUARY 1983
GTE PRODUCTS CORPORATION
WINCHESTER, KENTUCKY

NIOSH INVESTIGATOR:
John N. Zey, I.H.

I. SUMMARY

On February 22, 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from GTE Products Corporation, Winchester, Kentucky, to assess occupational exposures to hydrogen sulfide, methyl alcohol, isopropyl alcohol, methyl bromide, methyl iodide, sulfur dioxide, and 1,1,1-trichloroethane, which are materials used in the production of electric lamps.

On April 6-8, 1982, NIOSH conducted environmental sampling to evaluate airborne concentrations of hydrogen sulfide in the Dichroic Area and Industrial Engineering Office, methyl alcohol in the Acid Wash Area, isopropyl alcohol in the Spare Parts Washing Area, methyl bromide in the Infrared Area (IR), methyl iodide in the Quality Engineering Office, sulfur dioxide in the Glass Flare Forming Area, and 1,1,1-trichloroethane in a basement storage area. In addition, short medical questionnaires were administered to employees who participated in the environmental evaluation.

Airborne concentrations for methyl alcohol were 301 and 356 mg/m^3 for two long-term (approximately 8 hours) samples and ranged from 338 to 853 mg/m^3 for five short-term (15 minutes) samples. All seven samples were in excess of the corresponding lowest current criteria, which is 260 mg/m^3 for long-term (OSHA, NIOSH, ACGIH) and 310 mg/m^3 for short-term samples (ACGIH).

Airborne concentrations for six short-term isopropyl alcohol samples ranged from 223 to 759 mg/m^3. All samples were below the lowest current criterion of 1225 mg/m^3 (ACGIH).

Airborne concentrations for methyl iodide, 1,1,1-trichloroethane, and methyl bromide samples were low. Methyl iodide was not detected on two area samples and 1,1,1-trichloroethane was detected at concentrations of 4.5 and 14.5 mg/m^3 on two area samples. The current criteria is 1900 mg/m^3 (OSHA, NIOSH, ACGIH). Methyl bromide was not detected on six personal and two area samples.

Airborne concentrations for two personal long-term sulfur dioxide samples were 2.9 and 3.7 ppm. Both samples exceeded the lowest current criterion of 0.5 ppm (NIOSH). Eight of nine grab samples collected with certified direct reading indicator tubes had airborne concentrations ranging from nondetectable to 25 ppm.

Hydrogen sulfide was not detected on any of three personal dosimeters. This was due in part to the fact that the dichroic operation only ran for a portion of one shift.

Three of eight employees interviewed reported health problems they believed to be related to workplace exposures. Symptoms reported were fatigue and headache (associated with the IR Area), and sinus trouble (associated with the Dichroic Operation).

Based on these results, NIOSH has determined that a health hazard did exist for employees exposed to methyl alcohol in the Acid Wash Area and to sulfur dioxide in the Glass Flare Forming Area. Recommendations are made in Section VIII of this report for further environmental evaluations and implementation of controls to reduce airborne concentrations of methyl alcohol and sulfur dioxide.

KEYWORDS: SIC 3641 (Electric Lamps), Methyl Alcohol, Isopropyl Alcohol, Sulfur Dioxide, Hydrogen Sulfide.

II. INTRODUCTION

On February 22, 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from the management of GTE Products Corporation, Winchester, Kentucky, for a health hazard evaluation. The request was for environmental monitoring of employee exposure to hydrogen sulfide, methyl alcohol, isopropyl alcohol, methyl bromide, methyl iodide, sulfur dioxide, and 1,1,1-trichloroethane.

A NIOSH industrial hygienist conducted an investigation at the Winchester facility on April 6-8, 1982. The survey consisted of an opening conference and subsequent initial walk-through survey on April 6, an environmental field survey on April 7-8, and a closing conference on April 8.

An interim report presenting results from the investigation was distributed in November 1982.

III. BACKGROUND

GTE Products Corporation, Winchester, Kentucky, employs approximately 700 people. It began production in 1953, at which time only flash bulbs were produced. Presently, over 750 different lamps are produced for use in projection equipment, theater and studio lighting, floodlights, spotlights, flash bulbs, and a variety of other uses.

Four types of specialty bulbs (lamps) are manufactured: 1) infrared (IR), 2) incandescent projection, 3) quartz projection, and 4) par lamps. There are a number of processing operations in the production of these bulbs; however, they fall into two main categories: 1) high speed continuous line operations and 2) manual processing steps performed at individual stations.

Infrared lamps are produced by inserting a metal filament inside a glass stick (rod). The unit is flushed with an inert gas (usually argon) and sealed at each end. Finally, contact buttons and ceramic shields are added to each end.

Incandescent lamps are produced by joining a preformed globe with a metal filament. Next, the glass globe is drawn together at the bottom and formed into a wafer. The lamp is then filled with an inert gas mixture (usually nitrogen and argon) and the end is closed (tipped). These lamps will be joined to one of a number of different anodized aluminum bases.

Quartz lamps are manufactured by joining a tungsten filament with a fused silica bulb. The bulb is filled with a halogen gas mixture and subsequently assembled into a base or reflector housing.

Par lamp production is similar to the production of incandescent lamps. A preformed reflector is joined with a metal filament. A lens

cover is added manually and subsequently heated and shaped to the desired contour. These lamps are filled with a gas mixture (either nitrogen or an argon mix) and placed in an appropriate base.

Continuous operations include paint lines, gas-filling lines, and lamp part production. Manual operations include welding, soldering, and buffing.

Specific areas evaluated during this survey are the Dichroic Area, the Industrial Engineering Office, the Glass Wash Area, the Spare Parts Wash Area, Glass Flare Forming, IR Area, the Quality Engineering Department, and a basement storage area. In the Dichroic area one employee places lamp parts into a chamber with two sources (silicon monoxide and zinc sulfide). The chamber is heated while under a slight vacuum. This process imparts a reflective surface onto the glass parts. This area was evaluated for hydrogen sulfide. The Industrial Engineering Office is located next to the Dichroic Area. It was evaluated to determine if hydrogen sulfide vapors from Dichroic were spreading into the Industrial Engineering Office.

The Glass Wash Area involves one employee washing small glass tubes (cut from long glass rods by two to three employees working in the same general area). Initially, glass tubes are washed in a soap solution, then rinsed in water, and subsequently rinsed in a vinegar solution. Following this, the tubes are rinsed in methyl alcohol twice. After removal from the alcohol bath, the tubes are transferred to a drying table where floodlights and small air blowers are used to decrease the drying time. This area was evaluated for methyl alcohol exposure.

The Spare Parts Wash Area is located in the basement. One employee works in this area for 1 to 4 hours per day. Gaskets are placed into a small tub containing isopropyl alcohol and then the employee removes individual gaskets and uses a cloth to clean them. This area was evaluated for isopropyl alcohol exposure.

The Glass Flare Forming Area involves one employee who loads glass rods into semiautomatic glass flare forming machines. Sulfur dioxide, natural gas, oxygen, and air are mixed and fuel the flames used to heat one end of each rod. The hot end is flared and a small section of the rod (with flared end) is cut off. In addition to the employee responsible for running the flare forming machines, one to two other employees work in the room on a periodic basis. This area was evaluated for sulfide dioxide exposure.

The section of the IR Area evaluated involves employees operating machines which fill glass tubes with a methyl bromide mixture. In addition to one to two operators, there was also a mechanic and an engineer who spent several hours a day in this area. This area was evaluated for methyl bromide exposure.

A storage area located in the basement was evaluated for airborne concentrations of 1,1,1-trichloroethane. A bucket of 1,1,1-trichloroethane located near the storage area was used periodically to soak parts. Employees were in the area only long enough to put parts into the bucket or remove parts from the bucket.

The Quality Engineering Department was evaluated for airborne concentrations of methyl iodide. Methyl iodide had been used at this facility previously and had been detected on an area sample collected at the same location during a previous health hazard evaluation.[1] Subsequently, all known sources of methyl iodide had been removed from the Winchester facility. Management requested that this area be reevaluated to ensure that methyl iodide was no longer present.

Overall production appeared to be normal during the survey. Some areas, however, were reported running below normal production. These areas would include Dichroic which only ran for a portion of one shift and Acid Wash which was reported to be running somewhat lower than usual.

During the initial survey, management reported that plans were underway to install local exhaust ventilation equipment on each of the glass flare forming machines.

IV. METHODS AND MATERIALS

During the survey, environmental sampling was conducted to evaluate airborne concentrations of methyl iodide in the Quality Engineering Department, methyl bromide in the IR Area, 1,1,1-trichloroethane in a storage area located in the basement, methyl alcohol in the Acid Wash Area, isopropyl alcohol in the Spare Parts Cleaning Area, sulfur dioxide in the Glass Flare Forming Area, and hydrogen sulfide in the Dichroic Area and the Industrial Engineering Office. Table I summarizes sampling and analytical methodology used for the substances evaluated.

Long-term (7 to 8 hours) and short-term (15 minutes) methyl alcohol samples were collected with large silica gel tubes attached via flexible tubing to battery-operated pumps calibrated at 0.05 and 0.45 liters per minute (LPM), respectively. These samples were analyzed using gas chromatography following a modified version of NIOSH Method P&CAM 247.[2]

Short-term isopropyl alcohol samples were collected with charcoal tubes attached via flexible tubing to battery-operated pumps calibrated at 0.2 LPM. These samples were analyzed using gas chromatography following a modified version of NIOSH Method P&CAM S-65.[3]

Long-term methyl iodide samples were collected with charcoal tubes attached via flexible tubing to battery-operated pumps calibrated at 0.05 LPM. These samples were analyzed by gas chromatography following a modified version of NIOSH Method P&CAM S-98.[3]

Long-term methyl bromide samples were collected with two petroleum-based charcoal tubes (one large and one small) connected in line and attached via flexible tubing to a battery-operation pump calibrated at 0.05 LPM. These samples were analyzed using gas chromatography following a modified version of NIOSH Method S-372.[4]

Long-term 1,1,1-trichloroethane samples were collected with charcoal tubes attached via flexible tubing to battery-operated pumps calibrated at 0.2 LPM. These samples were analyzed using gas chromatography following a modified version of NIOSH Method P&CAM S-328.[4]

Long-term hydrogen sulfide samples were collected using passive dosimeters. The dosimeters were analyzed using a microprocessor.[5]

Long-term sulfur dioxide samples were collected using long-term indicator tubes attached via flexible tubing to battery-operated pumps calibrated at 0.02 LPM. These samples were analyzed by recording the amount of material collected on the tube and subsequently using a formula to determine the TWA concentration.[6]

Grab samples for sulfur dioxide and hydrogen sulfide were collected using certified direct-reading indicator tubes. A grab sample for 1,1,1-trichloroethane was collected with a noncertified direct-reading indicator tube. All grab samples were evaluated visually, immediately after collection.[6,7]

In addition to collecting airborne samples short medical questionnaires were administered to employees who participated in the environmental evaluation.

V. EVALUATION CRITERIA

The environmental criteria used in this report are the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs), NIOSH recommended standards, and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV). These criteria (listed in Table I) are three of the primary sources of environmental criteria used in the United States. These criteria are designed to protect nearly the entire workforce from adverse health effects. Individual susceptibility may result in some employees experiencing adverse health effects at or even below the currently accepted criteria. The majority of the OSHA PELs were promulgated under the Occupational Safety and Health Act of 1970. Many of the NIOSH and ACGIH criteria have been developed and or revised

since that time. For these reasons, all three criteria are considered, but usually the lowest criterion are used to assess employee exposures.

Following are discussions of the health effects associated with exposure to those chemicals whose airborne concentrations exceeded 50% of the lowest current environmental criteria on at least one sample.

A. Methyl Alcohol

Methyl alcohol presents a potential health hazard from ingestion, inhalation, and skin absorption. Effects of short-term exposure include headache, drowsiness, nausea, eye irritation, blindness, and death. Effects of long-term exposure include headache, eye irritation, digestive problems, impairment of vision, and skin irritation.[8]

B. Isopropyl Alcohol

Isopropyl alcohol poses a health hazard from inhalation, ingestion, and skin absorption. Short-term exposures are associated with irritation of the eyes, nose, and throat; as well as headache, drowsiness, and incoordination. If swallowed, isopropyl alcohol may cause drowsiness, unconsciousness, cramps, nausea, diarrhea, and death. Long-term exposures may cause drying and cracking of the skin.[8]

C. Sulfur Dioxide

Sulfur dioxide poses a health hazard if it is inhaled or if it comes in contact with the eyes or skin. It is extremely irritating to the eyes and respiratory tract. It can also cause severe breathing difficulties. Exposure to very high concentrations may cause death. Liquid sulfur dioxide may cause skin and/or eye burns with loss of vision.[8]

VI. RESULTS

A. Airborne Concentrations

1. Methyl Alcohol

Table II presents the personal sampling results for airborne methyl alcohol in the Acid Wash area. Two long-term samples had concentrations of 301 and 356 milligrams per cubic meter of air (mg/m^3). Both samples are in excess of the current criteria of 260 mg/m^3 (OSHA, NIOSH, and ACGIH). Concentrations for short-term samples ranged from 338 to 853 mg/m^3. All five short-term samples are above the ACGIH Threshold Limit Value - Short Term Exposure Limit (TLV-STEL) of 310 mg/m^3.

2. Isopropyl Alcohol

Table III presents the results of sampling for airborne isopropyl alcohol in the Spare Parts Wash area. Concentrations for six short-term samples ranged from 223 to 759 mg/m^3. All concentrations are below the ACGIH TLV-STEL of 1225 mg/m^3.

3. Methyl Iodide and 1,1,1-Trichloroethane

Table IV presents the results of sampling for airborne methyl iodide and 1,1,1-trichloroethane. Two area samples for methyl iodide collected in the Quality Engineering Department were below the limit of detection (.01 mg/sample). Two area samples for 1,1,1-trichloroethane collected on a storage rack located in the basement had concentrations of 4.5 and 14.5 mg/m^3, which are both less than 1% of the current criteria of 1900 mg/m^3 (OSHA, NIOSH, and ACGIH).

4. Methyl Bromide

Table V presents the results of sampling for airborne methyl bromide in the IR Area and in the basement beneath the IR Area. Methyl bromide was below the limit of detection (.001 to .002 mg/sample) for six personal and two area samples.

5. Sulfur Dioxide

Table VI presents the results of grab sampling for airborne sulfur dioxide in the Glass Flare Forming Area using certified direct-reading indicator tubes. Concentrations for grab samples ranged from non-detected to 25 parts per million parts of air (ppm). Eight of the nine samples collected were above the NIOSH TWA criteria of 0.5 ppm. Grab sample results cannot be compared directly to TWA criteria due to the difference in sample times. In addition, certified direct-reading indicator tubes are certified to be accurate to within ±35% at one half the test concentration and ±25% at one to five times the test concentration.[7] The test concentration usually corresponds to the OSHA PEL.[7,9] These results do indicate, however, excessive exposure at the time the samples were collected. Table VI also presents the results of airborne sampling for sulfur dioxide using long-term indicator tubes. Airborne concentrations for four long-term samples were all above the NIOSH criteria of 0.5 ppm. Two personal samples showed concentrations of 2.9 and 3.7 ppm. These are approximately six and seven times the NIOSH criteria. Long-term indicator tubes have not been certified and thus their accuracy may be less than that established for certified tubes. The results obtained, however, do indicate excessive exposure.

6. Hydrogen Sulfide and 1,1,1-Trichloroethane

Hydrogen sulfide was not detected on any of three passive dosimeters used to evaluate its presence. The Dichroic Operation only ran one load on one shift (April 7, 1982). Normally, 3 to 4 loads would be run per shift. This probably contributed to hydrogen sulfide not being detected. One detector tube sample for hydrogen sulfide was collected in the Dichroic Area and one detector tube sample for 1,1,1-trichloroethane was collected in the basement storage area. 1,1,1-Trichloroethane was not detected, while a trace (not sufficient for quantification) of hydrogen sulfide was detected as the dichroic chamber was being unloaded.

B. Questionnaire Data

Three of eight employees interviewed by questionnaire believed they had health problems which could be attributed to workplace exposures. Symptoms reported were fatigue, headache, and sinus problems. The first two symptoms were associated with the IR Area and sinus problems with the Dichroic Area.

C. General Observations

During clean-up activities in the Glass Flare Forming Area, an employee used an air hose to clean around the various machines, thus creating a lot of visible airborne dust. A second employee entered the area during the blowdown period. Neither employee wore respiratory protection during the blowdown.

Several employees stated that they felt vapors or odors were being produced in some areas (i.e., Dichroic) and subsequently contaminating other areas (i.e., Industrial Engineering). One reason suggested for this is that ventilation exhaust and intakes are all located on the roof of the facility. In order to adequately evaluate this situation, an extensive evaluation of the ventilation equipment would be required.

Vapors from the Spare Parts Wash Area were spreading into nearby areas. Vapors were detected in an aisleway located approximately 20 feet from the Spare Parts Wash Area. This operation had no local exhaust ventilation. In addition, a ceiling fan located near the employee was probably contributing to the problem.

VII. DISCUSSION AND CONCLUSION

A follow-up survey had been anticipated to evaluate employee exposure to hydrogen sulfide in the Dichroic Area and Industrial Engineering Office. In addition, an evaluation of the number of heart attacks among past and/or present Sylvania employees would have been attempted if sufficient information had been provided. No information was received and thus no evaluation of the heart attack issue could be attempted. Subsequent to the initial survey, management notified NIOSH of its decision to conduct further investigations internally. As a result, no follow-up survey was conducted at the Winchester facility. Management should proceed with investigations of both issues.

Results of hydrogen sulfide sampling in the Dichroic Area and Industrial Engineering Office are not conclusive of what levels may be encountered when the Dichroic Area is operating normally. This operation should be evaluated during normal production.

Based on the initial survey results, NIOSH has determined that a health hazard did exist for employees exposed to methyl alcohol in the Spare Parts Wash Area, and to sulfur dioxide in the Glass Flare Forming Area. Employees in both areas should be issued chemical cartridge respirators certified for use in atmospheres containing methyl alcohol, and sulfur dioxide respectively, until such time that the airborne concentrations of both chemicals can be reduced below the current environmental criteria. Environmental monitoring of each area subsequent to attempts to reduce the airborne concentrations would be needed to ensure that the attempts were successful.

VIII. RECOMMENDATIONS

1. Employees working in the Glass Flare Forming Area and the Acid Wash Area should be issued chemical cartridge respirators certified for protection against sulfur dioxide and methyl alcohol, respectively, until such time that the airborne concentrations of each are reduced. Local exhaust ventilation equipment (presently being installed in the Glass Flare Forming Area) should be installed in the Acid Wash Area as it would provide the best means of control.

2. The Dichroic Area should be evaluated for hydrogen sulfide exposure when it is operating at full production.

3. The Spare Parts Washing operation should be modified to reduce the spread of isopropyl alcohol vapors into nearby areas. Local exhaust ventilation would provide the most effective means of controlling this operation.

4. A thorough evaluation of the entire plant ventilation system should be conducted to determine if materials being exhausted from one area are being transferred to other areas.

5. Management should attempt to determine if the occurrence of heart attacks among past and present employees are above what would be expected for a normal population.

6. Blow down activities in the Glass Flare Forming Area should be reduced to a minimum and conducted when other employees are not in adjacent areas.

IX. REFERENCES

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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. GTE Products Corporation, Winchester, Kentucky
2. Authorized Representative of Employees Local 1608, United Auto Workers of America
3. NIOSH, Region IV
4. OSHA, Region IV

For the purpose of informing the approximately 25 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

Sampling and Analytical Methods and Environmental Criteria

GTE Products Corporation
Winchester, Kentucky
HETA 82-144

Contaminant	Flow Rate (LPM)	Collection Media	Analytical Method	Environmental Criteria (mg/m^3, unless otherwise noted)
Methyl Alcohol (Long-Term And Short-Term Sample)	LT=0.05 ST=0.45	Large Silica Gel Tube	Gas Chromatography using P&CAM No. 247 (Modified)	OSHA: 260[A] NIOSH: 260[B] NIOSH: 1048[C] ACGIH: 260[A] ACGIH: 310[D]
Isopropyl Alcohol (Short-Term Sample)	0.2	Charcoal Tube	Gas Chromatography using P&CAM No. S-65 (Modified)	OSHA: No ST Criteria NIOSH: 1968[C] ACGIH: 1225[D]
Methyl Bromide	0.05	Petroleum Based Charcoal Tube (2 tubes)	Gas Chromatography using P&CAM No. S-372 (Modified)	OSHA: 80.0[E] NIOSH: None ACGIH: 20.0[A]
Methyl Iodide	0.05	Charcoal Tube	Gas Chromatography using P&CAM No. S-98 (Modified)	OSHA: 28.0[A] NIOSH: None ACGIH: 10.0[A,F]
1,1,1-Trichloroethane	0.2	Charcoal Tube	Gas Chromatography using P&CAM No. S-328 (Modified)	OSHA: 1900.0[A] NIOSH: 1900[C] ACGIH: 1900.0[A]

(continued)

TABLE 1 (continued)

Contaminant	Flow Rate (LPM)	Collection Media	Analytical Method	Environmental Criteria (mg/m^3, unless otherwise noted)
Sulfur Dioxide (Long-Term Sample)	0.02	Long-Term Detector Tubes	Visual, Direct Reading	OSHA: 5.0 (ppm)[A] NIOSH: 0.5 (ppm)[B] ACGIH: 2.0 (ppm)[A]
Hydrogen Sulfide	-	Passive Dosimeter	Visual, Printout	OSHA: 20.0 (ppm)[G] NIOSH: 10.0 (ppm)[H] ACGIH: 10.0 (ppm)[A]
Sulfur Dioxide, Hydrogen Sulfide, 1,1,1-Trichloroethane (Grab Sample)	-	Direct-Reading Indicator Tubes	Visual, Direct Reading	OSHA: Used TWA criteria NIOSH: Used TWA criteria ACGIH: Used TWA criteria

A = 8-hour TWA.
B = Up to a 10-hour TWA.
C = Ceiling value, for a 15-minute period.
D = TLV-STEL (Threshold Limit Value - Short Term Exposure Limit), the maximum concentration to which workers can be exposed for up to a 15-minute period. Up to four excursions per day, each at least 1.0-hour apart.
E = Ceiling value that shall not be exceeded at any time.
F = Industrial substance suspect of carcinogenic potential for man.
G = Acceptable ceiling concentration that should not be exceeded during an 8-hour shift, except as provided for as maximum peak values listed in Table Z-2 of 29 CFR 1910.1000.
H = Ceiling concentration, 10-minute period.
LT = Long-term
ST = Short-term

TABLE II

Airborne Concentrations of Methyl Alcohol
Long-Term (7-8 hours) and Short-Term (15 minutes) Personal Samples

GTE Products Corporation
Winchester, Kentucky
HETA 82-144

April 7-8, 1982

Job/Location	Volume (Liters)	Sample Time	Date	Type of Sample	Concentration mg/m^3
Acid Wash Wash And Pack	25.6	0706-1512	4-7-82	L.T.	356
Acid Wash* Wash And Pack	26.	0708-1510	4-8-82	L.T.	301
Acid Wash Wash And Pack	6.8	0831-0846	4-7-82	S.T.	441
Acid Wash Wash And Pack	6.8	1244-1259	4-7-82	S.T.	853
Acid Wash Wash And Pack	6.8	1259-1314	4-7-82	S.T.	338
Acid Wash Wash And Pack	7.2	0907-0923	4-8-82	S.T.	847
Acid Wash Wash And Pack	6.8	1229-1244	4-8-82	S.T.	500

All samples collected on one employee.

L.T. = Long-term sample (approximately 8 hours)
S.T. = Short-term sample (15 minutes)
Laboratory limit of detection: .02 mg/sample
* Employee left pump in acid wash area during lunch, approximately 20 minutes.

Environmental Criteria (mg/m^3): Long-term = 260 (OSHA, NIOSH, ACGIH)
Short-term = 310 (ACGIH TLV-STEL)

TABLE III

Airborne Concentrations of Isopropyl Alcohol
Personal Short-Term (15 Minutes) Samples

GTE Products Corporation
Winchester, Kentucky
HETA 82-144

April 7-8, 1982

Job/Location	Volume (Liters)	Sample Time	Date	Concentration (mg/m^3)
Basement - Spare Parts Wash And Assembly	2.9	0952-1007	4-7-82	345
Basement - Spare Parts Wash And Assembly	3.1	1008-1023	4-7-82	419
Basement - Spare Parts Wash And Assembly	3.1	1409-1424	4-7-82	310
Basement - Spare Parts Wash And Assembly	2.7	0946-1001	4-8-82	407
Basement - Spare Parts Wash And Assembly	3.0	1001-1016	4-8-82	223
Basement - Spare Parts Wash And Assembly	2.9	1022-1037	4-8-82	759

All samples collected on one employee.

Laboratory limit of detection: 0.01 mg/sample

Environmental Criteria (mg/m^3): 1225 (ACGIH TLV-STEL)

TABLE IV

Airborne Concentrations of Methyl Iodide and 1,1,1-Trichloroethane
Area Samples

GTE Products Corporation
Winchester, Kentucky
HETA 82-144

April 7-8, 1982

Job/Location	Volume (Liters)	Sample Time	Date	Type of Sample	Concentration (mg/m^3)
Quality Engineering Dept.- On Window 4 Feet Off Floor	25.6	0722-1533	4-7-82	M.I.	LLD
Quality Engineering Dept.- On Window 4 Feet Off Floor	26.5	0735-1555	4-8-82	M.I.	LLD
Basement - On Storage Rack Near Bucket Containing Tri-C	29.4	0654-1528	4-7-82	Tri-C	14.5
Basement - On Storage Rack Near Bucket Containing Tri-C	30.9	0654-1550	4-8-82	Tri-C	4.5

M.I. = Methyl iodide
Tri-C = 1,1,1-trichloroethane
LLD = Below the Laboratory limit of detection (M.I.=.01 mg/sample, Tri-C=.01 mg/sample)

Environmental Criteria (mg/m^3): Methyl iodide - 10.0* (ACGIH)
1,1,1-trichloroethane - 1900.0 (OSHA, NIOSH, ACGIH)

* Industrial substance suspect of carcinogen potential for man

TABLE V

Airborne Concentrations for Methyl Bromide
Personal and Area Samples

GTE Products Corporation
Winchester, Kentucky
HETA 82-144

April 7-8, 1982

Job/Location	Volume (Liters)	Sample Time	Date	Type Of Sample	Concentration (mg/m^3)
Operator IR Area	23.2	0701-1128* 1159-1515	4-7-82	P	LLD
Operator IR Area	22.3	0704-1124* 1210-1516	4-8-82	P	LLD
Mechanic IR Area	26.0	0635-1515	4-7-82	P	LLD
Mechanic IR Area	25.8	0638-1513	4-8-82	P	LLD
Engineer IR Area	11.9	0716-1114**	4-7-82	P	LLD
Engineer IR Area	21.4	0712-1128* 1253-1545	4-8-82	P	LLD
Basement (Under IR Area) In Darkroom Near End Of RR Track	27.8	0640-1530	4-7-82	A	LLD
Basement (Under IR Area) In Darkroom Near End Of RR Track	26.4	0659-1548	4-8-82	A	LLD

LLD = Below the laboratory limit of detection (.001 to .002 mg/sample)

* Sample removed when employee left plant for lunch.
** Sample removed for lunch, employee did not return to area until late in the day.

P = Personal sample, A = Area sample

Environmental Criteria: 20.0 mg/m^3 (ACGIH)

TABLE VI

Airborne Concentrations for Sulfur Dioxide
Long-Term (Approximately 8 Hours) and Grab Samples

GTE Products Corporation
Winchester, Kentucky
HETA 82-144

April 7-8, 1982

Job/Location	Date	Time of Sample	Sample Type	Concentration (ppm)
Glass Flare Forming - Middle Of Room	4-7-82	1228	GS	7
Glass Flare Forming - Middle Of Room	4-7-82	1446	GS	2.5
Glass Flare Forming - Middle Of Room	4-8-82	1050	GS	ND
Glass Flare Forming - At Location Of Area Sample	4-7-82	1233	GS	3
Glass Flare Forming - At Location Of Area Sample	4-7-82	1448	GS	4
Glass Flare Forming - At Location Of Area Sample	4-7-82	1055	GS	5
Glass Flare Forming - Corner Of Room Where Gas Cylinder Bottles Are Stored	4-7-82	1552	GS	5
Glass Flare Forming - At Approximate Position Employee Would Be When Loading Glass Rods Into Machine	4-8-82	1100	GS	12
Glass Flare Forming - Sample Taken Between Machine No. 2 And Machine No. 3, Approximately 12 Inches From Machine No. 2	4-8-82	1215	GS	25

(continued)

TABLE VI (continued)

Job/Location	Date	Time of Sample	Sample Type	Concentration (ppm)
Maintenance - Glass Flare Forming	4-7-82	0631-1150 1220-1541	Personal LT	3.7
Maintenance - Glass Flare Forming	4-8-82	0633-1142 1220-1530	Personal LT	2.9
Glass Flare Forming - On Gas Pipe, Approximately 2 Feet From Flare Forming Machine No. 3	4-7-82	0740-1542	Area LT	3.3
Glass Flare Forming - On Gas Pipe, Approximately 2 Feet From Flare Forming Machine No. 3	4-8-82	0745-1525	Area LT	0.7

ND = Non-detected.
GS = Grab sample collected with certified direct-reading indicator tube.
LT = Long-term sample collected with long-term detector tube.

Environmental Criteria: 0.5 ppm TWA (NIOSH)

DEPARTMENT OF HEALTH AND HUMAN SERVICES
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