U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION REPORT NO. 78-120-608
ASSOCIATED GROCERS, INC.
SEATTLE, WA

JULY 1979

I. TOXICITY DETERMINATION

It has been determined that:

1. The employee's exposure to sodium hydroxide during the replenishing of the caustic solution in the 500 gallon tank is toxic as used and found. This is based on sample results which showed that he was exposed to airborne concentrations of sodium hydroxide that were three times the 15 minute ceiling criterion, and the fact that he experienced sufficient throat irritation to make him cough and a transient burning of the face.

2. The employees' exposure to chemicals used while scrubbing the floor and cleaning the Cryovac line and hamburger equipment were not considered toxic. this is based on environmental samples which showed airborne exposures to the chemicals used were less than 4% of the evaluation criteria, and the absence of medical symptoms in these employees.

3. The medical problems currently exhibited by one employee who conducted these jobs in the past are not related to occupational exposures in the course of his employment at Associated Grocers. This is based on a complete review by the medical investigator of his medical records, physical examination of the employee and conversation with his attending physicians.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this complete Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information Resources and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After ninety (90) days, the report will be available through the National Technical Information Services (NTIS), Springfield, Virginia. 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. Associated Grocers, Inc., Seattle, Washington
2. Amalgamated Meat Cutters & Butchers of America Local 186
3. Washington Industrial Safety & Health Agency (WISHA), Olympia, WA
4. United Food and Commercial Workers International Union
5. U.S. Department of Labor, Occupational Safety and Health Agency (OSHA), Region X, Seattle, Washington

For the purpose of informing the approximately four affected employees, the employer shall promptly post this Determination Report in a prominent place(s), near the work area of the affected employees for a period of thirty (30) calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorizes the Secretary of Health, Education, and Welfare, following receipt of 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 National Institute for Occupational Safety and Health received such a request from a representative of the employees to determine if the substances used to clean the floors, meat hooks, baskets, tubs and other meat cutting related equipment, are toxic as used or found.

IV. HEALTH HAZARD EVALUATION

A. Description of Process

This request involves the meat cutting department at the distribution center of Associated Grocers, Inc. In particular, it involves the various cleaning operations. There are four employees working three shifts who do this work. Each job is done on a different shift.

1. Floor Cleaning: The floor cleaning is performed using a battery powered, self-propelled scrubbing unit. Three gallons of the cleaning chemical (3% isopropyl alcohol, 3% butyl cellosolve and 5% sodium hydroxide) are hand pumped from a 55 gallon drum into a bucket, added to the scrubbing unit and mixed with 30 gallons of water. The scrubber applies the solution to the floor and scrubs the floor. After the floor has been scrubbed, it is vacuumed dry. The operation is conducted on the graveyard shift and takes approximately 1½ hours. the operator wears cloth gloves, coveralls and rubber boots.

2. Basket and Hook Cleaning: In the cleaning rooms is a heated (152°F) 500 gallon tank. A powdered compound that consists of 43% sodium hydroxide and 57% inert substances is added to water. The strength of the final solution is estimated by the operator. When he feels the solution is getting weak, he will add sodium hydroxide to it. That may occur 1-3 times a week. The compound is in a 55 gallon drum. As the humidity in the room is high, the compound becomes crusty. He will reach into the barrel, scrape and scoop up several cans full of the compound and dump it into the tank. As he is scraping and scooping the compound, dust is generated, and it passes his breathing zone. This part of the operation only takes 1-2 minutes. During this time, the operator wears no respirator or gloves. The basket cleaning is then accomplished by removing the solution from the tank with a bucket and splashing the liquid over the baskets. After the baskets have soaked, they are washed off with hot water. The hook cleaning is done by dipping the hooks in the tank and then rinsing them off with hot water. Both the hook and baskets are dipped in a vegetable oil to prevent rust. The basket cleaning requires about ten minutes to complete. This operation is done during the day shift.

3. Cleaning of Cryovac Line and Hamburger Mixing Equipment: Approximately one pound of powdered cleaning compound that contains 33% trisodium phosphate, 29% sodium metasilicate pentahydrate, 4% sodium dodecylbenzene sulfonate and 1% sodium hypochlorite is diluted with approximately 30 gallons of water. The solution is pumped through a hose and the hamburger carts, hamburger mixer, other equipment and the floors are sprayed and allowed to soak. The equipment is then thoroughly washed and rinsed with hot water. Because of the low room temperature, (≃38°F) the moisture condenses and a fog is produced. The cleaning takes about 1½ to 2 hours to complete, and is done at the end of the night shift. After the cleaning is done, the equipment is sanitized by spraying the equipment with about 1-2 ounces of solution (89% ethanol, 5.5% n alkyl dimethyl ethyl benzyl ammonium chloride) mixed with water. This requires about 90 seconds to complete.

B. Evaluation Design and Progress

An initial survey was conducted on October 24, 1978. An environmental-medical survey was conducted on February 22 and March 23, 1979. The environmental-medical survey was delayed due to the absence of one of the employees from his job for medical reasons.

The sampling was designed to determine the workers' exposure to the various airborne materials present only during the time he was using the materials. The exposure time for any employee was short and there were no additional chemical exposures during his work shift.

C. Evaluation Methods

1. Environmental - The air sampling and analysis methodology are shown in Table 1.

2. Medical - Medical histories and symptoms were obtained from four workers by interviews with an occupational health physician. A limited physical examination was conducted on Employee A. In addition, medical records from one hospital on Employee A were reviewed and several of his attending physicians were interviewed by telephone.

D. Evaluation Criteria

1. Environmental - The environmental criteria used in this evaluation are listed in Table 2.

2. Medical - The primary health effects are listed in Table 2.

E. Evaluation Results and Discussion

1. Environmental - There were two samples collected for sodium hydroxide, one for isopropyl alcohol and butyl cellosolve. The results are shown in Table 3. An attempt was made to sample for sodium compounds during the cleaning of the Cryovac line and hamburger equipment; however, there was so much water vapor present that the moisture plugged the sampling filter.

The employee who was scrubbing the floor for a 95 minute period was exposed to 3 ppm of isopropyl alcohol which is less than 1% of the evaluation criterion of 400 ppm and to 1.6 ppm of butyl cellosolve which is 3% of the evaluation criterion of 50 ppm. Airborne sodium hydroxide was not detectable. This is the employee's only exposure to chemicals during the day, hence, based on the extremely low sample results they are not considered toxic.

During the night shift, one employee cleans the Cryovac line and the hamburger equipment. The cleaning solution used contains trisodium phosphate, sodium metasilicate and sodium dodecylbenzene sulfonate. His exposure for a 15 minute period showed no detectable quantities of airborne sodium present. This is expected because the cleaner is dissolved in water and allowed to soak and is then rinsed off.

For a 90 second period he sprays a dilute solution of ethanol and n alkyl dimethyl benzyl ammonium chloride. The exposure time was

too short to sample; however, it is the evaluator's opinion, based on the way the material was used, that a hazard does not exist.

One employee on the day shift cleans the meat baskets and meat hooks. The baskets are cleaned by splashing a strong caustic (sodium hydroxide) solution on the baskets, letting them soak, followed by a hot water rinse. The caustic solution is in an open heated 500 gallon tank. When the employee feels the solution is getting weak, he will add additional powdered caustic material to the tank from a 55 gallon drum. A 4¼ minute sample was collected during the time he reached in the barrel, scooped the caustic out and put it in the 500 gallon tank and then splashed the solution over the baskets. The breathing zone concentration of sodium hydroxide powder during this period was 24.8 mg/cu m. During the following twelve minutes, sodium hydroxide was not detectable. The short term average exposure to sodium hydroxide over the 16¼ minute period was 6.4 mg/cu m. This exceeds the evaluation criterion of 2 mg/cu m ceiling for a 15 minute period. When the employee scooped the sodium hydroxide out of the drum, he tended to turn his head; however, he still received sufficient throat irritation to cause him to cough. During this time, he was not wearing any eye or face protection or gloves. He stated that his face burned slightly.

This exposure to sodium hydroxide is considered toxic as used and found. Recommended controls for this are listed under Recommendations, Section G.

2. Medical

a) One employee who had not worked for approximately four months at the time of his evaluation. The absence from work was unusual, because he previously had not missed a day of work for approximately seven years. This employee has performed all the jobs listed in Section IV-A of this report over the course of his employment. His most recent work involved the basket and hook cleaning operations.

He had experienced episodes of frontal headaches, nausea, dizziness and photo phobia for eight months. He had right ear pain in 1978, and a workup by a specialty clinic revealed no pathology. In January 1979, he returned to the same specialty clinic with symptoms of headache and nosebleeds. Sinus films were normal, and no source of the nosebleeds was found. The nasal mucosa was not inflamed, and the nosebleeds were not considered caused by alkaline dust exposures.

He had additional symptoms the past eight months including abdominal pain, knee pain, and conjunctivitis. In addition, he developed macular lesions of the dorsum of both hands and forearms which were diagnosed by a dermatologist as hyperpigmented macules secondary and

folliculitis. Physicians concluded that the skin lesions and conjunctivitis were not caused by alkaline dust exposures; moreover, these symptoms and findings continued after removal from the job.

b) Three other employees in the meat cutting department had not experienced eye irritation, nosebleeds, or the many symptoms of this one employee. However, one of these three has had transient facial burning and an occasional cough while scooping the sodium hydroxide out of the drum. Another, a smoker, had pneumonia prior to employment here and continues to have annual episodes of bronchitis, but not persistant cough or sputum production. It is not apparent that his episodic bronchitis is work related.

F. Summary and Conclusions

1. The employee's exposure to sodium hydroxide during the replenishing of the caustic solution in the 500 gallon tank is toxic as used and found. This is based on sample results which showed that he was exposed to airborne concentrations of sodium hydroxide that were three times the 15 minute ceiling criterion, and the fact that he experienced sufficient throat irritation to make him cough and a transient burning of the face.

2. The employees' exposure to chemicals used while scrubbing the floor and cleaning the Cryovac line and hamburger equipment were not considered toxic. This is based on environmental samples which showed airborne exposures to the chemicals used were less than 4% of the evaluation criteria, and the absence of medical symptoms in these employees.

3. It is the investigator's opinion that the medical problems currently exhibited by one employee who conducted these jobs in the past, but was off work for over four months due to medical difficulties, are not related to occupational exposures in the course of his employment at Associated Grocers. This is based on a complete review by the medical investigator of his medical records, physical examination of the employee and conversation with his attending physicians.

RECOMMENDATIONS

1. The exposure to the airborne sodium hydroxide dust can be reduced or eliminated by:

   a. Use of liquid concentrate.
   b. Use of a granulated sodium hydroxide in place of the powdered material now in use.

2. The use of local exhaust ventilation on the drum probably would not eliminate all exposures since the employees still would have to lean into the drum as the drum is emptied. In addition, this job requires only several minutes, once or twice a week, and it can be more economically reduced by a change in product and personal protection equipment.

3. Eye and face protection (e.g., face shield) should be worn when putting chemicals and/or parts into the caustic tank and when dipping the liquid from the tank and splashing it over the baskets.

4. A NIOSH approved respirator for use against sodium hydroxide dust should be worn when replenishing the 500 gallon tank with sodium hydroxide.

5. Rubber gloves and gauntlets should be worn when scooping the sodium hydroxide from the drum and when dipping the solution from the tank.

6. The caustic tank should be labeled as to its contents.

V. AUTHORSHIP AND ACKNOWLEDGMENTS

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TABLE 1

AIR SAMPLING AND ANALYSIS METHODOLOGY

ASSOCIATED GROCERS INC.
SEATTLE WASHINGTON

HHE 78-120

SUBSTANCE	COLLECTION DEVICE	FLOW RATE	ANALYSIS	DETECTION LIMIT	REFERENCE
Butyl Cellosolve	Charcoal Tube	1 lpm	Gas Chromatography	0.04 mg	NIOSH[1] P&CAM 127
Isopropyl Alcohol	Charcoal Tube	1 lpm	Gas Chromatography	.01 mg	NIOSH P&CAM 127
Sodium Dodecylbenzene Sulfonate	Filter (2)	1.5 lpm	Atomic Absorption	1 ug	NIOSH P&CAM 173
Sodium Hydroxide	Filter (2)	1.5 lpm	Atomic Absorption	1 ug	NIOSH P&CAM 173
Sodium Metasilicate	Filter (2)	1.5 lpm	Atomic Absorption	1 ug	NIOSH P&CAM 173
Trisodium Phosphate	Filter (2)	1.5 lpm	Atomic Absorption	1 ug	NIOSH P&CAM 173

1. NIOSH Manual of Analytical Methods. HEW Publication (NIOSH) 77-157 A&B.

2. Cellosolve ester membrane filter.

TABLE 2

ENVIRONMENTAL EVALUATION CRITERIA

ASSOCIATED GROCERS INC.
SEATTLE WASHINGTON

HHE 78-120

SUBSTANCE	RECOMMENDED ENVIRONMENTAL LIMITS	SOURCE	WISHA[1] AND OSHA[2] STANDARDS	PRIMARY HEALTH EFFECTS
Butyl Cellosolve	50 ppm[3]	ACGIH[4]	50 ppm	Upper respiratory tract and eye irritation; fatigue, headache, nausea.
Isopropyl Alcohol	400 ppm TWA 800 ppm ceiling (15 min.)	NIOSH[5]	400 ppm	Mucous membrane irritation.
Sodium Dodecylbenzene Sulfonate	None	-	None	Skin irritation.
Sodium Hydroxide	2 mg/m[3] ceiling[6] for any 15 min. period	NIOSH	2 mg/m[3]	Airway irritation, eye, skin, mucous membrane irritation.
Sodium Metasilicate	None	-	None	Irritating and caustic to skin and mucous membrane.
Trisodium phosphate	None	-	None	Nasal membrane irritation; skin irritation.

1. WISHA - Washington Industrial Safety and Health Agency
2. OSHA - Occupational Safety and Health Agency - U.S. Department of Labor
3. PPM - Rate of vapor or gas per million parts of air.
4. ACGIH - American Conference of Government Industrial Hygienists.
5. NIOSH - National Institute of Occupational Safety and Health.
6. mg/m - milligrams of cubic meters of air.

TABLE 3

ENVIRONMENTAL AIR CONCENTRATIONS

ASSOCIATED GROCERS INC.
SEATTLE WASHINGTON

HHE 78-120

	SAMPLE LOCATION	DATE	SAMPLE NUMBER	SAMPLE TIME MIN.	SAMPLE VOLUME LITERS	SUBSTANCE AND CONCENTRATION
BZ	During scrubbing of floor	2-22-79	C-1	95	95	Isopropyl Alcohol 3 PPM; Butyl Cellosolve 1.6 PPM
BZ	During scrubbing of floor	2-22-79	AA-8	95	142	Sodium Hydroxide ND[2] < 1 ug/filter
BZ	Cleaning of Cryovac line & Hamburger line	2-22-79	AA-10	15	22	Trisodium Phosphate; Sodium Metasilicate; Sodium Dodecylbenzene Sulfonate; ND < 1 ug sodium/ filter; extreme moisture in air started to plug the filter.
BZ	Cleaning baskets; scooped 4-2 gallon buckets of cleaner from 35 gal drum and put in tank; dipped liquid from tank and splashed over baskets.	3-23-79	AA-1	4¼	6.4	Sodium Hydroxide - 24.8 mg/cu m[3]
BZ	Hosing off of baskets	3-23-79	AA-2	12	18	Sodium Hydroxide ND < 1 ug/filter
BZ	16¼ min Time Weighted Average Concentration for Samples AA-1 & AA-2	3-23-79	AA-1 & 2	16¼	24.4	Sodium Hydroxide 6.4 mg/cu m

1. PPM - Parts of vapor or gas per million parts of air.
2. ND - Non Detectable
3. mg/cu m - milligrams of substance per cubic meter of air.