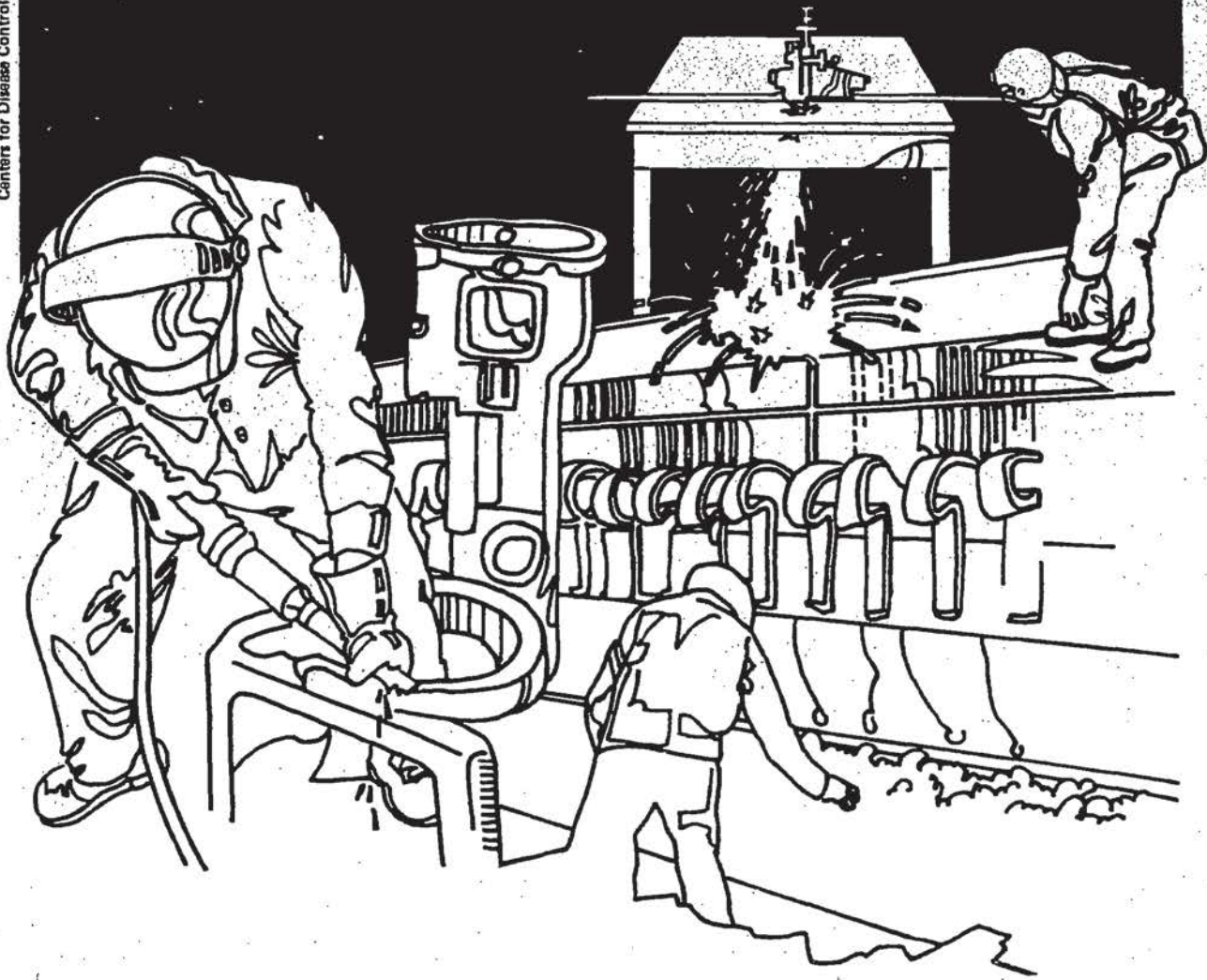


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Centers for Disease Control ■ National Institute for Occupational Safety and Health

NIOSH



Health Hazard Evaluation Report

HETA 82-370-1270
KISTLER COMMUNICATIONS, INC.
DENVER, COLORADO

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.

Mention of company names or products does not constitute endorsement by the National Institute for Occupational Safety and Health.

HETA 82-370-1270
MARCH 1983
KISTLER COMMUNICATIONS, INC.
DENVER, COLORADO

NIOSH INVESTIGATORS:
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I. SUMMARY

In August 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from Kistler Communications, Inc., Denver, Colorado, to evaluate the potential exposure of employees to polychlorinated biphenyls (PCBs). The PCBs were thought to have contaminated numerous catalog surfaces which were shipped from the publisher (Gates Rubber Company) to the Kistler warehouse and then handled by employees at Kistler. One employee who handled these catalogs developed a rash on the face and hands while cleaning residue off the catalogs which was thought to have come from a transformer fire at Gates Rubber Company's publishing house.

On August 9, 1982, NIOSH performed its initial survey. Based on information found during the initial survey, magnesium, arsenic, lead, cadmium, chromium, zinc, and the pH content of the residue found on the catalogs were also evaluated in addition to PCBs. Bulk and wipe samples of the residue were analyzed for the contaminants of concern. The employee most involved in handling the contaminated catalogs in the warehouse operation was interviewed by a NIOSH physician. Other workers were only questioned briefly.

The results of the bulk and wipe samples showed non-detectable levels of PCBs, polychlorinated dioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs). Arsenic, cadmium, and chromium were also below the limit of analytical detection. Lead, zinc, and magnesium in the bulk material were 0.25, 0.42, and 0.31 percent, respectively. These were only slightly above the analytical detection levels for each. The pH was 10.7 which is considered distinctly alkaline.

The medical evaluation determined that the alkalinity of the dust was the probable cause of the rash and that an unaccustomed amount of muscular work was the probable cause of soreness in arm and neck.

On the basis of the data obtained in this investigation, NIOSH determined that exposures to the residue found on the catalogs did not contain PCBs, PCDDs, PCDFs or a large percentage of the various metals evaluated. It was determined, however, that the pH content of the residue found on the catalogs probably was a major contributor to the irritation/rash experienced by the employee who worked with the catalogs. The route of contamination was thought to be skin contact which was caused by direct contact and raising dust when the employees handled the catalogs. Therefore, based on the environmental and medical findings there did appear to be a health hazard to the workers who handled the contaminated catalogs. Recommendations are included in Section VIII of this report to help assist in preventing future episodes.

KEYWORDS: SIC 4225 (General Warehousing and Storage), publication storage, pamphlets, brochures, dust, pH.

II. INTRODUCTION

In August 1982 the National Institute for Occupational Safety and Health (NIOSH) received a request for assistance from a representative of Kistler Communications, Inc., Denver, Colorado. The request was to determine if there was a health hazard from exposures to polychlorinated biphenyls (PCBs) or other polychlorinated compounds which were thought to be in a grayish-white residue found on the catalogs. The catalogs were shipped to Kistler from the publishing department of Gates Rubber Company, Denver, Colorado. A transformer fire/spill at Gates was reported to have contaminated numerous crates containing publications that were sent to Kistler.

NIOSH conducted an environmental and medical survey during August 1982 to evaluate the potential exposures. The results and recommendations presented in this report were given to the companies involved and the employees of concern as soon as the results were available.

III. BACKGROUND

Kistler Communications, Inc., is a distribution house for published materials, e.g., magazines, catalogs, pamphlets, etc. The company receives this material from industries in the Denver area and distributes the materials when required. Gates Rubber Company, Denver, Colorado, is one of the industries that store their publishing materials at Kistler Communications.

In July 1982 Gates sent Kistler approximately 42 skids which contained the company's publications. A few days after their delivery at Kistler a warehouse employee began removing the catalogs from the boxes. This required approximately a full day's work and during this time the employee counted, cleaned, and repackaged the catalogs. It was determined that during this day the employee counted thousands of the catalogs. As the work day concluded, the employee noticed a rash around the face and hands and it was thought that the grayish-white material found on the catalogs might be the cause of the irritation/rash. The following day the employee developed a soreness in her right arm and neck.

Information given Kistler management regarding the grayish-white material suggested that the catalogs/skids in question were stored in a warehouse at Gates Rubber and that during June 1981, a transformer containing PCBs had caught fire and contaminated the catalogs and skids.

This information was not available until after the employee had separated the catalogs. Because of these concerns Kistler contacted NIOSH to evaluate the potential health problem.

IV. EVALUATION: DESIGN AND METHODS

A. Environmental

Due to the lack of information concerning the grayish-white material found on the catalogs and skids, as well as the concerns described to NIOSH regarding the potential for PCBs from a transformer fire, the following strategy was used:

1. Contacted Gates Rubber Company to confirm the possibility of PCB contamination from a transformer fire.
2. Collected various samples of the grayish-white material and submitted them to the NIOSH laboratory for evaluation.
3. Based on conversations with Kistler, Gates, and NIOSH's laboratory, it was decided that the material would be analyzed for polychlorinated biphenyls (PCBs), dioxins (PCDDs), and dibenzofurans (PCDFs). PCDDs and PCDFs are produced when PCBs are heated excessively, either during manufacture or in an explosion or fire. The material was also analyzed for magnesium, arsenic, lead, cadmium, chromium, zinc, and the materials' pH level. These last concerns were included because of information which suggested that the material might be waste material from Gates' battery production area.

A variety of techniques were used to evaluate the material in question. The samples were analyzed in the following manner:

1. Polychlorinated Materials

Five samples--one bulk and four wipe--were analyzed for the presence of isomers of PCBs, PCDDs, and PCDFs of any degree of chlorine substitution, i.e., Cl₁ to Cl₈. Any individual isomers detected were summed to yield a concentration for the group, e.g., the tetrachlorodibenzofurans. The 2,3,7,8-tetrachloro isomers of the dioxins and furans are the only ones to be reported individually.

Both bulk and wipe of the grayish-white material samples were Soxhlet extracted for 24 hours with hot benzene and this extract concentrated to a final volume of 200 μ L using a cool N₂ gas blowdown. A recovery spike of 200 ng of d₁₂-chrysene was added to each sample before extraction and a quantitation internal standard of 200 ng of d₁₀-anthracene was added to the 200 μ L of concentrated extract before HRGC-MS analysis. Multiple analyses of each sample extract were required to screen for and, if necessary, confirm the presence of the many PCDD and PCDF isomers possible.

2. Metals and pH

One bulk sample of the grayish-white material was also analyzed for arsenic, lead, cadmium, chromium, magnesium, and zinc by NIOSH Method No. P&CAI: 173 after digesting a portion of the sample with nitric acid and removing the excess acid by evaporation.

A 1% mixture of the sample in deionized distilled water was agitated for about ten minutes and allowed to settle. The pH of the decanted liquid was measured and, since it was greater than 7, no sulfuric acid was present. The pH of the deionized water was also checked.

B. Medical

The one worker primarily affected was interviewed privately on two occasions. Other workers were questioned only briefly in the general work area.

V. EVALUATION CRITERIA AND TOXICOLOGY

Because NIOSH and Kistler did not want to re-expose employees to the work operation, NIOSH felt that analysis of the bulk material and medical interview was the only way to adequately evaluate the circumstances leading to the episode in question. Therefore, the normal sources of criteria used to assess the workroom concentrations, e.g. the Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.1000); the NIOSH criteria for a recommended standard; and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment (TLVs), 1981, could not be used.

Except for the pH concern which is discussed below, the medical (toxicological) evaluation criteria used for this investigation are presented in Table 1. This includes the primary health effects for each of the contaminants of concern. None of the metals would be expected to have acute effects from short term dermal exposure. The polychlorinated compounds, arsenic, cadmium, and chromium are not included since they were not detected in the laboratory analysis.

The pH of the dust turned out to be the primary concern in this study. pH is a value taken to represent the acidity or alkalinity of a material. Strong alkalis can be caustic and corrosive in liquid form or in moist environments. Somewhat less alkaline material can be irritating. Normal skin is slightly acid (pH a little less than 7). Sodium carbonate (washing suds) solution exposed to the carbon dioxide normally found in air will have a pH in the 9.2 to 11.0 range.¹ A substance with a pH similar to washing suds could be expected to be irritating to mucous membranes or moist skin on prolonged exposures.

VI. RESULTS AND DISCUSSION

A. Environmental

The analysis for the various polychlorinated compounds were all non-detectable and therefore this concern was determined to be unwarranted.

The results from the sample collected at Kistler for metals and pH analysis are described in Table 2. Lead, zinc, and magnesium were the only metals detected and the percentages were relatively low, i.e., 0.25, 0.42, and 0.31 percent respectively.

The pH level (10.7) of the grayish-white material found was considered excessively high and could be a major factor in the skin irritation described.

B. Medical

The one worker affected noted a reddening of the skin of her face after work but did not characterize her problem as irritation. She received non-specific treatment from her private physician with improvement. The following day she experienced discomfort in her right arm and neck. Again this was non-specific. Several other employees were questioned briefly, but were not involved with the immediate problem.

The most likely explanation for this worker's problem is that the alkaline dust served as a low level irritant to the skin when mixed with sweat (even though sweating was low enough to go unnoticed). The irritancy was sufficiently low that only the rash was noticeable without a sensation of irritation. The dust could have gotten on the face both by transfer on the hands and by becoming airborne while counting the catalogs.

A likely explanation for the arm and neck discomfort is an unaccustomed amount of muscular activity going through the rather large cartons of catalogs while counting them.

C. Other

It was determined that the alleged fire and transformer spill episode were not related. When inquiries were made by NIOSH of Gates concerning these episodes, Gates stated that the fire was a rubber particle fire that occurred on June 17, 1981, in Unit 11 of their Denver plant. The transformer spill did contain PCB fluid; however, this was described to NIOSH as a minor spill in the basement of Unit 46 which is across the street from Unit 11 at the Denver plant. Also, the spill occurred on June 12 not June 17. Finally, the catalogs in question were stored in the basement of Unit 46; however, the spill was not in the same room as the catalogs.

VII. CONCLUSIONS

NIOSH concluded that a health hazard did exist to the employee who handled the materials shipped to Kistler from Gates Rubber Company. It was felt by NIOSH that this grayish-white material had a high pH level which contributed to the symptoms experienced by the employee. An unaccustomed amount of physical activity was a factor in the muscular complaints.

VIII. RECOMMENDATIONS

In view of the findings of NIOSH's environmental and medical study, as well as personal communications with individuals at Kistler and Gates, the following recommendations are made to assist both companies in providing a better work environment for the concerned employees:

1. Gates Rubber Company should attempt to determine the source of the grayish-white material. If possible it should be eliminated; otherwise the printed matter should be protected from further contamination.

2. Gates should attempt to remove the grayish-white material from any of the remaining catalogs still at the Denver plant before allowing their employees or other employees to come in contact with this material.
3. If either of the companies should encounter this material in the future, proper steps should be taken to remove the material. This would include the use of proper removal equipment and/or techniques. Personal protective clothing and good personal hygiene measures should be a necessity.
4. The proper removal equipment would include vacuuming and the use of rags to reduce and/or eliminate the potential exposures described.
5. Proper personal protective clothing would include NIOSH approved dust-type respirators, gloves, and possibly garments worn only for this removal process.
6. Good personal hygiene measures should be considered during removal. This would include washing of one's hands and face before eating or at the end of the job. Also food, drinking, or smoking should be prohibited during the cleaning process.

IX. REFERENCES

1. Dean, J.A. (Ed.). Lange's Handbook of Chemistry. 12th Edition, McGraw-Hill Book Company, New York, 1979. Table 5-24.
2. Industrial Hygiene and Toxicology, second edition, Frank Patty (editor), Interscience Publishers, 1967, Vol. II.
3. Encyclopedia of Occupational Health and Safety, International Labor Office, McGraw-Hill Book Company, New York.
4. U.S. Department of Health, Education, and Welfare. Occupational Diseases, A Guide to Their Recognition, Public Health Service Publication (NIOSH) No. 77-181.

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XI. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, 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, Publications Office, at the Cincinnati address.

Copies of this report have been sent to:

1. Kistler Communications, Inc.
2. U.S. Department of Labor/OSHA - Region VIII.
3. NIOSH - Region VIII.
4. Colorado Department of Health.
5. State Designated Agency.

For the purpose of informing 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

EVALUATION TOXICOLOGY

Kistler Communications, Inc.
Denver, Colorado

Substance	Primary health Effects ²
Magnesium	As freshly generated fume: irritation of eyes, nose; flu-like symptoms (metal fume fever). Otherwise not toxic. Epsom Salts (magnesium sulfate) is used as a laxative.
Lead	Chronic poisoning affects red cell formation, the nervous system, and the digestive system. Early symptoms include constipation, abdominal cramps, fatigue, and sleep disturbances. Massive doses will hasten these symptoms. Lead fume exposure is the most likely cause of industrial poisoning; chronic ingestion being a problem primarily in young children.
Zinc	As freshly generated fume can cause metal fume fever (see magnesium above). Zinc salts of strong acids are astringent and corrosive to the skin and irritating to the gastrointestinal tract. However, as the dust in question is alkaline, no dermal toxicity would be anticipated.

TABLE 2

Summary of Samples for Metals and pH in Percent

Kistler Communications, Inc.
Denver, Colorado

August 1982

Arsenic	Lead	Cadmium	Chromium	Zinc	Magnesium	pH
ND	0.25	ND	ND	0.42	0.31	10.7
LIMIT OF DETECTION IN ug/sample:						
0.08	0.003	0.002	0.003	0.002	0.004	1 to 13

ND = non-detectable