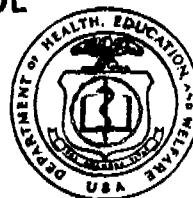


CENTER FOR DISEASE CONTROL

Morbidity and Mortality



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WEEKLY
REPORT

For
Week Ending
February 9, 1974

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE PUBLIC HEALTH SERVICE

DATE OF RELEASE: FEBRUARY 15, 1974 - ATLANTA, GEORGIA 30333

EPIDEMIOLOGIC NOTES AND REPORTS ANGIOSARCOMA OF THE LIVER AMONG POLYVINYL CHLORIDE WORKERS - Kentucky

Between September 1967 and December 1973, 4 cases of angiosarcoma of the liver were diagnosed among men employed in the polyvinyl chloride polymerization section of a B.F. Goodrich plant near Louisville, Kentucky. This section of the plant began operations in 1938. It employs about 270 persons and produces polyvinyl chloride as well as a variety of copolymers by polymerization of vinyl chloride monomer. All 4 men had worked continuously in the section for at least 14 years prior to onset of illness (Table 1); all 4 had worked directly in various phases of the polymerization process.

Case 1 presented in August 1967 with an epigastric mass and thrombocytopenia. An exploratory laparotomy was per-

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formed in September 1967; liver biopsy revealed angiosarcoma. Case 2 presented in January 1970 with gastrointestinal (GI) bleeding. Recurrent bleeding in May 1970 led to an exploratory laparotomy at which time a diagnosis of angiosarcoma was made on liver biopsy. Case 3 presented in January 1964 with GI bleeding which recurred in May 1965 with

TABLE 1. CASES OF SPECIFIED NOTIFIABLE DISEASES: UNITED STATES
(Cumulative totals include revised and delayed reports through previous weeks)

DISEASE	6th WEEK ENDING		MEDIAN 1969-1973	CUMULATIVE, FIRST 6 WEEKS		
	February 9, 1974	February 10, 1973		1974	1973	MEDIAN 1969-1973
Aseptic meningitis	34	29	35	213	238	218
Brucellosis	1	3	1	9	11	11
Chickenpox	3,609	5,305	-	18,811	27,061	-
Diphtheria	1	2	2	7	12	17
Encephalitis						
Primary: Arthropod-borne and unspecified	19	21	18	86	95	120
Post-infectious	12	4	5	27	20	26
Hepatitis, Viral						
Type B	135	120	128	934	805	805
Type A	871	1,027	1,067	4,914	5,775	6,407
Type unspecified	153	-	-	812	-	-
Malaria	6	6	39	18	17	243
Measles (rubeola)	521	704	704	2,414	3,461	3,663
Meningococcal infections, total	34	34	50	156	174	331
Civilian	34	34	49	156	166	307
Military	-	-	2	-	8	15
Mumps	1,762	2,145	2,502	9,148	10,400	12,594
Pertussis	72	-	-	182	-	-
Rubella (German measles)	258	441	823	1,098	2,269	2,964
Tetanus	2	1	1	6	6	6
Tuberculosis, new active	529	562	-	3,040	3,027	-
Tularemia	2	2	2	10	10	10
Typhoid fever	6	4	4	35	22	26
Typhus, tick-borne (Rky. Mt. spotted fever)	-	1	-	12	6	3
Veneral Diseases						
Gonorrhea	16,810	14,259	-	97,831	85,951	-
Syphilis, primary and secondary	462	516	-	2,661	2,917	-
Rabies in animals	43	69	67	267	327	347

TABLE II. NOTIFIABLE DISEASES OF LOW FREQUENCY

	Cum.		Cum.
Anthrax	1	Poliomyelitis, total	
Botulism: Wash. 2	2	Paralytic	
Congenital rubella syndrome, Ida. 1, Tex. 1	7	Pottacosis: Tex. 1	2
Leprosy: Hawaii 1	4	Rabies in man	
Leptospirosis: Hawaii 1, Ida. 1	6	Trichinosis: N.Y.C. 1, Okla. 1	13
Plague	-	Typhus, murine: Calif. 1, Va. 1	2

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ANGIOSARCOMA* - Continued

signs of portal hypertension. A portacaval shunt was performed, and liver biopsy yielded a diagnosis of cirrhosis. Repeat biopsies in October 1970 and September 1972 confirmed this diagnosis. Autopsy in March 1973 revealed angiosarcoma. Case 4 presented in July 1973 with hepatosplenomegaly, weight loss, and jaundice. Two liver biopsies were interpreted as showing severe cirrhosis. Autopsy in December 1973 revealed angiosarcoma.

In each case, pathologic material revealed the presence of extensive cirrhosis of a non-alcoholic type in addition to angiosarcoma. In 2 cases, the diagnosis of angiosarcoma was made only at autopsy, cirrhosis having been diagnosed 7 years before in Case 3 and 5 months before in Case 4. None of the patients gave histories of prolonged alcohol use or exposure to hepatotoxins outside their work place. In particular, none had ever had exposure to thorium dioxide or to arsenic, 2 materials known specifically to induce hepatic angiosarcoma in man (1,2).

(Reported by John Creech, M.D., Plant Physician, B.F. Goodrich Chemical Company, Louisville, Kentucky; Maurice N. Johnson, M.D., Director of Environmental Health, B.F. Goodrich Chemical Company, Akron, Ohio; Bradford Block, M.D., Medical Consultant, Kentucky Occupational Safety and Health Administration, Kentucky State Department of Labor; National Institute for Occupational Safety and Health, and the Cancer and Birth Defects Division, Bureau of Epidemiology, CDC.)

Editorial Note

Angiosarcoma of the liver is an exceedingly rare tumor. It is estimated that only about 25 such cases occur each year in the United States. Four cases, therefore, among a small number of workers at a single plant is a most unusual event, and one which raises the possibility of some work-related carcinogen, conceivably vinyl chloride itself. Although no data are yet available concerning the occurrence of angiosarcoma among workers at other vinyl chloride plants in the United States, it seems distinctly possible that the problem may be industry-wide. Epidemiologic studies have started to

Table 1
Cases of Angiosarcoma of the Liver
among Polyvinyl Chloride Workers
B. F. Goodrich Plant
Louisville, Kentucky

Case	Age at illness onset	Date of			Years worked with PVC before illness
		Illness onset	Diagnosis	Death	
1	43	Aug. 1967	Sept. 1967	Jan. 7, 1968	17
2	36	Jan. 1970	May 1970	Sept. 27, 1971	14
3	41	Jan. 1964	Mar. 1973	Mar. 3, 1973	14
4	58	July 1973	Dec. 1973	Dec. 19, 1973	27

determine the extent of the problem in the United States, with respect both to angiosarcoma of the liver and to its possible relationship to post-toxic cirrhosis.

Published data concerning the potential hepato-toxicity and oncogenicity of vinyl chloride are limited. Studies in Germany have suggested a link between hepatic damage and occupational exposure to vinyl chloride (3), while Italian workers have suggested that vinyl chloride may cause a wide variety of tumors in animals (4). The chemical concentrations used in these latter experiments, however, far exceed levels likely to be encountered in industrial environments. Efforts to confirm such observations and to measure effects at lower dose levels are now in progress.

References

1. da Silva Horta J, Abbatt JD, Cayolla da Motta L, Roriz ML. Malignancy and other late effects following administration of thorotrast. *Lancet* 2:201-205, 1965
2. Regelson W, Kim U, Ospina J, Holland JP: Hemangioendothelial sarcoma of liver from chronic arsenic intoxication by Fowler's solution. *Cancer* 21:514-522, 1968
3. Marsteller HJ, Lebach WK, Müller R, et al: Chronisch-toxische Leberschäden bei Arbeitern in der PVC-Produktion. *Dtsch Med Wochenschr* 98:2311-2314, 1973
4. Viola PL, Bigotti A, Caputo A: Oncogenic response of rat skin, lungs, and bone to vinyl chloride. *Cancer Research* 31:516-522, 1971

WILD MUSHROOM POISONING - Pennsylvania

On October 9, 1973, 37 nuns ate their evening meal at a convent in Berks County, Pennsylvania. Between 3 and 4 hours later (median—approximately 2 hours), 17 nuns developed an illness characterized by profuse sweating (76%), watery diarrhea (76%), chills (58%), and abdominal pain (42%) (Table 2). Six of the nuns were hospitalized; none died.

Food-specific attack rates for foods ingested in the 24 hours before illness strongly implicated mushrooms as the intoxicating food (Table 3). Stool specimens from 4 of the ill nuns and bacteriologic cultures of the remaining mushrooms yielded no enteric pathogens. Remnants of the mushrooms were identified as *Clitocybe* sp. and *Lepiota* sp. Some species of the former genus are known to contain muscarine, which produces parasympathomimetic effects.

The mushrooms had been picked on the grounds of the convent on the afternoon of the outbreak. For several years, the nuns had eaten these mushrooms at meals, and no apparent illness had occurred. On October 9, however, the nun who

Table 2
Symptoms in 17 Ill Nuns
Berks County Convent - October 9, 1973

Symptom	Percent with Symptom
Diarrhea	76
Sweating	76
Chills	58
Abdominal pain	42
Nausea	35
Vomiting	23
Excessive salivation	23
Feverish feeling	18
Dry mouth	12
Blurred vision	12
Headache	6
Weakness	6
Faint feeling	6

(Continued on page 55)

ANGIOSARCOMA* - Continued

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has elapsed since both of these Committees have been appointed and public announcement has been made. Since the Act, in Section 6 (b) (1), provides a period which is not to extend longer than 270 days, it is our opinion that you are now in violation of the Act by the failure of the two Committees to make their recommendations to you in this time frame. We reject any attempt to explain that the time begins to elapse at the initial meeting or first working meeting, even if this Section of the Act did not make such a stipulation, we would still reject it. More than 270 days have elapsed to date from the date of the first working meeting of both Committees.

We would like your response as to when you expect these standards promulgated. Further delay can only expose thousands of workers to noise and heat stress hazards against which standards such as these should be promulgated to protect them.

Sincerely yours,

/s/George H. R. Taylor
Executive Secretary
AFL-CIO Standing Committee on
Occupational Safety and Health

Health Hazards

AFL-CIO CALLS ON BRENNAN TO CREATE ADVISORY COMMITTEE FOR LEAD EXPOSURE

The Industrial Union Department, AFL-CIO, requested the Department of Labor to appoint and convene an advisory committee on the occupational exposure to inorganic lead in a message to Peter J. Brennan, Secretary of Labor, on February 6.

The request was issued on behalf of the IUD council on lead hazards. "We feel strongly that this step in the promulgation of a standard is essential in view of the shortcomings of the National Institute for Occupational Safety and Health recommendations," the letter stated.

The NIOSH criteria document, issued in January 1973 (Current Report, January 18, 1973, p. 924), recommended a standard limiting occupational exposure to lead at 0.15 milligrams per cubic meter of air as a time-weighted average for an eight-hour workday. IUD claimed in the message that creation of an advisory committee "will permit full examination of information and views not adequately represented in the NIOSH criteria document."

Health Hazards

POLYVINYL CHLORIDE RESEARCH IS TOP PRIORITY WITH NIOSH NOW, KEY CLAIMS

CLEVELAND, Ohio — (By an OSHR staff correspondent) — Polyvinyl chloride research is a top priority of the National Institute for Occupational Safety and Health, NIOSH Director Dr. Marcus Key said February 12.

Key and other NIOSH experts addressed a briefing session on vinyl chloride for labor and management representatives. The session was scheduled following the

announcement of four cases of angiosarcoma at the B.F. Goodrich plant in Louisville, Ky. (Current Report, January 31, p. 1099).

NIOSH has taken action from the beginning to protect workers, Key said, although the proposed course of action to deal with the vinyl chloride hazard is not yet in final form. All parties concerned including B.F. Goodrich Company, the Manufacturing Chemists Association, and labor unions have responded quickly to the crisis, he added.

NIOSH Action

Key said that the emphasis on polyvinyl chloride research which now has the highest NIOSH priority will have an effect on other NIOSH projects. Hopefully, Key said, no other projects will have to be dropped.

Despite budget cuts for research activities, NIOSH will be allotted 40 more positions in fiscal 1975. Still NIOSH needs additional resources and must contract for some of its surveys, Key said. The average GS level of NIOSH employees is now 7.82.

NIOSH is not the only organization working on the polyvinyl chloride problem, Key stated. Other government organizations, companies, and unions are participating. NIOSH was only alerted to this problem three weeks ago, Key said, adding that NIOSH does not have all of the answers, but it will attempt to handle the problem in a professional manner.

Key said he was hopeful the anigosarcoma problem would remain a small occupational outbreak. He said he hoped the other plants to be investigated would have more open work processes than the Louisville plant, and that workers consequently would have less exposure.

Vernon Rose, assistant director, NIOSH, said the United States produces 25 percent of the polyvinyl chloride in the world. There are 23 plants and 5,000 workers employed directly in the polymerization process. Tens of thousands of workers are involved in subsidiary operations involving use of the product, he said.

The latent period for angiosarcoma involves decades, Rose said. Consequently NIOSH decided it is necessary to compare present work practices with those of the past. A list of some 50 chemicals that have been used over the years was identified and is being checked by NIOSH.

Louisville Plant Operations

The first step of the polymerization process at the Louisville plant involves the unloading of vinyl chloride as a liquid under pressure, Rose said. Vinyl chloride is a colorless gas with an odor threshold of 250 ppm, half of the OSHA maximum exposure standard of 500 ppm. Workers involved in this transfer operation reported smelling the odor many times.

Vinyl chloride is then pumped under pressure to a reactor where other chemicals are added, Rose said. The slurry then flows into a blow-down tank where it is subjected to high heat. Up to that point the substance is in a closed system.

After the substance leaves the blow-down tank, it goes to a blend tank that is covered but not really closed, Rose said. The substance then goes into dryers and is packaged.

Employees must enter and clean the reactor tanks,

Rose said. Because of obvious ill effects from exposure, such as a malady of the fingers, a steam cleaning system was developed. Now the employees only enter after each third batch to scrape the residue off. After each sixth batch employees enter from a more thorough cleaning.

There was a natural background level of vinyl chloride in the plant, Rose said. This was probably the result of various leaks in the system.

In the case of the two OSHA personnel present during the investigation of the Louisville plant, Rose stated that they were there on a fact-finding mission from the national OSHA office, and consequently were not concerned with issuing citations to the Goodrich plant.

NIOSH Recommendations

NIOSH made several recommendations for work practices to the B. F. Goodrich Company and the MCA, Rose stated. The recommendations covered the following areas:

(1) Housekeeping- moderate amounts of resin were found in the plant and NIOSH recommended that they be cleaned up. NIOSH further recommended that the resin be stored in closed containers and that eating facilities for the workers be separated from the work area.

(2) Protective clothing - NIOSH recommended protective clothing, including coveralls, for all employees, and that employees working in the tanks be provided with impervious suits.

(3) Showers - NIOSH recommended that all workers in the polymerization process be required to take showers after leaving work.

(4) Monitoring - NIOSH recommended that monitoring be carried out of the work environment to determine where leaks are occurring. NIOSH further recommended that eight-hour breathing zone samples be made for all employees.

(5) Respiratory protection - NIOSH recommended that all workers in transfer operations be provided with self-contained breathing apparatus and that employees in the tanks be supplied with air-supplied respirators.

Plant Fatalities

Dr. Henry Falk, Center for Disease Control, said he had examined all four cases of angiosarcoma reported at the plant. One of the men had been diagnosed as a victim of cirrhosis of the liver, he said. An autopsy revealed the existence of angiosarcoma.

All four of the victims had non-alcoholic cirrhosis of the liver in addition to the angiosarcoma, Falk said. In addition, he stated, they had no prior history of hepatitis or any other experience that could account for the disease.

NIOSH will be looking for the entire spectrum of diseases that may result from polyvinyl chloride exposure and will conduct studies of records of former workers in polyvinyl plants, he said.

Other Comment

Dr. J. William Lloyd, NIOSH, said that angiosarcoma is an extremely rare disease with a reported 20 to 30 annual deaths in the United States. The National Cancer Institute reports that only 16 of 623 known malignant cancers are classified as angiosarcoma.

Dr. William S. Lainhart, Center for Disease Control,

said the first priority of the investigation will be the study of vinyl chloride in the polyvinyl chloride process to determine the levels of worker exposure and its effects. In addition to that, NIOSH will need to obtain data on the uses of polyvinyl chloride and products that contain polyvinyl chloride.

Dr. Joseph K. Wagoner, NIOSH, said that NIOSH will conduct studies in plants that have had polyvinyl chloride operations for 15 years or more. The study of workers, however, will include workers with varying amounts of time of exposure. NIOSH is now finding the initial study group. NIOSH initiated a telephone survey of polyvinyl chloride plant facilities. The initial survey seems to indicate that most of the polyvinyl chloride facilities are clustered in Ohio, Kentucky, and Pennsylvania.

NIOSH will be looking for the entire spectrum of diseases that may result from polyvinyl chloride exposure. In addition, NIOSH will conduct studies of records of former workers in polyvinyl chloride plants.

Dr. Edward Fairchild, NIOSH, said he would initiate a study of the available literature regarding the toxicological effects of exposure to polyvinyl chloride. One toxicological report based on animal studies will be reported during the Labor Department hearing on February 15.

Health Hazards

MANUFACTURERS CHEMISTS ASSOCIATION STOPS ISSUANCE OF VINYL CHLORIDE SHEET

The Manufacturing Chemists Association announced it has stopped circulation of a chemical safety data sheet on vinyl chloride operations because of four fatalities from liver cancer among workers exposed to the substance at the B. F. Goodrich Company.

The action, taken on MCA Chemical Data Sheet SD-56 (1972), resulted from a report by the company that one of its plants had experienced four fatal cases of angiosarcoma, a rare cancer of the liver (Current Report, January 31, p. 1099). The 1972 sheet called attention to reports that long-term, massive exposure of rats to vinyl chloride vapors had produced malignant tumors of a kind not found in man.

In the 1972 revision of the data sheet, MCA called attention to the reports but added that carcinogenicity to humans had not been observed. The report from Goodrich questions the validity of this statement, MCA stated.

A new vinyl chloride data sheet will be issued by MCA when the carcinogenicity of vinyl chloride to humans has been resolved.

State Plans

NACOSH SUBCOMMITTEE REPORT URGES FEDERAL ENFORCEMENT UNTIL EVALUATIONS

Federal enforcement in states with approved plans should continue until initial evaluations have been conducted, the state plans subcommittee of the National Advisory Committee on Occupational Safety and Health recommended in a report submitted to NACOSH on February 12.

now planning change or believe that there is some probability of its occurrence.

The report may be ordered from The Conference Board, 845 Third Avenue, New York, N.Y. 10022. Prices are \$4.00 for associate members (or for educational purposes) and \$20.00 for nonassociates.

Standards

OSHA RECEIVES TRICHLOROETHYLENE CRITERIA DOCUMENT COMMENTS FROM FIRMS

Numerous reservations were expressed by firms commenting on the criteria document on occupational exposure to trichloroethylene (TCE) issued by the National Institute for Occupational Safety and Health, according to initial comments received by the Occupational Safety and Health Administration.

The NIOSH document, issued last July (Current Report, August 2, p. 254), proposed a limit for worker exposure to TCE of not more than 100 parts per million (ppm) as a time-weighted average exposure for an eight-hour workday and a peak concentration to TCE of not more than 150 ppm. Among 11 firms and agencies which commented initially on the document, only two rejected the proposed limit completely.

However, there were numerous reservations about parts of the document. Sections receiving the most comment and recommendations for changes included sampling and analysis, medical surveillance, labeling, monitoring and recordkeeping requirements, work practices, personal protective equipment and clothing, and sanitation practices. In general, objections to these sections were based on claims that procedures or requirements in the document were redundant or unnecessary.

Workplace Exposure

Bethlehem Steel Corporation and Organization Resources Counselors, Inc., questioned the need for a peak exposure limit of 150 ppm. The firms recommended consideration of a peak ceiling of 200 ppm as justifiable under the data utilized by NIOSH in the criteria document.

American Telephone & Telegraph Company outlined a surveillance protocol for exposure to TCE divided into four risk categories with requirements for frequency of medical examinations and environmental monitoring based on levels of exposure above 100 ppm. Deletion of the 10-minute minimum sampling time for measurement of occupational exposure was recommended also. Dow Chemical U.S.A. concurred in the deletion of the 10-minute period and recommended a time measurement based on industrial hygiene analysis.

National Starch and Chemical Corporation recommended that some consideration be given in the document to exposures between 50 ppm and 100 ppm with respect to frequency of exposure. Such consideration would cover industries in which TCE is used infrequently in the manufacture of a product that is not made every day, the firm claimed.

The Department of Defense recommended that exposure criteria be supplemented to exclude from the

standard intermittent work procedures where TCE levels do not exceed the workroom standard and which occur on not more than five working days a month.

Major Objections

PPG Industries, Inc., objected to the publication of a standard on TCE without simultaneously publishing similar standards on perchloroethylene, methylene chloride, and 1,1,1-trichloroethane. The objection was based on the fact that all of the solvents are used in vapor degreasing operations and that publication of a standard for TCE alone would be discriminatory.

Detrex Chemical Industries, Inc., recommended that standards for all the vapor degreasing solvents should be issued at one time, including fluorinated hydrocarbons. The firm stated that no standard should be issued until OSHA has complete recommendations from NIOSH on solvents used in the vapor degreasing process.

Hooker Chemical Corporation stated that the data in the criteria document does not support a change in the present standard for exposure to TCE. The firm recommended also that standards should be issued at the same time for all four solvents used in the degreasing process.

Standard Support

Although many detailed changes were recommended in the comment, Dow Chemical U.S.A. "strongly supports" the standard proposed by NIOSH. The comment added, "such a standard is necessary for the widely varied operations within both the manufacturing and consuming industries."

Dow Chemical noted, however, that major anticipated costs of implementing the medical surveillance, monitoring requirements, personal protective clothing, and recordkeeping requirements of the document would total \$11 million. In an effort to reduce these costs, the firm recommended tri-annual medical exams, annual monitoring, deletion of the monthly monitoring requirement, and improvement in the protective clothing requirement. Dow Chemical claimed that these steps could reduce the costs of compliance to approximately \$4.5 million.

Standards

OSHA RECEIVES COMMENTS ON GROUND FAULT CIRCUIT INTERRUPTOR DEVICES

The majority of firms commenting on the proposed requirement for ground fault circuit interruptors (GFI's) in the construction industry urged delay in issuing the rule until practical, safe trip values can be developed, according to responses received by the Occupational Safety and Health Administration.

The requirement, originally scheduled to become effective on January 1, would require the use of GFI's in all 15 and 20 ampere receptacle outlets on single-phase circuits. At the request of the National Constructors Association, the original effective date was suspended and a public hearing is scheduled on February 26 in Washington, D.C. (Current Report, December 13, p. 898).

The basic attitude of firms which recommended suspension or postponement of the effective date is that there