PB89-120216

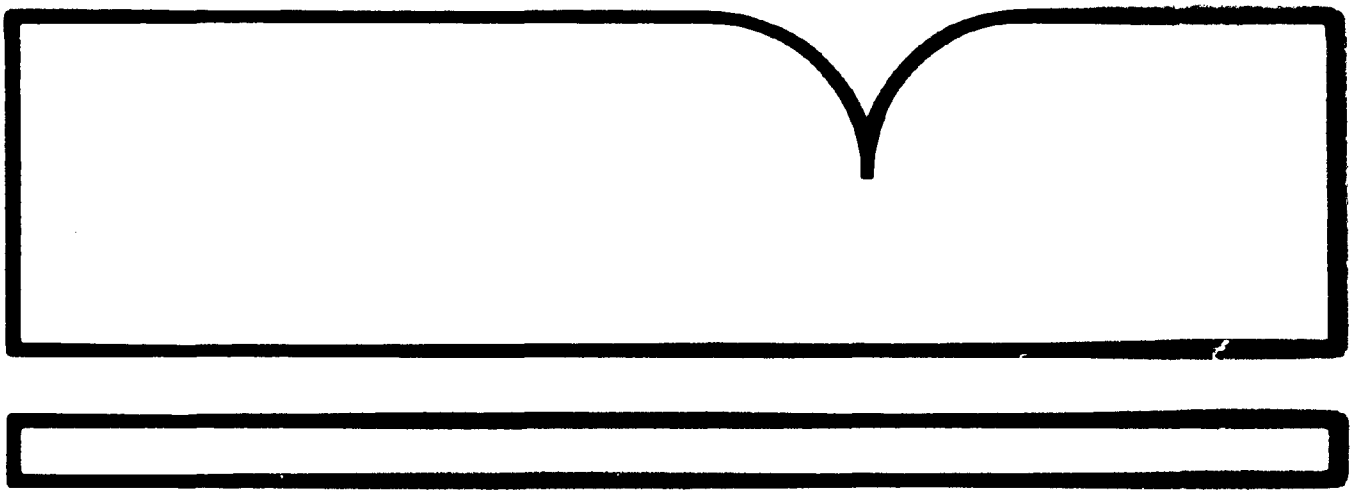
Walk-Through Industrial Hygiene Survey Wood Preservative Treatment Facility Bell Lumber and Pole New Brighton, Minnesota, June 27, 1979

Stewart-Todd Associates, Inc., Wayne, PA

Prepared for

National Inst. for Occupational Safety and Health, Cincinnati, OH

4 Sep 79



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IWS-110.14.10
Region-5

PB89-120216

INDUSTRIAL HYGIENE REPORT

WALK-THROUGH SURVEY OF WOOD PRESERVATIVE TREATMENT FACILITY

at

BELL LUMBER AND POLE
New Brighton, Minnesota

Survey conducted by

Stewart-Todd Associates, Incorporated

June 27, 1979

Report written by

Alan S. Todd
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Report Date

September 4, 1979

Industrial Hygiene Section
Industrywide Studies Branch
Division of Surveillance, Hazard Evaluations and Field Studies
National Institute for Occupational Safety and Health
Cincinnati, Ohio

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO.	2.	3. Recipient's Accession No.
			7AS

4. Title and Subtitle
Industrial Hygiene Report, Walk-Through Survey of Wood Preservative Treatment Facility, Bell Lumber and Pole, New Brighton, MN., June 27, 1979.

5. Report Date
September 1979

6.

7. Author(s)
Todd, A., and Timbie, C.

8. Performing Organization Rept. No.
IWS-110-14-10

9. Performing Organization Name and Address
NIOSH
4676 Columbia Parkway
Cincinnati, Ohio 45226

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C) 210-78-0062
(G)

12. Sponsoring Organization Name and Address
NIOSH
4676 Columbia Parkway
Cincinnati, Ohio 45226

13. Type of Report & Period Covered

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

A preliminary survey of the Bell Lumber and Pole Company in New Brighton, Minnesota, was conducted on June 27, 1979. Process methods, potential or known exposure conditions, and test sampling methods were assessed to determine if a comprehensive investigation was needed to evaluate long term health effects associated with wood preserving. Fifteen of 27 employees at the facility treat utility poles with pentachlorophenol (PCP) using a nonpressure thermal process. Employee training and work practices, the occupational educational program, historical data, and results of safety and health monitoring were evaluated. General air sampling was conducted during regular operations at sites of potential exposure in order to evaluate different air sampling methods, define analytical limitations, and obtain a range of exposure levels during critical short term tasks. PCP concentrations were measured at 0.13 to 0.36 milligrams per cubic meter (mg/cu m) using a NIOSH procedure, and 0.27 to 1.33 mg/cu m using a silica gel method. Airborne levels of PCP over a treatment tank decreased during the afternoon sampling period possibly due to wind effect. The authors conclude that differences in results using the NIOSH procedure and the silica gel method could not be explained adequately because of the limited data obtained.

17. Document Analysis a. Descriptors

NIOSH-Survey Pentachlorophenol Wood-Preserving Lumber-Industry Coatings

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement:
AVAILABLE TO THE PUBLIC

19. Security Class (This Report)
Unclassified

21. No. of Pages
16

20. Security Class (This Page)
Unclassified

22. Price
A03 $13.75

(See ANSI-Z39.18) See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

PURPOSE OF SURVEY:	This walk-through survey was conducted as a part of the Phase II study of the INDUSTRIAL HYGIENE ASSESSMENT OF NEW AGENTS - III, NIOSH Contract No. 210-78-0060. Specifically, this survey was for the first group which includes all agents used in wood preserving. This facility was selected on the basis of the criteria set forth in the Study Proposal from information gathered in Phase I.
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EMPLOYEE REPRESENTATIVES CONTACTED:	Larry Haselius, Union Steward Jake Albright, Union Representative (612)-633-4334 International Woodworkers of America Local #4-150
ACKNOWLEDGMENTS:	James L. Oser, NIOSH Battelle Columbus Laboratories (Richard E. Heffelfinger, Ph.D.)
STANDARD INDUSTRIAL CLASSIFICATION OF PLANT:	SIC #2491 Wood Treater (Utility Poles)

CONTENTS

ABSTRACT

A preliminary survey of the Bell Lumber and Pole Company, New Brighton, Minnesota, wood treatment plant was done as a partial fulfillment of obligations to the National Institute for Occupational Safety and Health under Contract No. 210-78-0060. "Industrial Hygiene Assessment of New Agents - III." The field site visit of June 27, 1979 provided familiarization with current and past pole processing methods, materials, and controls utilized to reduce exposure. Employee training and work practices, as well as general occupational educational efforts were evaluated along with any historical data and experience from safety and health monitoring. Range finding general air sampling was conducted during regular operations at sites of potential exposure in order to evaluate different air sampling methods, define analytical limitations and obtain a range of exposure levels during critical short-term tasks. The PCP air monitoring results varied from 0.13-0.36 mg/m^3 by the NIOSH procedure and were 0.27-1.33 mg/m^3 for the silica gel method. Due to the limited data obtained, the differences between the methods cannot be adequately explained.

INTRODUCTION

Stewart-Todd Associates, Incorporated, in conjunction with the National Institute for Occupational Safety and Health, under Contract No. 210-78-0060, "Industrial Hygiene Assessment of New Agents - III," conducted a preliminary industrial hygiene survey at Bell Lumber and Pole Company, New Brighton, Minnesota, June 27, 1979. This plant seasons, prepares and treats utility poles with Pentachlorophenol (PCP) using a non-pressure thermal process. The plant was selected from the group of non-pressure treaters as being representative of a midwestern processing facility which uses the basic Penta oil thermal immersion system.

The purpose of the preliminary survey is to gain familiarity with process methods, potential or known exposure conditions, and test sampling methods and determine the need for comprehensive field investigations to evaluate long-term health effects associated with this type of wood treatment method. The information obtained through this research effort will be utilized in technical reports on the wood preservative industry.

DESCRIPTION OF THE FACILITY

Bell Lumber and Pole New Brighton plant began processing poles and lumber on a 21½ acre stie in 1920. The plant initially

used creosote for butt-treating poles. In the 1940's, two horizontal full-length immersion tanks, 82 and 89 ft. in length, were built for additional capacity and PCP treatment was started. Another full-length immersion tank, 12 x 12 x 102 ft, was fabricated in the 1950's and is presently the primary tank being used for treating. The older horizontal tanks (32 ft. and 89 ft.) are used for sludge storage and occasional treatment (about 2 times per year) respectively. Creosote treating was discontinued in the early 1960's and the PCP oil system is the only preservation method currently used.

Poles are received primarily from other company facilities in Canada. Western Red Cedar is the predominate wood treated (90% of the poles), but Western Larch, Douglas Fir, and Pine are also used depending on market factors and the customer's requirements. All of the wood treating, both past and current, is done outdoors. The plant treats approximately 15,000 poles per year. They have a reclamation program in which used Cedar poles are returned to the plant by utilities for retreatment and further use.

DESCRIPTION OF WORKFORCE

A total of twenty-seven (27) are employed in the New Brighton plant, fifteen (15) if these work in the yard on pole preparation and treatment. Throughout the past twenty years, mechanization has reduced the yard crew size by two or threefold. A limited shutdown may occur during severe winter weather. Pole production is done on a single shift, five days per week. Most of the yard crew are engaged in pole storage, movement, peeling, incising

framing, drilling, inspection, and final hand cleanup with draw knives to remove residual bark and rot areas prior to treatment. Treating is done five days per week on essentially two shifts. There are three treater operators, one on night shift and two during the day. The night man may work longer than 8-hours, if needed to complete his tasks, etc. They are responsible for maintaining treatment solution levels in the tanks, controlling length of treatment cycle, operating boilers and minor maintenance. Other yard personnel assist in filling and unloading poles from the treatment tanks.

All the hourly employees are members of the International Woodworkers of American (Local No. 4-150). No women are currently employed in the yard crew, nor have any worked there in the past.

DESCRIPTION OF PROCESS

Poles, peeled and partially seasoned, are received by rail car. They are graded and stored in piles to continue air-drying, prior to the final peeling, incising, drilling and framing, which is followed by the preservative treatment. Most poles are taken from the storage area and processed to meet a specific customer's order. Only a limited number are treated for storage in site and sale on the open market. However, the plant does maintain a treated pole storage yard for local utilities.

Poles, after being re-peeled for more uniform taper and removal of excess bark and sapwood, are incised, 4 ft. below and 2 ft.

above estimated ground level. Gains are cut in the poles to be used for cross arms and holes are drilled to the utility customer's specifications. Final visual inspection and cleanup with draw knives are done to remove rot areas and residual bark, prior to treatment.

The treatment tank is loaded with poles late in the day shift. Cross beams used to keep the poles immersed, are put in place followed by the tank steel covers. Hot PCP-oil (190-225^{o} F.) is introduced to completely cover the poles and this treatment phase continues for 6-9 hours. Initially, steam is emitted as water vapor from the sapwood is boiled out. This results in a partial cell vacuum enhancing the pentration of the cold oil PCP treatment. The hot oil is replaced with cold oil at approximately 125^{o} F. for the remainder of the night. The solution in the tank is pumped out to storage by the day treating engineer. Occasionally, poles longer than 102 ft. are treated, and this requires two days; i.e., one day for each end immersed.

Poles are inspected as they are removed from the treatment tank and checked for quality control to determine PCP penetration and concentration prior to release for shipment or storage on site. The inspections and borings are done by an independent agent, Adams Engineering Company and by utility company representatives. They can be done either in the tank or after removal, depending on how quickly the poles are being shipped from the yard.

PCP is purchased from Reichhold Chemical in 1000 and 2000 lb. blocks. The plant has also utilized the Dow EC-7, in block form, and still has some on hand. The oil carrier is supplied by Ashland Oil and is a P-9 grade (approximately No. 3 Diesel Oil) with a boiling range of 380-695° F. It is less than ½% sulfur and somewhat aromatic in appearance. It should be relatively free of 4-5 ring polynuclears which initially distill at 700° F.

DESCRIPTION OF PAST EXPOSURES

Accidents and illnesses have been primarily traumatic injuries from poles or equipment; cuts, bruises, etc. They have no indications of health effects from treatment chemicals except for the typical skin photosensitization reaction from creosote treating, during the years when they used that process method.

Sound level measurements of the plant areas and equipment have been done by their compensation carrier, American Mutual Insurance Company. Hearing protection is utilized at some work stations and equipment. Some sound attenuation has been done to reduce exposure in vehicles and at some operator stations.

DESCRIPTION OF MEDICAL, INDUSTRIAL HYGIENE, AND SAFETY PROGRAMS

Presently, the plant has no formalized medical program. Pre-employment examinations are not done because most applicants are relatively young men and the employee turnover rate is low. Employees who remain more than a few years tend to stay until retirement. A few additional workers, typically college students,

are hired in the summer season to fill in for vacations, etc. There is not a plant physician on retainer and the emergency room facilities, five minutes from the plant, as Unity Hospital are used.

No airborne sampling for treatment materials has been conducted to date, either through the insurance carrier or regulatory agencies, state, or federal. The plant did, however, have an OSHA inspection in 1974 or 1975.

Ventilation is used for dust and chip collection in the chipping facility. Wood chips are collected and sold to a dealer who trucks them away. No other ventilation for exhaust control purposes or cooling are used in the yard areas.

The plant has a joint management-union safety committee which discusses potential problems and establishes plant policy. Formerly, it met once per month, but at the present time meetings are scheduled as the need is identified. All production personnel must attend these meetings.

The plant requires hardhats in the yard area and encourages the use of safety shoes or boots by paying part of the costs for such equipment each year. Eye protection is encouraged but not mandated. Protective plastic shields have been installed in some operations, to minimize the potential for injury from flying chips or wood shavings. The plant does not stock or use respirators at the present time since most of the facility is outdoors and

few significant exposures are anticipated by the management and work force.

New employees receive informal training on safety hazards for their job or area and further employee educational efforts are through the joint union-management meeting. The company is active in the Minnesota Safety Council and has records of accident frequency but not severity.

A lunch room is provided away from the treatment plant in the general pole processing area. Employees are encouraged to washup before lunch and when leaving the plant. Street clothing is worn on the job and protective equipment such as gloves and goggles are available. The use of such equipment is generally optional. If clothing become soiled with treatment materials, employees are encouraged to change. There are no emergency showers or eye wash facilities at the treatment building in the event of a splash or spill because past experience has not indicated the need.

INSPECTION OF THE PLANT

An industrial hygiene walk-through survey of the treatment and pole preparation yard was conducted following the preliminary discussions with plant personnel. Mr. Tom Doten, Plant Manager, provided the basic description of the process equipment, areas and flow pattern. Personal protective gear and supplies were evaluated along with a review of plant work practices and personal hygiene.

Area air sampling was conducted during the treatment cycle. The plant had modified their operating schedule in order to run the treatment process during the day shift so air sampling could be done. Two air sampling methods were being compared and therefore, relatively high air concentrations of PCP were desired in order to collect sufficient material within the short sampling period. Two sets of samples were taken on the lid of the treating tank adjacent to the opening used by the operator to observe the level of PCP oil solution. They represent potential maximum peak exposures when the operator is in this area. One set of samples was taken in the pump room which is located below ground level at the end of the treatment tank. The operator spends a relatively short period of time in this area, but the room is a warm, semi-confined space, and has only minimal natural ventilation. A small leak could quickly create a condition of significant exposure in this area.

DESCRIPTION OF SURVEY METHODS

The recommended NIOSH impinger sampling and analytical procedure S-297, and a silica gel adsorption method were used for collecting airborne PCP. Bendix BDX-41, MSA Model S, and Bendix, C-115 air sampling pumps, pre- and post-calibrated with a Universal Pump Calibrator, Model 302, were operated at flow rates approximately 1.5 liters per minute (LPM) for the NIOSH method and 0.5 LPM for the silica gel tube.

The sampling train for the NIOSH procedure included a pre-filter of 0.8 micron Millipore type AA filter, supported by a stainless steel screen in a three-piece cassette, and connected in series with a midget bubbler containing 15 mls. of ethylene glycol. This was followed by a second empty midget bubbler acting as a trap to protect the sampling pump from solvent splashover or condensation. When the sampling period was completed, the filter was removed from the cassette and added to the bubbler of ethylene glycol in order to prevent sublimation of any of the collected PCP. The samples were analyzed by a high pressure liquid chromatograph with an ultra-violet detector. The lower limit of PCP detection by this method is 12.5 micrograms per sample.

PCP collected on large size silica gel tubes (260/520mg) was desorbed with methylene chloride and analyzed using gas chromatography and a flame ionization detector. The lower limit of detection by this analytical method is 20 micrograms PCP per sample. For two of the sampling trains a prefilter (Millipore 0.8 micron) was added in order to determine if there was any airborne particulate PCP. At the end of the sampling period, the filter was removed from the cassette, submerged in a jar containing ethylene glycol and later analyzed by the NIOSH method.

RESULTS

The air samples collected on top of the treating tank during the initial phases of treatment in the morning showed airborne PCP concentrations of 0.36 milligrams per cubic meter (mg/m^3) by the NIOSH method and 1.33 mg/m^3 using the silica gel tube. The PCP levels in the second set of samples taken at the same location during the afternoon were 0.13 mg/m^3 for the NIOSH procedure and less than 0.27 mg/m^3 for the silica gel tubes. The samples collected in the pump room were 0.34 mg/m^3 by the NIOSH method and less than 0.34 mg/m^3 for the silica gel tube.

ANALYSIS AND DISCUSSION

The monitoring results represent potential peak exposures for the treater operator during the treatment cycle on the day of the survey. PCP levels for the first set of samples collected at the treating tank were significantly different by the two sampling procedures. The other sets of samples also varied, but to a lesser degree. Since the silica gel data for the later samples was below the limits of analytical detection, a valid comparison of the two methods is not possible. The differences cannot be adequately explained with the limited data collected. The silica gel/prefilter sample taken in the morning at the treating tank indicated that approximately 90% of the PCP was collected on the filter. This suggests that either there is a

significant portion of particulate PCP present or at the low air sampling rate (one-third of the NIOSH air sampling rate), the vapor phase PCP is being absorbed on the filter. The other silica gel/prefilter sample showed PCP levels below the limits of detection for both the silica gel tube and prefilter. Therefore no further conclusions can be drawn concerning the presence of particulate PCP.

According to the analytical results, airborne levels of PCP over the treating tank decreased during the afternoon sampling period. This, however, may have been affected by wind direction since these were "area" samples taken at only one location.

BELL LUMBER AND POLE
New Brighton, Minnesota

APPENDIX A
ANALYTICAL RESULTS - PRELIMINARY WALK THROUGH
NIOSH CONTRACT NO. 210-78-0060

Survey Date: 6/27

SAMPLE DESCRIPTION	PUMP# SAMPLE#	SAMPLING TIME (min)	FLOW RATE TOTAL AIR VOLUME	COMPONENT	CONCENTRATION µg	CONCENTRATION mg/m³
Area Sample - Taken on top of treating tank adjacent to lid opening during addition of hot oil and treatment cycle	C115-#1 IMP Prefilter BELL-01	9:20a-12:25p 185 min.	1.49 LPM liters 0.276 m³	Pentachlorophenol	100	0.36
	BDX-82 Prefilter BELL-02 Silica gel	9:20a-12:25p 185 min.	0.53 LPM 0.098 m³	Pentachlorophenol	115	
				Total	15.8 130.8	1.33
Area Sample - in pump room (below ground level) Operator goes down here occasionally	MSA-#1 IMP Prefilter BELL-04	9:25a-12:27p 182 min.	1.52 LPM 0.277 m³	Pentachlorophenol	93	0.34
	BDY-116 Prefilter BELL-03 Silica gel	9:25a-12:27p 182 min.	0.53 LPM* 0.096 m³	Pentachlorophenol	< 12.5	
				Total	< 20.0 < 32.5	<0.34
Area Sample - Same location as BELL-01 and 02. During treatment cycle	MSA-#1 IMP Prefilter BELL-05	12:27p-2:52p 145 min.	1.52 LPM 0.220 m³	Pentachlorophenol	29	0.13
	BD-82 No prefilter BELL-06 Silica gel	12:57p-2:53p 116 min.	0.64 LPM 0.074 m³	Pentachlorophenol	< 20	< .27

*A hole in pulsation damper was discovered during post-calibration. Total air volume sampled may