50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. 210-78-0060	2. NA	3. Recipient's Accession No. PB82 179771

4. Title and Subtitle
Industrial Hygiene Report, Preliminary Survey of Wood Preservative Treatment Facility at Kerr-Mcgee Chemical Corporation Forest Products Division, Texarkana, Texas

5. Report Date
October 1979

6. NA 075186

7. Author(s)

8. Performing Organization Rept. No.
NA

9. Performing Organization Name and Address
Stewart-Todd Associates, Inc.

10. Project/Task/Work Unit No.
NA

11. Contract(C) or Grant(G) No.
(C) 210-78-0060
(G)

12. Sponsoring Organization Name and Address
NIOSH, Industrial Hygiene Section, Industry-wide Studies Branch, Division of Surveillance, Hazard Evaluations, and Field Studies, Cincinnati, Ohio

13. Type of Report & Period Covered
Industrial Hygiene Report
October 1979

14. NA

15. Supplementary Notes

NA

16. Abstract (Limit: 200 words)

Working conditions at the Forest Products Division of Kerr-McGee Chemical Corporation (SIC-2491) in Texarkana, Texas were surveyed on October 9, 1979. Air samples were collected by OSHA and by the corporate industrial hygienist. Personal air samples were collected for wood treatment operators and locomotive and yard crews. Area samples were taken from the transfer and vacuum pumps used for creosote (8021394) and petroleum-oil ( ) treatment, from steam line valves, and from bundles of treated ties. The company employed 60 persons, 34 of whom were production or treatment operators. Basic safety and hygiene guidelines, hygiene monitored safety surveys, preemployment examinations, and protective equipment were provided by the company. A trained first-aid person provided emergency care and local hospitals provided additional care as required. No valid measurements for creosote samples at the cylinder doors, cylinder pressure pumps, or at bundles of wood ties were recorded due to an undetermined analytical or interference error. Coal tar pitch volatiles were 0.59 and 0.23 milligrams per cubic meter at the wood tie bundles and steam line valves in the treatment building, respectively. The samples did not represent 8 hour time weighted averages.

17. Document Analysis a. Descriptors

Wood-tar-creosote, Woodworkers, Air-pollutants, Air-sampling, Worksites, Safety-measures

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) NA	21. No. of Pages 12
Available to Public	20. Security Class (This Page)	22. Price

(ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77)

PB82-179771

INDUSTRIAL HYGIENE REPORT

PRELIMINARY SURVEY OF WOOD PRESERVATIVE TREATMENT FACILITY

at

KERR-MCGEE CHEMICAL CORPORATION
Forest Products Division
Texarkana, Texas

Survey Conducted by
Stewart-Todd Associates, Incorporated

October 9, 1979

Report written by
Alan S. Todd
Cynthia Y. Timbie

Report Date

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

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 criteria set forth in the Study Proposal based on information gathered in Phase I.
EMPLOYER REPRESENTATIVES CONTACTED:	B. H. Compton, Manager (214) 794-5169 C. L. Russell, Industrial Hygienist Kerr-McGee Center (405) 270-2526
EMPLOYEE REPRESENTATIVES CONTACTED:	Charles Bradley United steelworkers of Am., Local #13224 Shop Stewart
ACKNOWLEDGEMENTS:	James L. Oser, NIOSH Battelle Columbus Laboratories (Richard E. Heffelfinger, Ph.D.)
STANDARD INDUSTRIAL CLASSIFICATION OF PLANT:	SIC #2491 Wood Preserving

ABSTRACT

A preliminary survey of Kerr-McGee Chemical Corporation's Texarkana, Texas wood treatment plant was done as 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 October 9, 1979 provided familiarization with current and past process methods and controls utilized to reduce occupational hazards. Employee classifications and accident prevention programs were reviewed and evaluated along with historical data and experience from air monitoring. Range finding air sampling was conducted at potential employee exposure sites to evaluate airborne levels of the treatment chemicals used. Air samples were collected in the treatment building, at the cylinder door opening, and on the bundles of treated wood that had been removed from the cylinder, following creosote treatment. Due to the significant cyclohexane extractable blank filter value, air concentrations either could not be calculated or the validity of the results is uncertain.

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 the Kerr-McGee Chemical Corporation, Texarkana, Texas, wood treatment plant on October 9, 1979. This plant purchases and processes mixed hardwoods and pines for treatment and sale as railroad ties, poles, and dimension lumber using Creosote and Pentachlorophenol pressure systems. It was selected as being representative of a large diversified Southwestern United States pressure treating facility.

The purpose of the preliminary survey is to gain familiarity with process methods and potential or known exposure conditions; evaluate test sampling methods; and determine the need for comprehensive field investigations to further evaluate long-term health effects associated with the materials of concern; i.e., Creosote and Pentachlorophenol. The information obtained through this research effort will be utilized in technical reports on the wood preserving industry.

DESCRIPTION OF THE FACILITY

The Kerr-McGee Texarkana wood treatment plant was purchased from Moss-American, a subsidiary of Kerr-McGee, in 1974. The original owner, International Creosote and Construction Company, built the facility in 1901 and maintained treatment operations until 1969 when it was acquired by Moss American. The plant is located on a 200-acre site with an additional adjoining 240 acres for possible expansion purposes.

The plant has three pressure treatment cylinders. Poles and dimension lumber are treated with Pentachlorophenol (PCP) in a 9½' x 165' pressure cylinder. Creosote treatment of bridge timber, railroad ties, and poles is done in two cylinders, one of which is 8½' x 80' and the other is 9½' x 165'. The current total treated wood output is 275-300,000 cubic feet of material per month.

The facility includes a treater building, boilerhouse, bulk storage tanks, and adjacent yard area where the treated bundles are unloaded from tram cars. The pressure cylinders are partially housed in the treatment building; all cylinder doors, however, open outside. The processing area includes one main building for adzing and boring, with three or four smaller buildings used for offices, storage, lunchroom, lockers and showers.

The plant has always used creosote for wood treatment. The year when PCP was first used was not known with certainty. The only major addition to the plant during recent years occurred in 1977, with the installation of an automated storage hopper/feed system to prepare the PCP-oil solution. Prior to 1977, 50-pound bags of PCP were manually dumped into a hopper and fed to an air agitated mix tank via a conveyor line.

DESCRIPTION OF WORKFORCE

Currently, the plant employees 60 people; 29 are production workers, 5 are treater operators, and the remainder are supervisory and office personnel. Treatment is conducted on two twelve-hour shifts, 5 days per week, with two operators and a helper on day shift and one operator and helper on night shift. The treater operators are assisted by yard personnel in loading and unloading cylinders and moving treated lumber as needed during the day. The production people typically work an 8 to 10-hour day. They handle the wood processing, such as adzing and boring, and raw material storage and shipment.

The treating facility has an A-Operator on each shift. He is responsible for checking specifications of the material to be treated, gauging, operating pressure pumps, checking boilers, and the preparation of treatment chemicals. On day shift there is one B-Operator who assists the A-Operator in pumping out the tanks, operating the cylinders and mixing the treatment materials.

There are two Cylinder Helpers, one on each shift. They basically handle the cylinder door opening and closing and general cleanup. The helper on night shift also assists the A-Operator with his duties.

Minor leaks, pump adjustments and small maintenance tasks are done by the treating operators. A separate Maintenance crew has responsibility for major repair work on cylinders, lines, and pumps.

All the plant employees are members of the U.S. Steelworkers Union, Local #13224. There are no women currently employed in any of the wood treatment areas or facilities.

DESCRIPTION OF PROCESS

Poles and cross ties are received from producers already peeled and cut to size. The poles are brought in by rail or truck, unloaded by forklift, stacked, and sorted by size into 20' to 90' lengths. As customer orders are collected, sufficient for a charge, burdles of poles are loaded onto tram cars and pushed into the cylinders. They are treated either with Pentachlorophenol, as a 7½% solution in light oil, or with 100% creosote. The treatment process includes an initial 16-17 hour steaming cycle to remove excess moisture, a vacuum treatment for a period of 1½ to 3 hours, and a final vacuum to remove the excess liquid from the treated wood surface. The entire operation requires 23-24 hours. Creosote is used at 175-200° F.; whereas, PCP is utilized at

at ambient temperatures. At the completion of the treatment cycle, the charge is removed from the cylinder, unloaded, sorted, and shipped or stored in the yard depending on customer specifications or product demand.

Cross ties are received by truck, unloaded, sorted by wood species, sized, and stacked for air drying. As the seasoning period of 7 to 12 months is completed, the ties are moved to the main processing building for adzing and boring according to individual customer orders. When the tram cars are loaded, the charge is moved into the cylinder by the locomotive crew. Cross ties are treated with 70/30 or 50/50 creosote/heavy petroleum oil solutions for 5-9 hours by the Rueping or Lowry process. Some customers request green ties which require 12-15 hours of Boultonizing prior to treatment.

Lumber comes to the plant already processed and ready for penta treatment. Bridge lumber is either air-dried in the yard, followed by treatment with creosote or treated green. Typically, an 8-9 hour treatment cycle is required in order to obtain a 16 lbs/cu. ft. creosote concentration.

PCP is received as a glazed flake in bulk trucks from Vulcan Materials. It is air-conveyed through a closed system to a hopper from which it is automatically mixed with light pertoleum oil and pumped to storage. 100% creosote is obtained from Allied Chemical and U.S. Steel by truck or rail car. The 70/30 creosote/heavy petroleum oil is purchased already prepared but the 50/50 solution is mixed on site in a work tank and pumped to storage.

DESCRIPTION OF PAST EXPOSURES

Air monitoring data for the treatment facility was first conducted in December, 1978 by Kerr-McGee's Corporate Industrial Hygiene staff. Personal breathing zone (BZ) sampling for Coal Tar Pitch Volatiles (CTPV) was done, and air concentrations ranged from 0.02 to 0.09 mg/m^3. These levels are all less than 50% of the current regulatory limits. OSHA staff conducted survey work at the plant in June, 1979 which included personal CTPV sampling of the treatment operating personnel and some of the locomotive and yard crew. Concurrent air monitoring was conducted by the company Industrial Hygienist. The 8-hour Time-weighted Average (TWA) concentrations ranged from 0.02 to 0.08 mg/m^3. OSHA's employee exposure measurements varied from 0.02 to 0.03 mg/m^3.

According to plant management, there have not been any significant occupational illnesses related to any of the treatment chemicals. Skin photosensitization, typically resulting from creosote contact exposure, has been minimized at the Texarkana treatment facility by use of barrier skin creams, particularly recommended for use by new employees.

DESCRIPTION OF MEDICAL, INDUSTRIAL HYGIENE AND SAFETY PROGRAMS

The Kerr-McGee Forest Products Division provides the basic industrial hygiene and safety guidelines for the Texarkana plant.

Industrial hygiene monitoring has been performed by the company's Corporate Industrial Hygienist, Mr. C. L. Russell, since 1978.

Mr. Howard Rader, Safety Engineer with the Forest Products Division, conducts periodic safety surveys at the plant. He holds formal supervisor and plant-wide safety meetings during his visits. The plant Manager, Mr. B. H. Compton, and the supervisors are responsible for handling safety problems and/or questions in the interim periods.

Pre-employment medical examinations are conducted on employees, but no periodic evaluations are done. Routine services and emergency treatment are provided at either the Wadley Hospital or St. Michael's Hospital in Texarkana. To date injuries have been primarily limited to contusions, back or leg sprains, hand cuts and similar accidents. There is no physician or nurse at the plant. However, a trained First-aider who is responsible for providing any emergency treatment on site is available during the each shift.

The treating operators and helpers are supplied with gloves, rain gear, and boots, for use as needed. Safety glasses and hardhats are required throughout the plant. Written procedures for cylinder entry and respirator use were developed for emergency situations requiring cylinder entry. Norton full-facepiece cartridge respirators (760 Series) are provided for cylinder entry. An emergency eyewash and shower is centrally located in the boiler house for use by treater and yard personnel.

A uniform service is available to employees throughout the plant; but, in most instances, is not utilized by the treating oeprators. The plant has showers and change-room facilities which are used

at the employees' discretion. Typical lunch break for the yard crew is one-half hour from 12:00 to 12:30 p.m. Treating operators, however, take their meal break, as time permits, in the air-conditioned Control Room.

INSPECTION OF THE PLANT

An industrial hygiene walk-through survey of the treatment facility was conducted following preliminary discussions with plant personnel. Mr. B. H. Compton, Plant Manager, and C. L. Russell of Kerr-McGee's Corporate Industrial Hygiene staff provided the basic description of the treatment equipment, process flow, and other details. Personal protective gear and supplies were examined along with a review of employee work practices and personal hygiene.

Air monitoring was conducted in the treatment building adjacent to transfer and vacuum pumps used for creosote/petroleum oil treating on the day of the survey. During the Area Sampling there was a large leak at B pump which the treating and maintenance personnel were working to repair. The leak represented unusual conditions, therefore, monitoring in the treatment room represented an abnormal situation. Some employees used gloves; while otners did not. In correcting the leak and cleanup afterward, some of the workers' clotning, gloves, or bare hands became contaminated with Creosote. Cleanup of contaminated skin was done after the leak was corrected and the area secured. During the leak defined eye irritation was noted by the survey team.

The air concentrations measured are indicative of possible peak exposure levels during pump leaks and repair situations. However, it should be noted that the monitoring equipment was placed approximately 6 feet from the actual spill source. They could not be set up any closer because of space limitations to provide maneuverability for the workers during the cleanup.

Air monitoring was also conducted during the removal of treated railroad ties from the Creosote B Cylinder. A sample was taken adjacent to the cylinder door after the charge was removed and continued until the next charge was added and the door was closed. The treating operator and helper on this cylinder used an automatic air wrench to remove the bolts on the cylinder door, which typically takes 30-40 minutes. The operators were wearing boots, hardhats, and safety glasses during these tasks. One employee also wore gloves.

Another sample was taken on bundles of treated wood after the charge was removed from the cylinder, and the ties were being loaded into adjacent railcars by crane. Both the crane crew and treater helper assisting in the transfer operation used gloves to minimize skin contact with the treatment chemicals. No respiratory protection was utilized by any of these workers. Based on air sampling by management, respirator protection is not required for any of these jobs.

DESCRIPTION OF SURVEY METHODS

The NIOSH sampling and analytical method P & CAM 217 was utilized for evaluating airborne levles of creosote. Bendix BDX-41 and MSA Model S air sampling pumps, pre- and post-calibrated with a

Universal Pump Calibrator, Model 302, were operated at flow rates of 1.9-2.1 liters per minute (LPM). The sampling train included a glass fiber, type A, prefilter and an 0.8 micron silver membrane filter with a cellulose back-up pad in a 37 mm, 3-piece closed-face cassette. The filters were analyzed by cyclohexane extraction, evaporation, and gravimetric determination of the residue.

RESULTS

The creosote samples collected in the treatment building, at the cylinder door opening, and on the bundle of treated wood showed spurious results. The blank filter used in the gravimetric analysis had significant levels of extractable material.

The area samples collected in the treating building at the C Cylinder pressure pump and at the open cylinder door contained 0.133 and 0.103 mg cyclohexane extractables, respectively. The Blank value, however, showed 0.148 mg of material. Therefore, no valid air concentrations can be calculated for this series of samples.

The other area samples collected in the treatment building adjacent to the steam line valves and a second sample taken on the bundle of treated ties contained 0.085 mg and 0.092 mg extractables after subtracting the high blank. This corresponds to 0.23 mg/m^3 and 0.59 mg/m^3 CTPV, respectively. Samples were of short duration, 174 and 31 minutes, respectively, and do not represent 8-hour TWA concentrations.

ANALYSIS AND DISCUSSION

Following a review of the initial creosote data, the analytical laboratory was asked to analyze additional one (1) milliliter Aliquots for each sample and the blank. The results, as reported, are an average of three gravimetric determinations. The Blank, however, was still consistently higher than two of the air samples. Therefore, the accuracy and validity of the data is uncertain.

In summary, due to the significant blank filter values, air concentrations either are not considered quantitative or the validity of the results cannot be determined. Follow-up work is under way to determine the source of analytical error and/or interference.

KERR-McGEE COPORATION
Texarkana, Texas

AIR MONITORING RESULTS

Survey Date: 10/9/79

SAMPLE DESCRIPTION	PUMP# SAMPLE#	SAMPLING TIME (min)	FLOW RATE TOTAL AIR VOLUME	COMPONENT	CONCENTRATION mg/m^3
Area Sample - Treating Building Adjacent C Cylinder pressure pump. Leak at B pump. Fixed leak halfway through sample	MSA-1 KER - 01	1:24p-4:26p 182 min.	2.10 LPM 0.382 m^3	CTPV -- Blank	133 µg 148 µg -15 µg (not valid)
Area Sample - Adjacent steam line valves along wall, in Treating Building	BDX-51 KER - 02	1:31p-4:25p 174 min.	2.10 LPM 0.365 m^3	CTPV -- Blank	233 µg 148 µg 85 µg 0.23
Area Sample - At cylinder door, opening on step platform after charge was removed - until door was closed.	MSA-2 KER - 03	2:37p-3:55p 78 min.	1.93 LPM 0.150 m^3	CTPV -- Blank	103 µg 148 µg -45 µg (not valid)
Area Sample - On West side of charge - still on tram cars; 45' from N. end of charges; warm surface; noted eye irritation in this area.	BDX-91 KER - 04	2:56p-4:17p 81 min.	1.92 LPM 0.155 m^3	CTPV -- Blank	240 µg 148 µg 92 µg 0.59
Blank Filters				CTPV	148 µg