

INDUSTRIAL HYGIENE REPORT
PRELIMINARY SURVEY OF WOOD PRESERVATIVE
TREATMENT FACILITY

AT

SANTA FE CENTRALIZED TIE PLANT
Somerville, Texas

Survey conducted by
Stewart-Todd Associates, Incorporated

October 10, 1979

Report written by

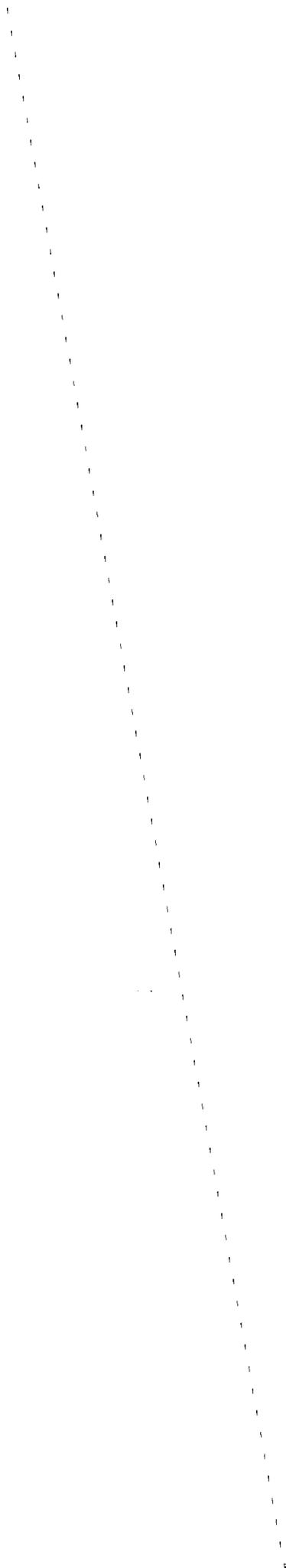
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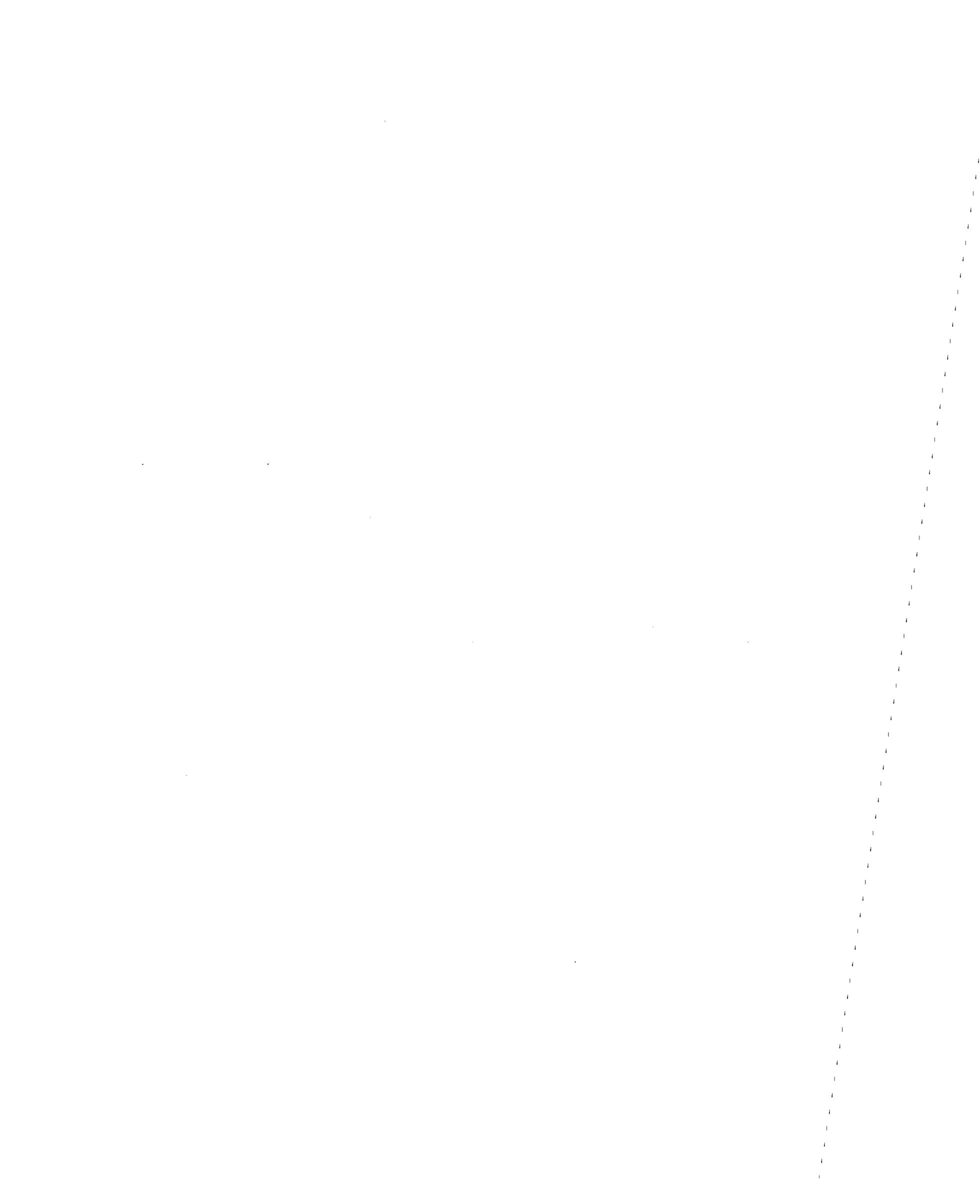
PURPOSE OF SURVEY: This walk-through survey was conducted as a part of the Phase II study of the INDUSTRIAL HYGIENE ASSESSMENT OF NEW AGENTS - III, NIOSH Contract No. 210-78-0060. Specifically, this survey was for the first group which includes all agents used in wood preserving. This facility was selected on the criteria set forth in the Study Proposal based on information gathered in Phase I.

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EMPLOYEE REPRESENTATIVES CONTACTED: Division Chairman
Brotherhood of Railway and Airline Clerks

ACKNOWLEDGEMENTS: James L. Oser, NIOSH
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STANDARD INDUSTRIAL CLASSIFICATION OF PLANT: SIC #2491
Wood Preserving



ABSTRACT

A preliminary survey of the Santa Fe Railway Company, Somerville, 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 10, 1979 provided familiarization with current and past process methods and materials used for treating railroad ties. Control methods or procedures, in addition to work practices used to eliminate or reduce exposures in the treating plant were discussed and observed. Employee training efforts and historic exposure data were reviewed along with descriptive information on safety and health programs. Range finding air sampling was conducted in the treatment building during regular operations to evaluate potential maximum employee exposure levels. Due to the significant cyclohexane extractable blank filter value, valid air concentrations could not be determined.

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 Centralized Tie Treatment plant of the Santa Fe Railway Company, Somerville, Texas, on October 10, 1979. This plant purchases and processes mixed hardwoods and conifers for treatment as railroad ties, bridge timbers, and miscellaneous or other specialty items, using Creosote and Chromated Copper Arsenate (CCA) pressure treatment systems. It was selected on the basis of size, geographical location and process materials as representative of a large Southwestern United States pressure treating facility.

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

DESCRIPTION OF FACILITY

The creosote treatment plant was originally built in 1896 at another location. In 1905 the Santa Fe Railway Company purchased the facility and moved it to its present site in Somerville, Texas. The plant has 115 acres fully utilized for material loading and unloading, processing, treatment and yard storage, as well as 23 additional acres for possible future expansion purposes.

Creosote pressure-treated cross ties account for 80-85% of the current production capacity. Bridge timbers, which are the plant's other major product, make up the remaining 15-20% of present annual wood treatment. Both are for the exclusive use of the Santa Fe Railroad. Petroleum oil/creosote solutions 70/30 and 50/50 are used to treat the cross ties and bridge timbers, respectively. CCA is used to a limited extent to treat sign base material and other specialty items. Southern yellow Pine, mixed hardwoods and Oak are the predominate wood species treated for railroad ties and bridge timbers. The plant processes 1,500,000 ties annually and 4,000,000 additional board feet of other forest products.

Originally, 3 cylinders, 8' x 124' were used for creosote treatment. In 1974, the treating and unloading facilities were renovated and rebuilt and the 124' cylinders were replaced with four 8' x 155' units with hydraulically operated doors. The Butt ends of the cylinders are enclosed in the treatment building.

The 6' x 132' CCA treatment cylinder was installed in 1973. Prior to that time a small experimental 27 foot cylinder was utilized. The CCA treatment and storage areas are separate from the creosote treating building and cylinders.

DESCRIPTION OF WORKFORCE

The plant presently employs 158 people; there are 8 supervisors, 8 office personnel, 4 treating engineers, and the remainder are production workers and yard personnel. Creosote treatment is conducted on all three shifts, 7 days per week, with one treating operator per shift. CCA treating is only done occasionally, i.e., approximately once per month. This requires one treating operator only on the day shift. The locomotive crew, which has three employees per shift, charge and unload all treating cylinders. All other personnel in the plant are involved in wood preparation, i.e., sawing, boring, inspecting, loading, or material storage and shipment. These operations are generally done on day shift. Loading is mostly done on the day shift, with a limited loading crew on the second shift. Miscellaneous forest products are handled almost entirely on the day shift.

The treating process and equipment were automated when the facility was rebuilt in 1974. The treating engineer's duties are generally limited to operating the cylinder control panels, checking pressure gauges and temperature conditions and transferring creosote solutions. Most of this is conducted in the treatment building. One mechanic is assigned to the treating area on the day shift and he is responsible for leak correction and pump repairs or adjustments. Other mechanics on all shifts are available when needed. The treating engineer makes known the problem areas which are then repaired by the mechanic.

The employees are represented by the Brotherhood of Railway and Airline Clerks Union.

DESCRIPTION OF PROCESS

Cross ties peeled and cut to size are purchased from commercial producers and shipped to the plant by rail. They are unloaded by using knuckle boom equipment which picks up 6-8 ties at one time, or by the use of an overhead crane. The ties are moved to a counting, sizing, and inspection station from which they are routed to one of two boring mills, or taken to storage areas when they are air seasoned for periods of 7-12 months. The 1934 Greenley Boring machine and the 1975 Eford boring machine are used for trimming, boring and branding the cross ties. The more recent boring mill trims the ends, bores, and brands the ties and mechanically loads them onto tram cars, as does the older Greenley Boring machine. The locomotive crew transfers the cars to the treating area for process drying and creosote treatment.

Only when there is not sufficient space to vapor-dry the ties received are the ties stored for air seasoning.

Bridge timbers, panel crossings and other specialty items are processed in the sawmill which consists of several small buildings. In some cases, the machinery is either outside, or only partially enclosed. An incisor is used for bridge timbers but this task is done only three days per month. The bridge material is treated with 70/30 Petroleum Oil/Creosote and CCA is used for the specialty times.

Since 1953, a petroleum naphtha vapor-dry process has been utilized to condition unseasoned wood prior to creosote treatment. This eliminates where possible, the 7-12 month storage and air-drying period. Tram cars of ties or timbers are loaded into a cylinder and petroleum naphtha is added. The cylinder temperature is increased to 270 - 350° F. which results in naphtha vaporizing and extracting of excess moisture from the wood in preparation for treatment. The process requires 14 hours after which a vacuum is applied for approximately another 2 hours to remove the wood sap, water, and recover petroleum naphtha solvent. The solvent and water solutions are then gravity separated and the naphtha is recycled for further vapor-dry processing. The residual extracted water is neutralized and used in the

boilers. The vapor-dry and subsequent treatment process typically require a total of 23 hours. A vacuum is applied at the end of the treatment cycle to remove excess creosote solution. The treating engineer notifies the locomotive crew when the treatment cycle is completed since they are responsible for opening the cylinder door, removing the treated forest products on tram cars, and charging the treating cylinder with the next charge for conditioning and treatment. The entire task of unloading and reloading typically requires approximately 20 minutes. There are 17-19 tram cars per charge which carry approximately 3600 cubic feet of forest products.

The CCA pressure cylinder is used about one day per month. The control room and solution preparation area were installed as a package unit from Osmose Corporation. The cylinder, however, was purchased separately. Sign base material and other specialty items are air-dried and then treated for 4-6 hours.

Creosote, #1 Grade, is purchased from Koppers, Great Lakes Carbon, or Witco Chemical in bulk tank trucks for transfer to storage. It is blended, as needed, with petroleum oil (#5 or #6 fuel oil) in a closed system mix tank. The diluent oil is shipped by tank car from either Continental Oil or Kerr Mc-Gee Corporation.

CCA concentrate in paste form is received in 220 lb. drums from Sweden, through Taco, Inc., which is an American distributor located in South Carolina. CCA solution is prepared by inverting a can over a flush tank where water is sprayed into the can dissolving the paste. The resulting solution is pumped to a work tank where it is diluted to 1.5 to 2% for use at the plant.

Storm water run-off and any drainage from the processing cylinders in the immediate area in front of the cylinders are pumped to a clean-up cylinder which is 6' x 132' where the water and contaminants are separated. The oil is re-utilized in the process. The remaining water and the blowdown from the boilers goes to the aeration treatment pond. Run-off from the CCA cylinder is pumped from the pit and recycled to the work tank.

DESCRIPTION OF PAST EXPOSURES

Water quality testing and ambient air monitoring has been conducted at the plant by the state EPA or a similar agency. No employee exposure monitoring has been done by either plant management or government organizations. The plant has purchased a sound level meter for determining noise sources; particularly, in the processing area. Ear muffs or plugs are available for production employees working at the boring mills or at other excessively noisy machinery. The operator of the automated

boring station works in an enclosure where sound-insulating has been done. According to plant management, most employees do not typically work in high-noise areas for sufficient time periods to be overexposed. Additionally, they also indicate that significant exposure problems resulting from the treatment chemicals does not occur. Most lost-time reported accidents are typically related to finger and hand injuries.

DESCRIPTION OF MEDICAL, INDUSTRIAL HYGIENE AND SAFETY PROGRAMS

The Santa Fe Tie Plant has a formal medical surveillance program established by the parent Railway Company. Pre-employment physical examinations are required for all new employees and periodic examinations are provided by the company to employees on a voluntary basis. A majority of the employees actually participate in this program. Pre-employment medical and emergency or other routine treatment is provided by Dr. G. V. Pazdral of Somerville, Texas. All periodic examinations, which include complete physicals with pulmonary function, blood tests, and chest x-rays, are done at the Santa Fe Hospital in Temple, Texas. There is no licensed nurse at the plant. However, twelve (12) employees are trained in CPR and eighteen (18) employees are certified by the Red Cross in first aid. These training classes are usually conducted at the plant.

The Santa Fe Railway Company, through the Corporate offices in Chicago, provides basic safety and health guidance for this plant. Mr. Sam Barkley, Plant Manager, is also the Safety and Health Coordinator. He conducts formal safety meetings with employees and supervisors on a monthly basis and questions or problems concerning safety or health are presented and discussed. Foremen also hold weekly safety meetings with workers to discuss safety problems and review work practices and rules. The Company issues a book of Safety Rules to all employees which they are formally required to read. It pertains to all phases of the railroad industry.

Hardhats and Safety glasses are required for all employees throughout the plant. Safety shoes are required for starting employees. The company pays a part of the cost of safety shoes for all employees. No softsoled shoes are permitted in the plant areas. Lunchroom facilities are provided, but many of the day-shift employees go home for the lunch break. All continuous 8-hour shifts take 20 minutes to one-half hour for meal time. The employees provide their own work clothing. Shower and change room facilities are available, but their use is a matter of personal preference. No respiratory protection is used during cylinder entry when cleaning, or dislodging jammed tram cars or material. Typically, the cylinder is aired out for a day or two prior to entry for cleaning purposes. Since the plant was rebuilt in 1974, there have been no incidents requiring an employee to go inside the cylinder except for cleaning.

The treating operator in the CCA plant is required to wear a face shield, gloves, and an apron while flushing the CCA drum to make up the treatment solution for the work tank. An eye wash and shower are available in this area of the CCA treating building.

INSPECTION OF THE PLANT

An industrial hygiene walk-through survey of the treatment facility was conducted following preliminary discussions with plant personnel. Mr. Sam Barkley, Plant Manager, provided the basic description of the treatment equipment and process flow. Employee work practices and personal hygiene were reviewed. Air monitoring was conducted during creosote treating. CCA treatment was not being done on the day of the survey.

Area air monitoring was conducted inside the treating building adjacent the #4 cylinder which was being used to treat a charge of ties with 70/30 creosote solution; and two cylinders were in the vapor-dry processing stage. The work areas were very clean with no obvious signs of recent spills or leaks. The treating engineer spends a significant part of his work day in this area since the control panels, pumps, and gauges for all the creosote cylinders are located inside the building. Cylinder door opening of the #4 cylinder was observed but no air monitoring was done because of time constraints. Typically,

the door is open for about 20 minutes during which the locomotive crew removes the treated charge and loads the cylinder with more green material for treatment.

DESCRIPTION OF SURVEY METHODS

The NIOSH sampling and analytical method P & CAM 217 was utilized for evaluating airborne levels of creosote. Mine Safety Appliance 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 ultrasonic extraction, with cyclohexane, evaporation of milliliter aliquots, and gravimetric determination of the residue.

RESULTS

The creosote samples collected in the treatment building adjacent to #4 cylinder contained 0.108 mg and 0.137 mg cyclohexane extractables. The blank filter used in the analysis indicated higher levels of extractable hydrocarbons than either sample taken. Therefore, no valid air concentrations can be calculated.

ANALYSIS AND DISCUSSION

Following a review of the initial creosote data, the analytical laboratory was asked to analyze additional 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 either of the air samples. Therefore, the accuracy and validity of the data is uncertain. Follow-up work is under way to determine the source of analytical error and/or interference.

SANTA FE CENTRALIZED TIE PLANT
SANTA FE RAILROAD
Somerville, Texas

AIR MONITORING RESULTS

Survey Date: 10/10/79

SAMPLE DESCRIPTION:	PUMP # SAMPLE #	SAMPLING TIME (Min.)	FLOW RATE TOTAL AIR VOLUME	COMPONENT	CONCENTRATION
Area Sample - In Creosote Treating building adjacent to #4 cylinder creosote/ oil tanks; treating a charge of ties with 70/30 solution.	MSA-#1	10:50a-2:03p	2.10 LPM	CTPV	0.108 mg
	SAN-01	193 min.	0.405 m ³	Blank	- 0.148 mg
					- 0.040 mg
Area Sample - In Creosote Treating building adjacent to #4 cylinder at tool box along wall; treating a charge of ties with 70/30 solution.	MSA-#2	10:53a-2:03p	1.93 LPM	CTPV	0.137 mg
	SAN-02	190 min.	0.367 m ³	Blank	-0.148 mg
					-0.011 mg
Blank				CTPV	0.148 mg

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