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CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45202

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 74-117-251

WEYERHAEUSER TREATING PLANT
DE QUEEN, ARKANSAS
DECEMBER 1975

I. TOXICITY DETERMINATION

Based on the results of physical examinations, clinical laboratory studies, observed work practices, a pertinent literature review, and environmental sampling, as conducted by the National Institute for Occupational Safety and Health (NIOSH) on January 22, 1975, and February 25-26, 1975, it was determined that definite toxic exposure(s) resulting in chloracne from pentachlorophenol contaminants were occurring in the Weyerhaeuser Treating Plant, De Queen, Arkansas.

The toxic exposure(s) resulted from sporadic manual opening and dumping of bagged pentachlorophenol obtained from a single manufacturer. The contaminant presumed to be responsible for the development of the chloracne is 2,3,7,8, Tetrachlorodibenzo-p-dioxin (TCDD), the most potent chloroacnegen known. Fortunately, most affected workmen showed no evidence of systemic or metabolic abnormalities of the type that have been reported in some previous studies.

It was similarly found that treating area employee exposures to cresol, arsenic acid, copper sulfate, and sodium bichromate were not toxic at the concentrations measured.

Various recommendations were made to management for possible improvement of existing conditions in the work environment within the treating area. Recommendations were similarly made for a much-needed occupational medical program.

II. DISTRIBUTION AND AVAILABILITY

Copies of this Determination Report are available upon request from the Hazard Evaluation Services Branch, NIOSH, U. S. Post Office Building, Room 508, 5th and Walnut Streets, Cincinnati, Ohio 45202. Copies have been sent to:

(1) Weyerhaeuser Treating Plant, De Queen, Arkansas
(2) Authorized Representative of Employees
(3) U. S. Department of Labor - Region VI

For the purpose of informing the "affected employees", the employer will promptly "post" the Determination Report in a prominent place(s), near where approximately fifty (50) affected employees work, for a period of thirty (30) calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6), authorized the Secretary of Health, Education and Welfare, following receipt of 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 National Institute for Occupational Safety and Health received such a request from an authorized representative of employees to evaluate the potential hazard associated with employee exposure to pentachlorophenol, creosote, arsenic acid, copper sulfate and sodium bichromate as used in the wood treating area of the plant.

IV. HEALTH HAZARD EVALUATION

A. Description of Process

This plant is the largest lumber preservation facility in the world. Operations began in 1947 with a single pressurized cylinder, and were gradually increased in size until 1961 when a seventh cylinder was installed. All cylinders are 112 feet long and eight feet in diameter, and are all essentially identical in design. Cylinder loading is accomplished by the insertion of specially designed railway cars containing the lumber to be treated. Each cylinder is closed with a hinged circular door which is manually bolted and unbolted with impact wrenches.

A chemical industry type control room is located adjacent to the number one cylinder and various chemical mixing and storage facilities and a boiler room are to be found in the immediate area. Log peeling and various conventional sawing operations are also located on the premises. A large area is utilized for the air drying of timber awaiting treatment and for the storage of treated material awaiting sale.

Approximately 250 persons are employed at the plant - forty (40) in administrative or supervisory categories; sixty (60) in maintenance operations; and the remaining 150 in production. Four (4) shifts were being utilized when the survey commenced; however, this was later reduced to three (3) shifts due to prevailing economic conditions. Operations in the treating area are normally conducted by six (6) men - one (1) operator, one (1) helper, one (1) trainee, one (1) boiler fireman and two (2) locomotive switching operators.

Lumber, telephone poles, cross-ties and fence post materials are the items receiving wood preservation treatment at the plant. Three (3) treatment processes are performed: (a) creosote - used for ties and poles; (b) pentachlorophenol dissolved in #2 fuel oil - used for lumber and posts; and (c) CCA, or Wolman's salts consisting of copper sulfate, sodium bichromate and arsenic acid - used almost exclusively for fencing material, and introduced at the plant approximately one

year prior to the receipt of the survey request. Two (2) cylinders are utilized for creosote, four (4) for pentachlorophenol treatments and one (1) for CCA treatment. Individual treatment times vary with the type chemical and product being treated, and range from thirty (30) minutes to twenty-four (24) hours. Normally, approximately one cylinder is "charged" every two (2) hours.

With a single important exception, all chemical handling, mixing and dispensing operations are automatically metered and entirely enclosed - thus minimizing employee exposure. Even the unbolting and opening of cylinders presents scant exposure since, (a) the cylinders are steam purged after the treating process is completed, and (b) the exposure time is quite brief.

The previously-mentioned exception involves the use of back-up supplies of pentachlorophenol, which are normally handled by entirely enclosed means and which have, in recent months, been in somewhat short supply. To avoid down-time, a standby bagged supply is maintained. This material is obtained from a different supplier than the bulk material normally used, and is utilized approximately once weekly. This operation is usually performed by the trainee or helper who manually opens and empties fifty (50) bags weighing fifty (50) pounds each, of pentachlorophenol through a grate into heated fuel oil. Ventilation provided for this operation includes: (a) natural ventilation from window openings in the area, and (b) a duct whose opening is located four to five feet above the grate. Thus, much pentachlorophenol dust is actually carried into the workers breathing zone as he stoops on or near the grate to empty each bag. Gauze-type dust masks were available, but seldom worn, for the operation during the initial survey. Appropriate supplied air respirators were utilized for the same operation during the follow-up environmental survey.

B. Study Progress and Design

1. Preliminary Survey

On January 21-22, 1975, an initial walk-through survey was conducted of the facility by NIOSH representatives Mr. Harry L. Markel, Jr., and James B. Lucas, M.D., who were accompanied by representatives of both management and the International Woodworkers of America, Local No. 5-15.

Fifteen (15) air samples were collected to permit a preliminary evaluation of the various chemicals/compounds being used in the treating area; namely, pentachlorophenol, creosote, arsenic acid, copper sulfate and sodium bichromate. Special attention was directed toward the previously-mentioned operation involving the manual dumping of pentachlorophenol.

During the initial portion of the medical evaluation, fifteen (15) treating area employees were privately interviewed, and in some in-

stances a limited physical examination performed. Interviewing was conducted in a non-directed manner to elicit complaints and/or symptoms. The average employee age was 35 years (range, 19-64 years). The average duration of company employment was 7.8 years, and the average time employed in the treating area was 4.4 years.

Four (4) men complained of the "smarts", or a phototoxic reaction which occurred occasionally each summer. Three (3) also complained of occasional eye irritation, especially on busy days when more than the usual number of cylinders had to be opened during a shift. One boiler operator noted occasional eye irritation from fresh wood shavings and wood dust. One individual noted respiratory tract and eye irritation when opening bags of pentachlorophenol.

As might be expected, a wide variety of other medical problems were elicited including diabetes, a cardiac arrhythmia, prostatitis, kidney stones, weight loss, fungus infection and edema. This latter symptom was felt to be secondary to extremely high blood pressure which was found on examination. None of these latter symptoms or conditions were felt to be specifically occupationally related. No symptoms or physical findings suggesting lung disease were encountered.

The most significant findings related to the skin. Seven individuals were noted to have lesions consistent with chloracne. In six men the condition was relatively mild consisting primarily of comedones (blackheads) located in the "crow's-feet" areas of the face. In one instance, the condition was extremely severe involving essentially the entire integument, and manifested by numerous cystic and inflammatory lesions in addition to extensive comedone formation. This individual related he had acne vulgaris when originally hired and since then had developed the generalized acniform eruption.

2. Follow-up Environmental and Medical Survey

In order to more fully evaluate employee exposure to chemicals mentioned in an earlier portion of this report, it was deemed necessary to collect additional air samples in the treating area and submit them to the laboratory for appropriate analyses. From a medical standpoint, and in view of the identification of chloracne in the workmen examined during the preliminary survey, it was also deemed essential to perform more extensive laboratory studies to determine whether systemic effects were present.

After observing the pentachlorophenol dumping operation, it was felt that the probable source of the chloracnegenic substance was TCDD present as a contaminant.

Observation of the work habits of the most severely affected individual performing this operation strengthened this impression. In fact, the irritative properties of the pentachlorophenol dust generated by this

operation were sufficient to promptly drive NIOSH observers from the building. Thus a follow-up medical and environmental study was conducted on February 25-26, 1975.

Utilizing the clinical laboratory facilities at De Queen General Hospital, both blood and urine samples were collected from seventeen (17) treating area employees. In addition, each employee was asked to complete a brief health questionnaire which listed a number of symptoms relevant to the substances in use in the treating area.

The following tests were run on blood or serum: blood urea nitrogen, alkaline phosphatase, total bilirubin, cholesterol, creatinine, glucose, lactic dehydrogenase, liver lactic dehydrogenase, triglycerides, uric acid, hemoglobin, white blood count, serum proteins, albumin, globulin, serum glutamic oxalic transaminase, serum calcium, chloride, sodium and potassium. A routine urinalysis was also carried out at De Queen General Hospital and an aliquot was returned to Cincinnati NIOSH laboratories for the following analysis: delta amino levulinic acid, porphyrin screening (Watson-Schwartz,) pentachlorophenol, and arsenic. Control urines were also obtained from four NIOSH employees and submitted to the laboratory.

C. Evaluation Methods

1. Pentachlorophenol

Personal breathing-zone and area air samples (vapors) were collected by using MSA, Model G, battery-operated vacuum pumps with midget impingers containing 15 ml. of 0.1N sodium hydroxide at sampling rates varying from 1.0-2.0 lpm. Samples were anaylzed by gas chromatography with electron capture.

2. Cresol

Personal breathing-zone and area air samples were collected by using MSA, Model G, battery-operated vacuum pumps with midget impingers containing 15 ml. of 0.1N sodium hydroxide at sampling rates varying from 1.0-1.7 lpm. Samples were analyzed by gas chromatography.

3. Arsenic Acid, Copper Sulfate, Sodium Bichromate

Personal breathing-zone and area air samples were collected by using MSA, model G, battery-operated vacuum pumps with HA, 0.45$_{\mu}$ pore density filters at sampling rates varying from 1.7-2.0 lpm. Samples were analyzed by atomic absorption spectroscopy.

D. Evaluation Criteria

1. Environmental Standards

a. Air contaminants - Current and available information, relating human toxicity with exposure to substances and conditions, has been

reviewed for compounds applicable to this survey. On the basis of this review, the values recommended by the American Conference of Governmental Industrial Hygienists, Threshold Limit Value Committee, are applied to this survey.

Substance	8-hour time-weighted average concentration ACHIH, TLV Committee (mg/M^3)*	Comparable OSHA standard (mg/M^3)*
Pentachlorophenol	0.5	0.5
Cresol	22.0	22.0
Arsenic Acid (as As)	0.5	0.5
Copper Sulfate	(a)	(b)
Sodium Bichromate	(a)	(b)
Tetrachlorodibenzo-p-dioxin	(a)	(b)

* mg/M^3 = milligrams of substance per cubic meter of air sampled

(a), (b) - no recommended levels or occupational health standard available at this time.

2. Medical

a. Pentachlorophenol

Pentachlorophenol (PCP) is widely used molluscicide, herbicide, insecticide, and microbiocide. To enhance preservation, it has been extensively applied to wood and other cellulose products, adhesives, leather, oils, paints, latex and rubber. It is especially important in the control of termites and other wood-boring insects.

Pentachlorophenol is a highly toxic substance and is readily absorbed through the skin, especially from aqueous solution or when dissolved in oils or organic solvents. In addition to irritative dermatitis, numerous fatalities have been recorded resulting from skin contact. Low concentrations of the dust produce painful irritation to the mucous membranes of the nose, throat, and eyes and these warning symptoms usually are sufficient to prevent serious systemic effects. Prominent symptoms of systemic intoxication include respiratory distress, hyperpyrexia, marked sweating, and rapidly progressive coma. These effects follow acute exposures and chronic poisoning probably does not occur.

As PCP is not a "natural" component of the earth's crust, its environmental or biologic presence is thought to represent contamination from manufacture and human usage. Current analytic methods permit its detection reliably to levels as low as 3-10 parts per billion. PCP urine levels for persons without known exposure have been reported to average from 0.0003 to 0.570 parts per million (ppm) with means of 0.002 to 0.044 ppm reported in various studies. Exposed workers have much higher levels and mean values of 0.265 and 0.465 ppm are reported.

PCP is prepared by the chlorination of phenol and its commercial production is commonly accompanied by the formation of various side products. These include tetrachlorophenol, trichlorophenol, chlorinated diphenyl ethers, chlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins (chlorinated dioxins). Many of these substances are present as impurities in commercial grade PCP and the chlorinated dioxins are of particular importance in this study. This highly toxic group of compounds also occur as contaminants in the production of 2,4,5-trichlorophenoxy-acetic acid (2,4,5-T), a widely used herbicide. Since they are extremely stable chemically, their accumulation of the environment has been extensively studied in the past several years and has generated much concern.

2,3,7,8 Tetrachlorodibenzo-p-dioxin (TCDD) and the other chlorinated dioxins are among the most toxic substances yet discovered, and lethal effects in some species have been demonstrated in the parts per trillion dose range. Males of all species appear to be more susceptible than females. TCDD is teratogenic in some animal species. Other effects of sublethal concentrations include thymic atrophy, hepatic lesions and cardiac lesions. Hematologic changes have been reported. It is also an extremely potent inducer of the hepatic enzyme delta-amino levulinic acid synthetase. In man, chloracne and porphyria cutanea tarda have been reported among workers exposed to 2,4,5-T contaminated with TCDD and it is generally considered the most potent chloracnegenic compound known.

Chloracne is an extremely refractory form of occupational acne produced by exposure to a variety of chlorinated aromatic compounds, and is often accompanied by serious systemic toxicity. Compounds known to cause chloracne include chloronaphthalenes, polychlorobiphenyls, polychlorinated dibenzofurans, chlorobenzenes, dichlorobenzonitrile, and polychlorinated dibenzo-p-dioxins, especially TCDD and hexa-chloro-dibenzo-p-dioxin. It is of interest that pure PCP is not acnegenic. The clinical features of chloracne consist of cysts, comedones (black-heads), pustules, and abscesses which heal with eventual scarring. Comedones resulting from follicular hyperkeratosis may predominate and may involve nearly every hair follicule.

The preferential sites of involvement are the exposed areas of the body, characteristically the temples, upper cheeks, ears, and temporozygomatic areas. In more severe cases, other body areas become involved. Once established, the condition tends to persist many years and is ordinary refractory to the usual therapeutic modalities. Among the systemic effects reported to accompany chloracne are hepatotoxicity, myocardial degeneration, toxic nephritis, hypertension, peripheral edema, and weight loss. A wide range of neurologic symptoms have also been reported, including peripheral neuropathy, headaches, coordination disturbances, fatigue, loss of libido, and emotional instability. Hyperlipidemia, especially of the triglyceride fraction, has been reported. It is interesting to note that in some chloracne outbreaks the incidence of systemic effects is as high as 50%, while

in other instances (presumably due to the same chloracnegen-TCDD) there has been little evidence of systemic toxicity.

Porphyria cutanea tarda (PCT) results from the excessive hepatic synthesis and storage of porphyrins which are hemoglobin precursors. Clinically, common findings include polycythemia, skin fragility, blistering in sun exposed areas, hirsutism, and hyperpigmentation. PCT is not necessarily associated with chloracne, and is also caused by a variety of other chemical substances which are not known to cause chloracne.

b. Creosote

Creosote is a complex mixture of multiple aromatic compounds obtained from the distructive distillation of wood or coal. Because of its relatively low cost and microbiocidal properties, it has found wide application in wood preservation.

Skin contact or exposure to the vapors results in intense burning and itching. Since several phototoxic substances are usually present in commercial grades of creosote, the exposed skin displays a markedly enhanced sunburn response with sufficient ultraviolet stimulation. Eventually hyperpigmentation of exposed skin areas results. Animal studies have also demonstrated that creosote is an active skin carcinogen, but its role in human cancer is still to be proven. While skin absorption occurs, serious systemic effects, including cardiovascular collapse and death, have been observed only after ingestion. Once widely used in medicine, occasional instances of "self-medication" are still reported and sometimes lead to chronic intoxication characterized by visual disturbances, hypertension and gastrointestional bleeding.

c. Arsenic Acid

Arsenic is widely found in nature and in the food chain--particularly seafood. In small amounts, it is regarded as a normal body constituent and it has been suggested that micro-amounts are possibly necessary for normal growth and development. Small amounts are normally excreted in the urine.

In common with other inorganic arsenic compounds, arsenic acid tends to accumulate in all tissues including the bones and hair. Absorption occurs through inhalation, ingestion and the skin, and slow excretion occurs largely through the urine. Fairly large amounts may be accumulated without adverse effects. Symptoms include gastrointestional disturbances, irritation of the nose and eyes, dermatitis, laryngitis, and bronchitis. Chronic exposure also may cause perforation of the nasal septum. Rarely, tremors and peripheral neuritis are encountered. An abnormal incidence of lung and skin cancer have been noted following many years of exposure.

Persons without known arsenic exposure have been reported to excrete between 0.015 and 0.08 mg/liter of urine with occasional "normal"

values reaching 0.1-0.2 mg/liter. However, values repeatedly above o.1 mg/liter suggest the possibility of arsenic intoxication.

d. Copper Sulfate

This copper salt is not usually considered a particularly poisonous substance and industrial poisoning is virtually unknown. When large amounts are ingested, usually with suicidal intent, the following have been noted: metallic taste, vomiting, diarrhea, hemolysis, hematuria, renal tubular necrosis, hypotension, and coma. Allergic contact dermatitis and eye irritation have been reported in rare instances from exposure to copper salts and dust. Metal fume fever from copper oxide and copper acetate has also been reported.

e. Sodium Bichromate

This chromate salt can cause irritation of the skin and eyes. If crystals become embedded in skin wounds ulceration (chrome holes) frequently follow. Nasal sepal ulceration or actual perforation has also been noted in chromate workers. These complications are usually preceeded by nasal itching, soreness and epixtaxis (bleeding). The mucous membranes of the throat may also be affected, resulting in soreness and in some workers hoarseness. While an increased incidence of lung cancer has been noted in chromate workers engaged in refining the metal from the ore, this problem has not been reported among those exposed to hexavalent chrome such as chromic acid or sodium bichromate.

E. Evaluation Results and Discussion

1. Environmental

The results of 57 air samples (24-Pentachlorophenol; 16 Cresol; 9-Arsenic acid; 4-Copper Sulfate; 4-Sodium bichromate) collected during the January 22, 1975, and February 25-26, 1975 surveys are shown in Tables 1 through 5. As can be seen from the tables, concentrations of pentachlorophenol (vapors from cylinder unloading), cresol, arsenic acid, copper sulfate and sodium bichromate were well below recommended levels and/or applicable standards.

On the other hand, one-half of the twelve (12) samples collected from the previously described bagged pentachlorophenol dumping operation, were found to be in excess of the above-mentioned recommended levels and standards. Ventilation was found to be generally poor in the area where this operation was being conducted. Appropriate recommendations for improvement of this situation will be forthcoming in a later portion of this report.

2. Medical

Because of the large number of tests and individuals involved, it was anticipated that several deviations from normal expected values might be encountered. Actually the total number of abnormal results was relatively small and most of these were minor in degree. The following blood or serum abnormalities were encountered: elevated glucose--

one individual who was a known diabetic; slightly elevated calcium, potassium and triglycerides in one individual; slight elevation of total proteins and elevated triglycerides in one worker; elevated alkaline prosphatase, total proteins, lactic dehydrogenase, and uric acid in a severe hypertensive; elevated cholesterol in one man; low sodium in one man; elevated trigycerides SGOT and borderline elevated alkaline phosphorous, LDH and liver LDH in an individual with mild to moderate chlorance; and slightly elevated hemoglobin on one subject.

The significance of most of these abnormalities is unknown, and it was suggested by personal letter that each of the above individuals consult his private physician for evaluation and retesting. Because of the lack of a definite discernible pattern in these abnormalities, they were not judged to be the result of a common occupational exposure to a toxic substance. However, the individual with severe chloracne did show some test results suggesting a systemic component to his illness, i.e., elevated alkaline phosphatase (suggesting liver involvement) and anemia (hemoglobin of 13.9). While still probably within normal limits, he also was noted to have elevated glucose, total proteins, albumin, and a slightly increased white blood count. These results are perhaps even more significant than at first appearance since he had terminated his exposure three weeks prior to testing.

In an attempt to further determine whether the presence or absence of chloracne lesions was associated with any particular deviation from expected values, statistical analysis was carried out. A comparison was made between the mean test values for the group with chloracne and the group without clinical evidence of lesions, using the t-test for independent samples and the usual 0.05 probability level for significance. In respect to the twenty-one (21) blood tests performed, there were no differences detected between affected and unaffected workers at the 5% significance level. The only test coming close to significance ($p = 0.0647$) was the triglyceride level which had a mean of 237 mg% for affected workers and 139 mg% for uninvolved men.

All routine urinalyses were within normal limits. All urinary delta aminolevulinic acid determinations were within normal limits and the urine porphyrin screening test was uniformly negative. Urinary arsenic values for the seventeen (17) employees tested ranged from 0.002 to 0.061 mg As/liter and averaged 0.013 mg/liter. The small control group ranged from 0.025 to 0.044 mg/liter with an average of 0.032 mg/liter. All these results are regarded as being well within normal limits.

The PCP urinary levels found in this study ranged from 0.11 to 1.85 ppm with a mean of 0.49 ppm. Three control urines from NIOSH volunteers ranged from 0.05 to 0.10 ppm with a mean of 0.07 ppm. This difference is not statistically significant, however, because of the very small number of control speciments and the wide standard deviation for the exposed group. While not statistically different, the consistently higher urinary PCP values found for plant employees undoubtedly reflects their occupational exposure to this substance.

The mean for the worker group (0.49 ppm) closely resembles that for other reportedly exposed groups (0.465 ppm) and maximum levels for exposed workers (physical status unknown) have reached levels greatly exceeding (up to 35 ppm) the highest found in this study. Analysis correlating the presence of chloracne and PCP urinary values indicated that affected individuals were excreting on average more PCP than non-affected workers (0.667 vs 0.379 ppm), but that this difference was not statistically significant. However, it is worth noting that the three men with PCP levels of 1 or more ppm included the two (2) individuals with the most marked chloracne and the man with hypertension. All three (3) had one or more clinical laboratory test abnormalities indicating possible hepatic disfunction. Of these, the man with the florid chloracne had the highest PCP level. This is especially significant in view of the 3-4 week period which had passed between his last work exposure and the date when the sample was obtained.

There is data to indicate that PCP is very rapidly excreted during the first 2-3 weeks following a single exposure, with perhaps 50% being excreted per day during the first few days. This appears to be especially true when higher concentrations are initially found in the urine. Excretion declines markedly after the second week to much lower relatively constant levels. This strongly suggests that very high levels may have been present in this individual at the time of the initial survey visit.

These results suggest that these three (3) men also would have had the greatest exposure to TCDD since it is a PCP contaminant. It is, however, impossible to definitely determine whether the abnormal laboratory tests found in these individuals resulted from TCDD or PCP toxicity or perhaps were on some other basis.

The results of the confidential health questionnaire revealed that blackheads were the most frequent complaint mentioned (5), itching, complexion problems, easy skin blistering, weight gain, and frequent headaches all had three (3) respondents. No other sign or symptom was noted by more than two (2) individuals. It is concluded from these results that no major symptoms of systemic involvement were occurring among the group.

F. Conclusions

Based on the results of physical examinations, clinical laboratory studies, observed work practices, PCP sample analysis, pertinent literature review, and environmental measurements, it is concluded that a definitely hazardous exposure, resulting in chloracne from PCP contaminants, was occurring within the Treating Department of the Weyerhaeuser Treating Plant, De Queen, Arkansas. The hazardous exposure resulted from the sporadic manual opening and dumping of bagged PCP obtained from a single manufacturer. The contaminant presumed to be responsible for the development of chloracne is TCDD, the most

potent chloroacnegen known. Fortunately, most affected workmen showed no evidence of systemic or metabolic abnormalities of the type that have been reported in some previous studies. Two workers were identified during the course of the study who had medical conditions of sufficient severity that it was deemed prudent to recommend their transfer to other plant areas in which toxic substances are not utilized. These transfers were promptly effected through joint union-managment agreement.

V. RECOMMENDATIONS

1. It is recommended that the present brand of bagged PCP be used with great care, and that adequate respiratory protection be provided at all times during the dumping process. After each dumping operation, workmen should promptly shower and change into clean clothing. These precautions should be strictly complied with and rigidly enforced.

2. It is suggested that an alternate supplier of PCP be contacted regarding the possibility of furnishing a bagged product which contains less contaminating substances than that now in use.

3. It is suggested that consideration be given to the installation of slot ventilation around the grating through which PCP is now dumped, since present ventilation provisions appear to be inadequate.

4. Tank entry procedures should be stressed by plant management for employees required to enter existing storage tanks for cleaning and/or maintenance operations.

5. Nearly all the various chemical substances utilized in wood preservation are highly toxic. The effects of long-term exposure to several of these substances are such that periodic medical monitoring is deemed essential. In addition, the acute toxic nature of other such materials strongly suggests that careful pre-employment health assessments be made prior to assigning men to the Treating Department area. For these reasons, the following recommendations for the development of an occupational medical program are suggested:

a. Prospective employees should receive a physical examination, chest x-ray, hemogram, urinalysis, and routine battery of clinical chemistries. A complete medical histroy should also be obtained. Persons with historic or present evidence of significant liver or kidney disease should be excluded from employment in the treating area. Those with active acne vulgaris or a history of moderate-to-severe acne should likewise be excluded. Since TCDD is a teratogenic compound (i.e., capable of producing physical defects prior to birth) for several animal species, women of childbearing age should not be employed in the treating area of the plant.

b. On an annual basis, it is suggested that the physical examination, chest x-ray, hemogram, urinalysis, and chemistries be repeated. Particular attention should be focused on the examination of the eyes, nose, throat, and skin. The skin examination should be directed not

only toward the detection of chloracne, but also to the detection of pre-malignant lesions.

c. A more comprehensive and practical approach to the above suggestions is possible if a single local physician is utilized to provide the above services. This permits better continuity of care, ease in record keeping, and rapport with labor and management.

VI. AUTHORSHIP AND ACKNOWLEDGEMENT

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VII TABLES

Table 1
Concentrations of Pentachlorophenol
Weyerhaeuser Treating Plant
De Queen, Arkansas
January 22, 1975
February 25-26, 1975

Sample No.	Operation	Date	Sampling Period (Minutes)	*Type of Sample	**Concentration (mg/M3)
75-00317	Manual Dumping	1-22-75	30	P	1.50
75-00318	Manual Dumping	1-22-75	30	P	0.14
75-00319	Manual Dumping	1-22-75	30	P	0.04
75-00320	Manual Dumping	1-22-75	30	P	0.04
75-00321	Cyl. #7 (composite)	1-22-75	13	P	(a)
75-00887	Cyl. #4 (composite)	2-25-75	24	P	0.00005
75-00888	Operator	2-25-75	224	P	0.00003
75-00889	Trainee	2-25-75	314	P	0.00002
75-00890	Helper	2-25-75	283	P	0.00004
75-00891	Maintenance	2-25-75	284	P	0.00002
75-00892	Mix Tank clean.	2-26-75	28	GA	0.00002
75-00893	Cyl. #4&6 (composite)	2-26-75	25	P	0.00044
75-00894	Maintenance	2-26-75	227	P	0.00001
75-00895	Helper	2-26-75	223	P	0.00001
75-00896	Trainee	2-26-75	364	P	0.00001
75-00911	Manual Dumping	2-26-75	31	P]	2.00
75-00912	Manual Dumping	2-26-75	31	P]	
75-00913	Manual Dumping	2-26-75	31	P	0.75
75-00914	Manual Dumping	2-26-75	31	P]	0.0002
75-00915	Manual Dumping	2-26-75	31	P]	
75-00916	Manual Dumping	2-26-75	31	P	0.23
75-00917	Manual Dumping	2-26-75	24	GA]	3.83
75-00918	Manual Dumping	2-26-75	24	GA]	
75-00919	Manual Dumping	2-26-75	24	GA	1.05
75-00920	Manual Dumping	2-26-75	24	GA]	0.0001
75-00921	Manual Dumping	2-26-75	24	GA]	
75-00922	Manual Dumping	2-26-75	24	GA	0.0001
75-00925	Mix tank clean.	2-26-75	13	P	0.0001

American Conference of Governmental Industrial Hygienists,
Threshold Limit Value Committee — 0.5

* P-Personal; GA-General Area
** mg/M3 = milligrams of subs nce per cubic meter of air sampled
a) Below lower detection limit of 0.0000002 milligrams

Table 2
Concentrations of Creosote (Cresol)
Weyerhaeuser Treating Plant
De Queen, Arkansas
January 22, 1975
February 25-26-, 1975

Sample No.	Operation	Date	Sampling Period (Minutes)	*Type of Sample	**Concentration (mg/M3)
[illegible]-00202	Helper	1-22-75	112	P	(a)
[illegible]-00203	Operator	1-22-75	101	P	(a)
[illegible]-00204	Clean-up	1-22-75	99	P	(a)
[illegible]-00205	Boiler Fireman	1-22-75	143	P	(a)
[illegible]-00206	Helper	1-22-75	135	P	(a)
[illegible]-00207	Operator	1-22-75	98	P	(a)
[illegible]-00899	Cyl. #1&2 (composite)	2-25-75	23	P	(a)
[illegible]-00900	Cyl. #1&2 (composite)	2-25-75	23	P	(a)
[illegible]-00901	Operator	2-25-75	224	P	(a)
[illegible]-00902	Maintenance	2-25-75	283	P	(a)
[illegible]-00903	Trainee	2-25-75	324	P	(a)
[illegible]-00904	Operator Sta.	2-25-75	376	GA	(a)
[illegible]-00905	Storage Tank	2-25-75	395	GA	(a)
[illegible]-00906	Helper	2-25-75	338	P	(a)
[illegible]-00907	Cyl. #3	2-26-75	11	P	(a)
[illegible]-00908	Operator	2-26-75	310	P	(a)

[illegible]merican Conference of Governmental Industrial Hygienists,
[illegible]hreshold Limit Value Committee 22.0

* P-Personal; GA-General Area
** mg/M3 = milligrams of substance per cubic meter of air sampled
a) Below lower detection limit of 0.4 milligrams

Table 3
Concentrations of Arsenic Acid
Weyerhaeuser Treating Plant
De Queen, Arkansas
January 22, 1975
February 25-26, 1975

Sample No.	Operation	Date	Sampling Period (Minutes)	*Type of Sample	**Concentration (mg/M3
-00324	Boiler Fireman	1-22-75	127	P	(a)
-00325	Cyl. #7	1-22-75	13	GA	(a)
-00926	Maintenance	2-25-75	284	P	(a)
-00927	Cyl. #7	2-25-75	24	P	(a)
-00928	Maintenance	2-26-75	227	P	(a)
-00929	Cyl. #7	2-26-75	10	P	(a)
-00930	Maintenance	2-25-75	140	P	(a)
-00931	Cyl. #7	2-26-75	10	P	(a)
-00932	Cyl. #7	2-26-75	10	P	(a)

erican Conference of Governmental Industrial Hygienists,
eshold Limit Value Committee 0.5

P-Personal; GA-General Area
mg/M3 = milligrams of substance per cubic meter of air sampled.
Below lower detection limit of 0.0057 milligrams.

Table 4
Concentrations of Copper Sulfate
Weyerhaeuser Treating Plant
De Queen, Arkansas
January 22, 1975
February 25-26, 1975

Sample No.	Operation	Date	Sampling Period (Minutes)	*Type of Sample	**Concentration (mg/M3)
75-00314	Cyl. # 7	1-22-75	13	P	(a)
75-00938	Cyl. # 7	2-26-75	10	P	(a)
75-00939	Maintenance	2-25-75	168	P	(a)
75-00940	Cyl. # 7	2-26-75	10	P	(a)

American Conference of Governmental Industrial Hygienists,
Threshold Limit Value Committee (b)

* P-Personal
** mg/M3 = Milligrams of substance per cubic meter of air sampled.
(a) Below lower detection limit of 0.0038 milligrams.
(b) No recommended level/available at this time.

Table 5
Concentrations of Sodium Bichromate
Weyerhaeuser Treating Plant
De Queen, Arkansas
January 22, 1975
February 25-26, 1975

Sample No.	Operation	Date	Sampling Period (Minutes)	*Type of Sample	**Concentration (mg/M3)
75-00328	Boiler Fireman	1-22-75	127	P	(a)
75-00934	Cyl. # 7	2-26-75	10	P	(a)
75-00935	Cyl. # 7	2-25-75	24	P	0.03
75-00936	Cyl. # 7	2-26-75	10	P	0.07
American Conference of Governmental Industrial Hygienists, Threshold Limit Value Committee					(b)

* P-Personal
** mg/M3 = milligrams of substance per cubic meter of air sampled.
(a) Below lower detection limit of 0.0013 milligrams.
(b) No recommended level available at this time.