U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
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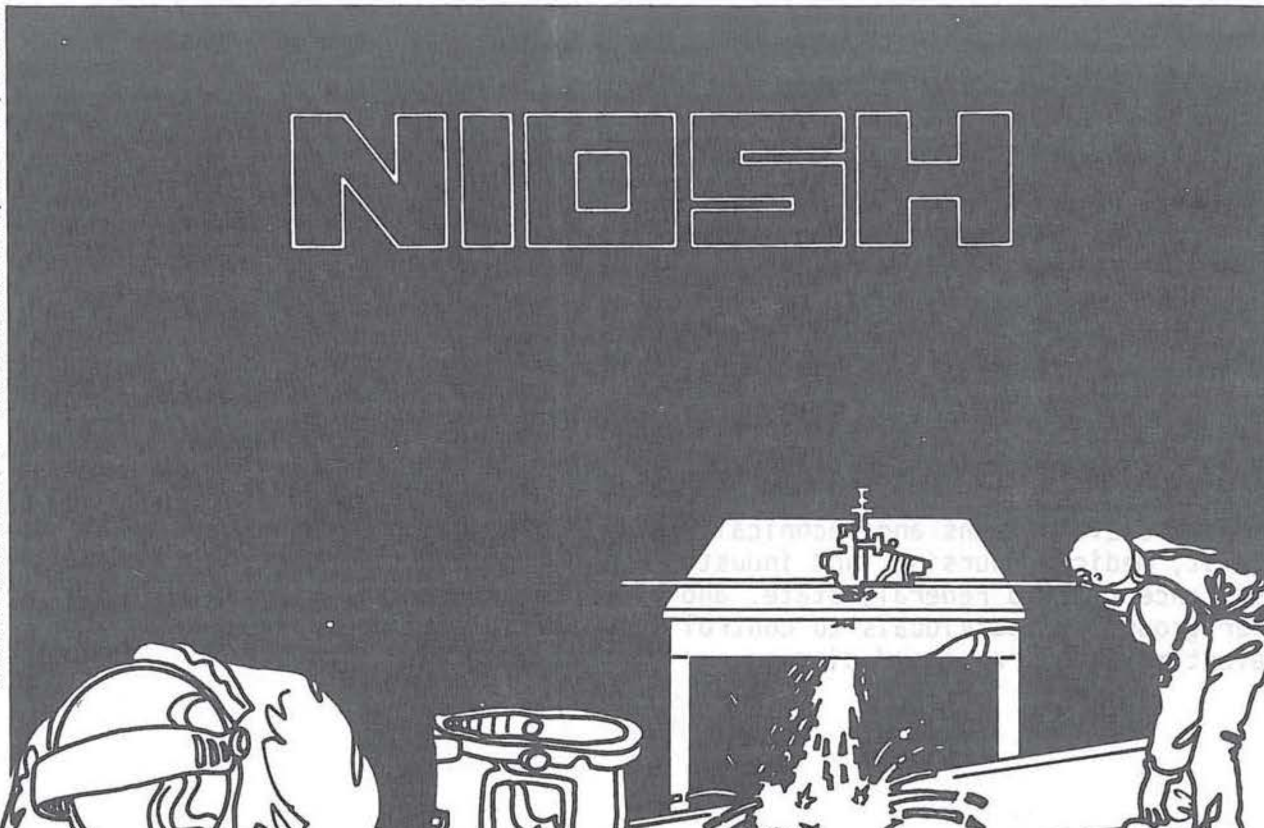


# Health Hazard Evaluation Report

HETA 82-208-1260
BABCOCK-WILCOX PLANT
BRUNSWICK, GEORGIA

## PREFACE

The Hazard Evaluations and Technical Assistance Branch of NIOSH conducts field investigations of possible health hazards in the workplace. These investigations are conducted under the authority of Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669(a)(6) which authorizes the Secretary of Health and Human Services, following 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 Hazard Evaluations and Technical Assistance Branch also provides, upon request, medical, nursing, and industrial hygiene technical and consultative assistance (TA) to Federal, state, and local agencies; labor; industry and other groups or individuals to control occupational health hazards and to prevent related trauma and disease.

HETA 82-208-1260
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BABCOCK-WILCOX PLANT
BRUNSWICK, GEORGIA

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## I. SUMMARY

On April 19, 1982, the National Institute for Occupational Safety and Health (NIOSH) received a request from the Boilermakers Union Local 901 for a health hazard evaluation at the Babcock-Wilcox Plant in Brunswick, Georgia. The request stated that about 45 electricians and maintenance workers were exposed to polychlorinated biphenyls (PCBs), and several of these workers had developed skin rashes on their legs and hands.

A walk-through survey of the facility, conducted May 18, 1982, and interviews with management and employees, revealed that over the past 25 years approximately 37 gallons of PCB transformer oil drawn from three transformers in use at the plant were discarded onto the ground behind the transformers at two sites. In 1971, approximately 2-3 gallons of PCB transformer oil were spilled around one of the transformers. Several of the maintenance workers still employed at the plant at the time of the survey were involved in the cleanup. In addition, one employee was involved in sampling oil periodically from the transformers over a period of some 25 years and in filtering oil from transformers on two occasions. It was also learned that over a period of 20 years from approximately 1953 to 1973 the plant utilized asbestos insulation in their fabrication process. The plant is scheduled to close May 1982 and had ceased operations by the time of the survey, so no environmental samples were collected.

Extensive medical examinations were conducted on 12 employees, six of whom gave a history of potential exposure to PCBs. None of the workers by history or on examination, were found to have skin lesions of the type associated with PCB exposures. One worker had a possible melanoma and a second had unusual eczema-like patches on his trunk. Blood PCB levels for exposed and unexposed plant employees fell within levels seen in populations without any history of PCB exposure, <20 ppb PCBs. Blood studies for thyroxine hormone, serum glutamic-oxaloacetic tranaminases and alkaline phosphatase to determine thyroid or liver changes often seen with PCB exposure were normal except in two individuals, one of whom had a history of 25 years of intermittent exposure to PCBs.

Of the eight persons who worked in areas with potential asbestos exposure, two had histories compatible with chronic bronchitis; both are current smokers. In comparison, the four workers who had no history of working in these areas, two had histories compatible with chronic bronchitis; both had a history of past or current smoking.

Pulmonary function studies showed that four individuals had mild to moderate decreases in their vital capacity consistent with restrictive lung disease. Three of these four individuals had histories compatible with chronic bronchitis and two of the four did not work in asbestos areas. The one individual with the longest history of potential exposure to asbestos had the lowest vital capacity, 62% of predicted. Chest X-rays of this individual were poor quality and, reportedly, X-rays have not been repeated.

Samples of soils taken from PCB dump locations were analyzed by EPA and contained 4.8 and 110 ppm of PCBs. Based on interviews and review of work practices, it is considered likely that workers were exposed to soils which contain PCBs.

Based on medical and environmental evaluations, the analysis of soil samples, record review, and personal communications with employees at the Babcock-Wilcox Company, it is recommended that EPA Regulations continue to be followed with respect to handling and disposal of PCBs at this plant site. In addition, continued medical follow-up of individual(s) potentially exposed to PCBs and/or asbestos over the past 25 years at the plant is recommended.

KEYWORDS: SIC 3443, polychlorinated biphenyls, asbestos, transformers, boilermakers, dermatitis.

## II INTRODUCTION

On April 19, 1982, the Boilermakers Union Local 901 requested a NIOSH health hazard evaluation at the Babcock-Wilcox Plant in Brunswick, Georgia. The request stated that about 45 electricians and maintenance workers were exposed to polychlorinated biphenyls (PCBs) and several of these workers had developed a skin rash on their legs and hands.

An on-site survey of the facility was conducted May 18, 1982 by two industrial hygienists, a physician and a dermatologist. The goals of the survey were to evaluate the environmental conditions for possible exposure to PCBs, conduct medical examinations and develop appropriate recommendations to management to alleviate any problems found.

## III. BACKGROUND

The following information was obtained in initial discussions with management personnel and union workers. The Babcock-Wilcox Plant in Brunswick, Georgia, is situated on a 110-acre site with over 225,000 square feet of shop area under roof. The plant began preliminary operations in 1952 and for the past ten years has employed 600 to 800 workers. Management personnel informed the survey team that the plant would close permanently May 31, 1982 and that at the time of the survey fewer than 30 employees would be present. These employees are primarily maintenance personnel responsible for disassembling and removing plant equipment.

Three large transformers and 19 PCB-coded capacitors service the main welding areas of the plant. In 1971, approximately 2-3 gallons of PCB transformer oil were spilled around one of the transformers. Several of the maintenance workers still employed at the plant at the time of the survey were involved in the oil cleanup after this spill. In addition, one employee was involved in sampling oil periodically from the transformers over a period of some 25 years and in filtering oil from transformers on two occasions. After 1978 an outside contractor performed these duties and personnel from the plant were not involved with checking the transformer oil. Before 1978, to check the quality of the oil one quart was drawn from each transformer and discarded and a second quart was drawn for checking quality. Over the years approximately 37 gallons of transformer oil were drawn from the three transformers and discarded onto the ground behind the transformers at two sites. Twenty-five gallons were dumped at one site and 12 gallons at the other. On May 11-12, 1982, the U. S. Environmental Protection Agency (EPA) collected soil samples at the two sites where the oil drained from the transformers was reportedly dumped.

It was learned during the survey that over a period of 20 years from approximately 1953 to 1973, asbestos insulation was used in the fabrication process at the plant. This insulation was cut and installed on F and C floors in the shop area.

## IV. METHODS AND MATERIALS

Environmental evaluation consisted of interviews with management and union personnel about environmental conditions in the past, a walk-through industrial hygiene survey of the areas of concern and review of records for compliance with regulations on storage, handling and disposal of PCB transformer oil. Employees provided such information as they were able in the interviews. No environmental monitoring for vapors or airborne particulates was conducted during the survey.

Medical examinations were conducted on 12 plant employees. For the six employees who gave a history of potential exposure to PCBs the examination included an occupational history and medical screening history, a complete physical examination and special examination of the skin, pulmonary function testing, chest X-ray, sputum cytology, chemical profile, thyroid hormone analysis and blood analysis for PCBs. For those employees without a history of exposure to PCBs, examination was the same except that the physical examination, medical history, chemical profile and thyroid hormone analysis were deleted. The PCB blood analyses were done by gas chromatography and calculated as Arochlor 1254.

Eight of the employees examined worked on one or both of the floors utilizing asbestos for periods of 2 years to 20 years. Since the plant had an open layout and potential asbestos exposure was not limited to just the F and C floors, all employees examined received a respiratory history questionnaire developed by NIOSH for documenting history of chronic lung disease in workers exposed to pneumoconiotic dusts, tests of pulmonary flow rates and volumes using an electronic pulmonary function testing machine with an attached recorder, a Posterior Anterior (PA) chest X-ray interpreted by a certified B reader, and a sputum cytology examination analyzed by the Arras Medical Laboratory of the Glynn-Brunswick Memorial Hospital.

## V. EVALUATION CRITERIA

### 1. Environmental

Criteria for evaluation of the environmental condition in the past during normal operations was primarily based on the judgements of the industrial hygienists. Results from the U.S. Environmental Protection Agency also aided the hygienists in judging the extent of PCBs in the spill area.

### 2. Medical

a. Toxic Substance Review of the Literature

1. Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls comprise a class of synthetic, chlorinated aromatic hydrocarbons which because of their remarkable physical and chemical properties, including high stability, nonflammability, low solubility in water, and high solubility in hydrocarbon solvents, have enjoyed a wide variety of industrial uses. These same properties, however, are characteristics that contribute to their extreme stability and persistence in the environment and result in their accumulation and concentration in the food chain ("bioaccumulation"). Because of their widespread distribution in the environment and because of concern for their potential toxicity, these chemcials were banned under the provision of the Toxic Substances Control Act (PL 94-469), so that by April 11, 1979, "no person shall process or distribute in commerce any polychlorinated biphenyl" except as may be exempted by the Administrator of the U.S. Environmental Protection Agency (EPA).

Despite the voluminous scientific literature that has been published over the past decade, inadequate information is available by which to judge the potential health hazard to man from occupational exposure to polychlorinated biphenyls. The early occupational literature generally describes occupational acne (also termed chloracne), occasionally in association with systemic symptoms (i.e., nausea, vomiting, malaise, etc.) from exposure to various chlorinated hydrocarbon compounds. Chlorinated biphenyls were generally minor constituents of various chlorinated hydrocarbon compounds termed "Halowax"[R], which were used as insulating materials in the manufacture of electrical cables, capacitors, and transformers. Major constituents of the "Halowaxes" were chlorinated naphthalenes, which are known chloracnegens.[1,2,3,4] A number of deaths from liver disease were described among exposed workers in "isolated individuals who had been picked out of large groups (of workers) having the same (Halowax) exposure" with no ill effects.[1] Clearly, no judgments can be made about current types of occupational exposure to polychlorinated biphenyls based on a review of this early literature.

In 1968 in Yusho, Japan, an outbreak of skin disease similar to chloroacne was traced to widespread ingestion of a rice oil used for cooking that had been contaminated with a 48% chlorinated PCB heat exchange fluid (Kanecoloe-400).[5] Initial analyses of the rice were based on measurement of the total chlorine content and calculation of the PCB level from the knowledge that Kaneclor-400 was 48% chlorinated. Subsequent analyses, using the more refined methods of gas-liquid chromatography and mass spectroscopy, have identified the presence of polychlorinated dibenzofurans and other unidentified chlorinated hydrocarbon compounds, presumably products of the original PCB heat exchange fluid subjected to heat stress.[6] Thus, extrapolation from this epidemic, due to prolonged ingestion of a cooking oil in which the possible offending agents were multiple and are only partially identified, to the occupational exposure situation may not be warranted.

Occupational studies following the Yusho epidemic have failed to demonstrate any adverse human health effects due to occupational exposure to PCBs, except for the possible association with chloracne. These studies include studies of Japanese,[7] Swedish,[8] and Australian[9] workers. The Australian report should be noted because it demonstrated scattered abnormalities of liver function tests among PCB-exposed workers. However, it was not possible to judge whether these abnormalities were present in excess of the expected, and the mere finding of these abnormalities cannot necessarily be equated with liver toxicity.

Thus, excluding such observations as the fact that exposure to PCBs at concentrations of 5-10 mg/M$^3$ have been reported an "unbearably" irritating,[10] PCBs have not clearly been demonstrated to result in adverse human health effects with the possible exception of the induction of chloracne. In this regard, Crow[11] has stated: "Relatively mild fume exposure in the capacitor industry caused occasional chloracne with pentachlordiphenyls although this was not to be compared with that from penta- and hexaclornaphthalene. Since the change to trichlordiphenyl, however, even this has entirely disappeared, as I can confirm from my own recent inspection of some two-thirds of the British capacitor industry which was using this material extensively. Contact with the cold liquid chlordiphenyls, although undesirable because of skin absorption, appears to pose no acnegenic hazard."

In 1975 NIOSH initiated a study of the effects of occupational exposure to PCBs.[12] In surveys of three groups of workers occupationally exposed to PCB serum PCB concentrations were quantitated as lower chlorinated biphenyls (L-PCBs) and higher chlorinated biphenyls (H-PCBs). Serum L-PCB and H-PCB concentrations were many times greater among workers employed in power capacitor manufacturing than among the general population, even comparing employees never assigned to work in PCB-exposed areas. Statistically significant positive correlations of symptoms suggestive of mucous membrane and skin irritation, of systemic malaise, and altered peripheral sensation were noted with increasing concentrations of serum PCB. No clinical abnormalities attributable to exposure to PCB were observed. Serum PCB concentrations were positively and significantly correlated with glutamic-oxalacetic transaminase (SGOT), serum gamma-glutamyl transpeptidase (GGTP), and plasma triglyceride, and inversely correlated with plasma high density lipoprotein-cholesterol. These correlations were present across all study sites. These findings are indicative of PCBs' physiological effect on the liver, whose long-range health significance is unknown. Nevertheless, the consistent positive association of serum PCB with plasma triglyceride and negative association with plasma HDL-cholesterol may have long-term cardiovascular consequences.

The major effects that have been found in workers exposed to PCBs are chloracne, liver injury, and irritation of skin and mucous membranes. While PCBs have not been proven to pose a demonstrable hazard to human health from occupational exposure, it may be assumed, based on the available toxicological studies, that PCBs are not innocuous. Except for the possible association with chloracne, no conclusions are warranted, based on the available human data, save only that occupational exposure to PCBs may pose an as yet unidentified hazard to the exposed individual. Substances such as PCBs that cause cancer in experimental animals are normally considered to pose a potential cancer risk in humans. Therefore, it should be judged as prudent that exposure to these compounds be kept below the minimum detectable level, and that the absence of human data to demonstrate an adverse effect should not be interpreted as evidence for their safety.

2. Asbestos

Asbestos has been identified as a carcinogen.[13] A safe level of exposure to asbestos has not been demonstrated, but the probability of developing cancer should be reduced by decreasing exposure. In the interim, NIOSH recommends that engineering controls and stringent work practices be employed to reduce occupational exposure to the lowest feasible limit (LFL).

b. Health Status

Criteria for evaluation of health status are (a) comparison of results of Health Screening History and Respiratory History questionnaire responses of the exposed group of workers with those of a demographically similar group of workers who are not exposed, and (b) judgment of the examining physicians.

## VI. RESULTS AND DISCUSSION

### 1. Medical

Most of the employees with potential PCB exposures had their exposure primarily limited to involvement with a PCB transformer oil spill cleanup in 1971. One employee, however, was involved in sampling PCB transformer oil periodically over a period of some 25 years as well as involvement in filtering oil from transformers on two occasions. By history or on examination, none of these workers were found to have skin lesions of a type associated with PCB exposures. One of the workers had a possible melanoma and a second worker had unusual eczema-like patches on his trunk. Both of these workers were referred to dermatologists for further evaluation. Table 1 shows the results of current blood PCB levels for exposed and unexposed plant employees. These fell within a range of levels seen in populations without any history of any PCB exposure.

Table 1. Blood PCB Levels for PCB-Exposed and Unexposed Employees

| Employees With Potential PCB Exposure (ppb) | Employees With No PCB Exposure (ppb) |
|---|---|
| <3 | 4 |
| 3 | 5 |
| <3 | <3 |
| 4 | <3 |
| 6 | 5 |
| 13 | 4 |

ppb - parts per billion
Population Normals: <20 ppb PCBs

Special blood studies looking for thyroid or liver changes that can be seen with PCB exposure (Table 2) were normal except in two cases where there were slightly elevated alkaline phosphatase levels. Both of these individuals were referred to their family physicians for further evaluation of these conditions. The individual with the alkaline phosphatase of 135 was the individual with the history of 25 years of intermittent exposure to PCB transformer oil.

Table 2. Special Blood Studies for Thyroid or Liver Changes

| Employee | T4 (ug/dl) | SGOT (IU/ml) | Alkaline Phosphatase (IU/ml) |
|---|---|---|---|
| 1 | 8.4 | 22 | 92 |
| 2 | 9.3 | 20 | 135 |
| 3 | 9.1 | 20 | 123 |
| 4 | 9.9 | 26 | 80 |
| 5 | 9.7 | 41 | 63 |
| 6 | 7.9 | 29 | 95 |
| Normal limits: | 4-12 | 4-40 | 20-115 |

$T_4$ = thryoxine hormone
ug/dl = micrograms per deciliter
SGOT = Serum glutamic-oxaloacetic tranaminases
IU/ml = International Unit established by the International Conference for the Unification of Formulae per milliliter

Of the eight workers who worked on F or C floors with potential asbestos exposure, two had histories compatible with chronic bronchitis; both are current smokers. In comparison, of the four workers who had no history of working on these floors, two had histories compatible with chronic bronchitis; both had a history of past or current smoking (Table 3).

Table 3. Pulmonary Symptoms for Employees Exposed to Asbestos and Not Exposed to Asbestos

| Employee | Asbestos Exposure (years) | Chronic Cough | Chronic Sputum | Dyspnea on Exercise | Smoke |
|---|---|---|---|---|---|
| 1 | 5 | + | + | mild | current |
| 4 | 2 | 0 | 0 | 0 | current |
| 7 | 6 | 0 | 0 | mild | no |
| 8 | 20 | 0 | 0 | 0 | past |
| 9 | 10 | 0 | 0 | mild | past |
| 10 | 2-3 | 0 | 0 | 0 | no |
| 11 | 4 | + | + | 0 | current |
| 12 | 4 | 0 | 0 | 0 | no |
| 2 | 0 | + | + | mild | current |
| 3 | 0 | + | + | mild | past |
| 5 | 0 | 0 | 0 | mild | no |
| 6 | 0 | 0 | 0 | mild | no |

Pulmonary function studies showed that four individuals had mild to moderate decreases in their vital capacity consistent with restrictive lung disease (Table 4). Three of these four individuals had histories compatible with chronic bronchitis and two of the four did not work on F or C floors. The one individual with the longest history of potential exposure to asbestos had the lowest vital capacity at 62% of predicted. This individual also had the only chest X-ray which was interpreted as being compatible with a pneumoconiosis. This X-ray, however, was of poor quality and we have asked that this study be repeated. Inquiries with this individual's physician eight months after the survey indicated the chest X-rays were not repeated. This individual was also the only individual who was found to have atypical cells on his sputum cytology. Because of this finding he was further evaluated by his family physician and a repeat sputum cytology test done later was negative.

Table 4. Pulmonary Function Testing Results

| Employee | Asbestos Exposure (years) | Smoking | FVC[a] | (% predicted) $FEV_{1.0}$[b] | $FEF_{25-75}$[c] |
|---|---|---|---|---|---|
| 1 | 5 | current | 81 | 89 | 108 |
| 4 | 2 | current | 103 | 97 | 83 |
| 7 | 6 | no | 96 | 96 | 114 |
| 8 | 20 | past | 62 | 65 | 70 |
| 9 | 10 | past | 107 | 91 | 66 |
| 10 | 2-3 | no | 87 | 93 | 102 |
| 11 | 4 | current | 76 | 70 | 64 |
| 12 | 4 | no | 95 | 100 | 100 |
| 2 | 0 | current | 65 | 59 | 57 |
| 3 | 0 | past | 76 | 85 | 115 |
| 5 | 0 | no | 83 | 67 | 87 |
| 6 | 0 | no | 104 | 108 | 110 |

a. FVC (Forced Vital Capacity): The FVC measures the ability of the lung to fully expand. Reduction of this ability could be caused by such things as diffuse interstitial fibrosis of the lung ("restrictive" lung disease) from whatever origin (e.g., asbestosis, silicosis, talcosis), left heart failure, and impairment of full movement of the chest wall (polio). FVC can be reduced in obstructive syndromes as well.

b. $FEV_{1.0}$ (Forced Expiratory Volume in 1 Second: The $FEV_{1.0}$ is a widely used test for the measurement of airways obstruction. The $FEV_{1.0}$ is in fact a complex measurement of lung function which is determined by effort exerted by the subject, the cross-sectional area of the large airways (determining resistance to air flow in the large airways), and the elastic recoil pressure of the lung. The [$FEV_{1.0}$/FVC x 100] ratio (or FEV%) has also been used to indicate obstruction. Thus, if FEV% is below normal, then some degree of obstruction is occurring.

The $FEV_{1.0}$ is not a good measure of early chronic obstructive airways disease for several reasons. Peripheral (or small) airways are the major sites of resistance in obstructive lung disease.[13] The resistance in the small airways could double or triple without having an appreciable effect on total airways resistance - or therefore on the ventilatory maneuvers that for the most part reflect changes in the large airways. Until recently, most epidemiological studies of industrial lung disease relied heavily on Spirometry (FVC, FEV) for assessing lung function. It (FEV) needs to be included in subsequent studies at least for comparison, despite the fact that it is relatively insensitive in detecting small airways disease.

c. $FEF_{25-75}$ (Forced Expiratory Flow at Given Percentages of FVC): This is the average flow over the middle half of the vital capacity (between 25% and 75% of vital capacity, 0% is maximal inspiration. This test is a better measure than FEV of the ventilatory function of "small airways." As the lungs become more deflated, the resistance of smaller airways becomes increasingly important.

2. Environmental

Personnel in the Pesticides and Toxic Substance Branch of the U.S. Environmental Protection Agency (EPA) surveyed the Babcock-Wilcox Company on May 11-12, 1982. Two soil samples were taken at this time at the sites of the PCB spill and dumping areas. At the site where 25 gallons of PCB had reportedly been dumped over a period from 1953 to 1978, 4.8 ppm PCB was detected. However, employees stated that fill dirt had been placed over this area in the past and that the amount and depth were unknown. At the second site where the PCB spill had occurred in 1971 and 12 gallons of PCB were dumped between 1953 and 1978, 110 ppm PCB was detected. At this site no fill dirt had been used.

EPA also checked the company's records for compliance with regulations for storage and disposal of PCB oil. Reportedly the firm had adequate records on its premises to comply with regulations except records on the 1980 disposal of some waste PCB oil, containers and capacitors. This waste was held by the company since before 1978. These records had been mailed to the company's group headquarters in Barbertown, Ohio. The company has been making weekly inspections of its transformers, a schedule which exceeds the required frequency of once every three months. Records are kept of these inspections.

All PCB-filled equipment was marked as required by regulations. The company does not have any PCBs or PCB-filled equipment in storage. Before 1978, the firm had 3 partially filled 55-gallon drums of PCB liquid, 2 PCB capacitors, 2 small empty PCB contaminated containers, and 3 empty, uncontaminated drums for disposal. This material was held until EPA regulations took effect. To comply with the regulations, the firm then placed this material in sheet metal bins they constructed with welded seams. The sheet metal bins were then placed in a building with a concrete floor.

The firm contracted with High Voltage Maintenance Corporation of Dayton, Ohio, to dispose of this material per regulations. On June 24, 1980, the latter firm picked up this material.

In its walk-through industrial hygiene survey, the UNC survey team could only observe the location of the transformers and the PCB transformer oil dump site. For the past five years Babcock-Wilcox employees had not serviced the transformers.

Floor areas F and C where asbestos was used as insulation in fabrication processes had been cleared of equipment. The storage area for the asbestos was no longer intact. No asbestos was observed in the cracks or corners of the floor areas.

## VII. CONCLUSIONS

It does not appear that the potential PCB exposure during the 1971 cleanup produced any significant acute or long term illness. The one individual with periodic PCB exposure over a period of 25 years did have the highest elevated alkaline phosphatase. Alkaline phosphatase can originate from bone as well as liver and further evaluation of this individual will be necessary before this abnormality can be attributed to his PCB exposures. Also this individual had minor enzyme changes that are potentially related to this exposure. Further evaluation of this individual will be necessary to determine whether or not he does indeed have any liver disease. Of the twelve individuals evaluated for possible asbestos related lung disease, only one individual was felt to have plausible evidence of asbestosis. This worker was the individual with the longest potential exposure to asbestos. This individual has been further evaluated by his family physician and currently is being followed for his abnormal findings.

Copies of the detailed findings of all examinations have been released or are pending release to physicians for each worker. Summary letters have been sent to each worker who was examined during this health hazard evaluation.

From interviews with management and employees about use, dumping and spillage of PCB transformer oil in the past and PCB soil analysis obtained about the sites of the incidents the following may be concluded. Employees associated with the PCB filled transformers and the 1971 PCB transformer oil clean-up had potential exposure to PCBs via inhalation and skin contact.

Reportedly asbestos was used in the past on Floors F and C and there was potential exposure to workers on these floors in addition to workers in areas where fibers may have drifted.

## VIII. RECOMMENDATIONS

In view of the medical and environmental evaluations, the results of EPA's soil samples, record review, and personal communications with employees at the Babcock-Wilcox Company, the following recommendations are made to further reduce and/or eliminate employee exposure to PCBs. In addition, recommendations are made for follow-up on individual(s) potentially exposed to PCBs and/or asbestos over the past 25 years.

1. If the transformers stay intact for the next occupant of the building, steps should be taken to insure that warning labels regarding PCB are securely attached to the transformers.

2. If the transformers are disassembled, caution should be used as noted in EPA Regulations.

3. Further evaluation of the employee with periodic PCB exposure over a period of 25 years should be made, so that it can be determined whether his abnormality can be attributed to his PCB exposure.

4. The individual with the longest potential exposure time to asbestos, and with some evidence of asbestosis, has been further evaluated by his family physician and should continue to be followed for his abnormal findings.

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## X. AUTHORSHIP AND ACKNOWLEDGEMENTS

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## XI. DISTRIBUTION AND AVAILABILITY

Copies of this Determination report are currently available upon request from NIOSH, Division of Technical Services, Information Resources, and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After ninety (90) days the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from the NIOSH Publications Office at the Cincinnati, Ohio address.

Copies of this report have been sent to:

(a) Babcock-Wilcox Company, Brunswick, Georgia
(b) Boilermakers Union Local 901, Brunswick, Georgia
(c) U.S. Department of Labor, OSHA, Region IV
(d) NIOSH Region IV
(e) Georgia Health Department