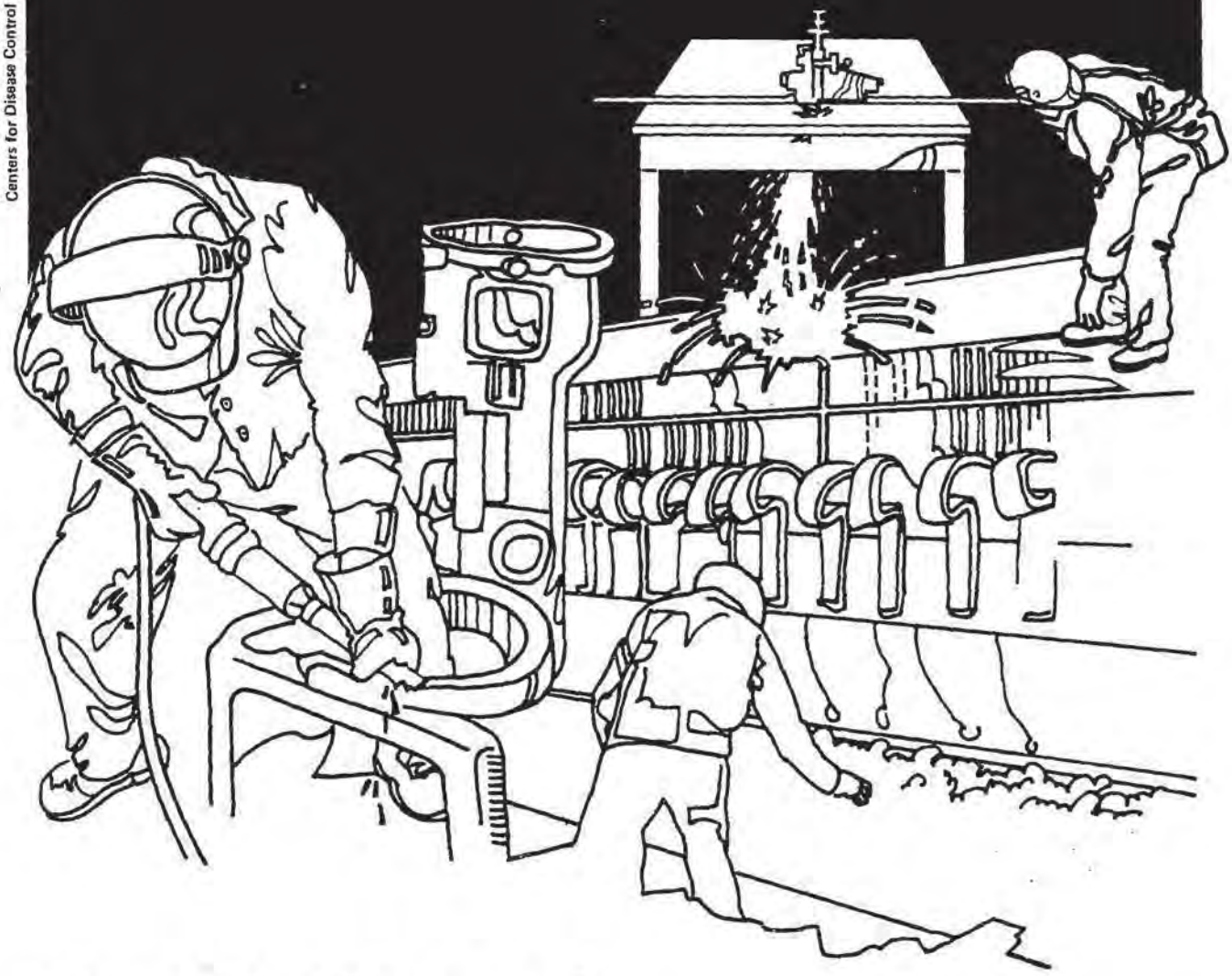
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES ■ Public Health Service
Centers for Disease Control ■ National Institute for Occupational Safety and Health

NIOSH



Health Hazard Evaluation Report

HETA 83-281-1457
HOLLEY ELECTRIC CORPORATION
JESUP, 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 83-281-1457
APRIL 1984
HOLLEY ELECTRIC CORPORATION
JESUP, GEORGIA

NIOSH INVESTIGATORS:
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I. SUMMARY

On May 13, 1983 the Georgia Dept. of Human Resources (DHR) requested technical assistance from NIOSH in evaluating potential hazards to employees of the Holley Electric Corp., Jesup, Georgia regarding worker exposure to polychlorinated biphenyls (PCBs). The primary business of this company has been rewinding electric motors, but about 1979 services were expanded to include electrical transformer repair, and later, PCB spill cleanup services and replacement of PCB transformer fluids.

On June 22-24, 1983, an occupational health hazard evaluation was conducted at the facility by the Georgia DHR, the Wayne County Health Dept., and NIOSH. To evaluate worker PCB exposure, industrial hygienists measured air and surface PCB contamination. PCB vapor levels in the operating portions of the facility ranged from 1 to 4 micrograms per cubic meter of air (ug/m^3). In the two warehouses, substantially higher airborne PCB concentrations were found near PCB storage drums and old electrical transformers. PCB vapor levels ranging from 25 to 74 ug/m^3 presented significantly higher worker exposure potential in the warehouses than in the other parts of the facility. The results of the wipe sampling for PCBs on working surfaces at Holley Electric generally ranged from 0.1 to 3 ug/100 cm^2. Higher levels were found on the floors in the shop area (28 and 30 ug/ 100 cm^2), probably residues from spills of transformer oils during transfers.

Blood samples had previously been collected in May 1983 by Georgia DHR for all full-time current employees. The twelve current Holley Electric employees were grouped according to their probable exposure to PCBs, based upon their work history. Two public health nurses with no known PCB exposure served as a local comparison group.

The levels of PCBs found in the blood of the 12 current workers ranged from 5 ppb to 128 ppb, with only one sample (128 ppb) exceeding the evaluation criterion of 30 ppb. The average level was 25 ppb. At levels between 5 ppb and 30 ppb, no clear assessment of health effects can be given at this time.

On the basis of airborne exposure levels in excess of the NIOSH-recommended limit of 1 ug/M^3, NIOSH has determined that a potential occupational health hazard may exist at this facility, especially in the two warehouses. Past work practices involving direct contact with PCB fluids probably contributed substantially to PCB body burdens. The contribution of current exposures from residual facility contamination to observed blood levels is unknown. It is recommended that the warehouses be thoroughly decontaminated prior to reuse.

KEYWORDS: SIC 7694 (Electric Motor Repair), power transformers, polychlorinated biphenyls, PCBs

II. INTRODUCTION AND BACKGROUND

On May 13, 1983 the Georgia Department of Human Resources (DHR) requested technical assistance from NIOSH in evaluating potential health hazards to employees of the Holley Electric Corporation in Jesup, Georgia regarding worker exposure to polychlorinated biphenyls (PCBs). Historically, the primary business of this company had been rewinding electric motors. Around 1979, the Jesup facility expanded its services to include the repair of electrical transformers, both at the company's facility in Jesup, and in the field at the facilities of customers. The company then became engaged in PCB spill cleanup operations for customers and performed transformer "retrofitting". Retrofitting involves replacement of PCB transformer oils with non-PCB substitutes. Used PCB-containing oils, and PCB-contaminated materials collected from PCB spill cleanups, were stored in warehouses at the Jesup facility until disposal.

In early 1983 the Georgia Department of Natural Resources, Environmental Protection Division (EPD), reported PCB contamination of soil at the site. Subsequently, the district office and state office of the Georgia Department of Human Resources, Division of Public Health, undertook a study of PCB exposures in and around Holley Electric. With the assistance and consultation of the Center for Environmental Health, Centers for Disease Control, the local and state health authorities utilized health survey questionnaires to identify persons considered to have the greatest potential exposures. A sample of individuals considered to be at greatest risk was chosen to obtain blood samples for PCB analysis. The individuals sampled came from 3 exposure groups - current employees, former employees, and neighborhood residents who lived adjacent to the facility. Out of a total of 16 persons sampled, 5 blood levels in excess of 20 parts per billion (ppb) were found. Of these 5 persons, one was a current employee, and four were former employees. This finding led to the study of occupational health hazards of current workers at the facility in order to identify what further protective steps should be taken.

On June 22-24, 1983, an occupational health hazard evaluation was conducted at the Holley Electric Corporation facility in Jesup, Georgia. The evaluation was conducted by Mr. James R. Drinnon, Environmental Health Section, Georgia DHR, and Mr. David S. Brake, Environmental Health Services, Wayne County Health Department, with technical assistance from NIOSH. Mr. Paul Roper, Regional Program Consultant, and Mr. Stanley Salisbury, Regional Industrial Hygienist, of the NIOSH Region IV office, Atlanta, Georgia, participated in the hazard evaluation and provided on-site technical assistance.

At the time of the NIOSH visit, excavation of contaminated soil around the facility had been completed, and the excavated soil had been replaced with fill dirt. Therefore, NIOSH did not observe firsthand this operation by Holley Electric employees. Furthermore, during the three days when the NIOSH team was in Jesup, PCB-containing liquids were not being pumped from the storage warehouses into a tanker truck for disposal. Therefore, NIOSH was not able to directly observe and evaluate the cleanup and removal of the materials from the warehouses. However, a description of the process was obtained, and an examination was made of the equipment and personal protective measures for these operations.

III. EVALUATION DESIGN AND METHODS

A. Industrial Hygiene Survey

On the afternoon of June 22, an opening conference was held with the plant manager, and a walk-through survey of the facility was conducted. NIOSH was informed that all transformer repair and retrofitting, where worker exposure to PCBs would result, had been discontinued. At the time of this survey, no employees were working with transformers or transformer fluids which would routinely expose them to PCBs at their occupations. Current and foreseeable PCB exposure would result only as a consequence of past contamination of the facility with PCBs. Thus the primary objectives of the industrial hygiene survey were to characterize contamination of the facility, by area or department, and to measure the degree of current worker exposure to PCBs as a consequence of past contamination of the worksite. It was not possible to evaluate worker exposure during removal of contamination from the facility because outdoor soil contamination had already been removed prior to the industrial hygiene survey; removal of PCB-contaminated liquids and equipment from the warehouses was not being conducted on the days of the survey, but was completed in a short time after the survey date.

On June 23 an industrial hygiene survey of the facility, concentrating on the assessment of PCB exposure to workers, was conducted. Air sampling for PCBs was conducted to measure potential exposure by inhalation (breathing). Wipe sampling of tabletops, machine handles, tool box surfaces, and the interior of work gloves was conducted to assess potential skin contact. Wipe samples of the palms of workers' hands and tabletops in the break room were collected to assess potential exposure via ingestion (swallowing).

The industrial hygiene survey covered all areas of the facility where work was being done and was expected to continue. These areas included the office, motor rewinding department, motor mechanic area, general machine shop area, and sand blast area. The warehouses where PCB oils and PCB- containing materials were stored were known to be contaminated. Air samples were collected in the warehouses to assist in determining the level of contamination and the type of respiratory protective devices to be worn when entering or working in the warehouses.

The surface wipe sampling was performed by wetting a Whatman smear tab with cyclohexane and then wiping the smear tab over a surface area of approximately 100 sq. cm. The tab was then placed in a glass scintillation vial and sealed.

The air sampling was performed using a 2-stage sampling arrangement. Air was first drawn through a 13 mm glass fiber filter to collect any PCB-containing aerosols. The filtered air was then passed through a florisil sampling tube, consisting of a glass tube containing 100 mg of florisil followed by a backup section of 50 mg of florisil. The florisil tubes were used to collect airborne vapors of PCBs.

The air and wipe samples were analyzed by gas chromatography[1] according to NIOSH Method S-120 with modifications:

Desorption Process	:	30 minutes of sonication in 2 milliliter of iso-octane
Gas Chromatograph	:	Hewlett-Packard Model 5711A equipped with an electron capture detector
Column	:	25m x 0.32 fused silica WCOT capillary coated internally with DB-5
Oven Conditions	:	Temperature programming from 210°C(held for 2 minutes) to 310°C at a rate of 8°C/minute
Carrier Gas	:	Five percent methane in argon
Injection	:	Splitless mode

The presence of Aroclors was determined by comparison with standard samples of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260 obtained from the EPA. None of the patterns of peaks in the samples matched exactly with the pattern of peaks in the standards. However, the pattern of standard peaks with the closest resemblance to the samples was chosen for quantitation.

Quantitation was performed by summing of the peak heights of five peaks of the standards and comparing those sums to the sums of the same peaks in the samples.

The limit of detection ranged from 0.05 to 0.20 micrograms per sample, depending on the specific Aroclors detected and the sampling medium from which the Aroclors were extracted.

B. Medical Evaluation

Both the State of Georgia (in April) and the Centers for Disease Control (in May and June) collected blood samples for PCB determination. County health personnel assisted with the collection of the biologic samples. In April a sample of selected individuals considered to be at greatest risk was chosen to obtain blood samples for PCB analysis. The individuals sampled came from 3 exposure groups - current employees, former employees and neighborhood residents who lived adjacent to the facility. Out of the sixteen persons sampled, five PCB blood levels in excess of 20 parts per billion (ppb) were found. Of these five cases, one was a current employee, and four were former employees. In May and June, the Centers for Disease Control collected blood samples for PCB analysis from all twelve current workers. Blood samples were also obtained from two Wayne County Health Department public health nurses who had no known PCB exposure.

The analytical method of Needham et al[2] was used to quantitate PCBs in human serum. The method includes denaturation of the protein in the serum, extraction, ion adsorption chromatography, and gas chromatography with electron capture detection. The method is capable of measuring concentrations as low as 10 ng PCBs/mL in 4 mL serum.

C. Classification of Exposure

Since work with transformers and PCB fluids had been discontinued at the company, the PCBs measured in worker blood samples were presumed to result from past exposures. Thus, workers were classified into low, medium, or high exposure groups on the basis of their work histories, rather than their current jobs, especially considering their actual or probable degree of past contact with PCBs.

Thus, office workers and motor rewinders were classified in the low exposure group, since neither transformers nor PCB fluids had been handled in these areas, although some contamination might have occurred from nearby areas. Motor mechanics and machine shop employees were generally classified in the moderate exposure group because transformer repairs and PCB spills had occasionally occurred in their general work area. Individuals who only occasionally worked with PCBs or cleaned up PCB spills were also considered moderately exposed. The high exposure group was composed of persons who once had high potential for PCB exposure, such as transformer mechanics and the field crew for PCB spill cleanup. Current positions or job descriptions of these workers are not indicative of their past jobs and PCB exposures.

IV. EVALUATION CRITERIA

Polychlorinated biphenyls (PCBs)

PCBs are synthetic, chlorinated, petroleum-derivative oils. Their manufacture in the United States was phased out from 1976 through 1979, then banned by the Environmental Protection Agency. Because of their dielectric properties and high stability, PCBs were used as coolants and insulators in most transformers and capacitors manufactured in this country before 1972. The typical useful lifespan of transformers is at least ten years. Therefore, many thousands of transformers, each containing up to several hundred liters of PCBs, are still in use. PCBs and their highly toxic contaminants, the chlorinated dibenzofurans, are persistent biosphere pollutants.[3] Long-term health hazards of residual amounts of these substances in human tissues are as yet unknown, but they should be regarded as potential human carcinogens. This assessment is based on data from animal studies which have shown PCBs to be carcinogenic and teratogenic, and hence potentially carcinogenic and teratogenic in man.[4]

A. Environmental Criteria

As a guide to the evaluation of the hazards posed by workplace exposures, NIOSH field staff employ environmental evaluation criteria for assessment of a number of chemical and physical agents. These criteria are intended to suggest levels of exposure to which most workers may be exposed up to 10 hours per day, 40 hours per week for a working lifetime without experiencing adverse health effects. It is, however, important to note that not all workers will be protected from adverse health effects if their exposures are maintained below these levels. A small percentage may experience adverse health effects because of individual susceptibility, a pre-existing medical condition, and/or a hypersensitivity (allergy).

In addition, some hazardous substances may act in combination with other workplace exposures, the general environment, or with medications or personal habits of the worker to produce health effects even if the occupational exposures are controlled at the level set by the evaluation criterion. These combined effects are often not considered in the evaluation criteria. Also, some substances are absorbed by direct contact with the skin and mucous membranes, and thus potentially increase the overall exposure. Finally, evaluation criteria may change over the years as new information on the toxic effects of an agent becomes available.

The primary sources of environmental evaluation criteria for the workplace are: 1. NIOSH criteria documents and recommendations, 2. The American Conference of Govern-

mental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLVs),[2] and 3. the U.S. Department of Labor (OSHA) occupational safety and health standards.[5] Often, the NIOSH recommendations and ACGIH TLVs are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLVs usually are based on more recent information than are the OSHA standards. The OSHA standards also may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended standards, by contrast, are based solely on concerns relating to the prevention of occupational disease. In evaluating the exposure levels and the recommendations for reducing these levels found in this report, it should be noted that industry is legally required to meet only those levels specified by an OSHA standard.

The OSHA permissible exposure limit[5] for the PCBs found, similar to Aroclor 1232, is 1,000 ug/M^3. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends an exposure limit for Chlorodiphenyl (42% Chlorine) of 1,000 ug/M^3, measured as an 8-hour time-weighted average.[6] NIOSH has recommended a much more stringent standard, based upon animal experiments where reproductive disorders and tumors were found in animal groups exposed to PCBs. NIOSH's recommended standard[4] is 1 ug/M^3, since this level was the lowest level considered reliably measurable at that time by our air sampling and analysis technique, and since scientific knowledge of PCBs is insufficient to establish what a safe level of exposure would be to protect workers from reproductive and tumorigenic effects.

B. Medical Criteria

Although there are no widely accepted normal values for serum PCB concentrations, levels can be compared to published values both for occupationally exposed groups and community groups without any known unusual exposure. A reasonable acceptable upper limit value for serum PCB would appear to be around 30 ppb [7,8]

V. RESULTS

A. Industrial Hygiene Sampling

The results of the wipe sampling for surface PCB contamination are shown in Table 1. As a result of previous NIOSH studies involving PCBs, we have found the uncontaminated surfaces generally have 0.5

micrograms or less of PCBs per 100 square centimeters of surface sampled (ug PCBs/100cm^2).[9] The levels found on working surfaces at Holley Electric generally ranged from 0.1 to 3 ug/100 cm^2. These levels represent trace contamination. Higher levels were found on the floors in the shop area (28 and 30 ug/100 cm^2), probably residues from spills of transformer oils during transfers. No elevated skin contamination was detected by wipe samples from one glove interior or three workers' hands. The warehouses where PCB-containing liquids and old transformers were stored were considered contaminated based upon previous use and storage of PCBs. Surface wipe samples confirmed higher contamination of surfaces in the warehouses.

The results of the air sampling for PCB content are shown in Table 2. A two-stage sampler was used to collect PCBs attached to airborne particulates as well as in vapor form. No PCBs were detected on particulate samples collected on filters. PCB vapors were detected in all the florisil sampling tubes. Levels found in the operating portions of the facility ranged from 1 to 9 micrograms of PCBs per cubic meter of air (ug/M^3). However, only 1 sample higher than 4 ug/M^3, a value of 9 ug/M^3, was found, except in the warehouses. No work was being performed in the warehouses during our survey, but air samples collected around PCB storage drums and old electrical transformers found higher contamination levels ranging from 25 to 74 ug/M^3.

B. Blood Sampling

The twelve current Holley Electric employees were grouped according to their probable past exposure to PCBs. The low exposure group (5 workers) included office workers, motor rewinders, and summer help. The moderate exposure group (3 workers) was composed of workers with secondary PCB contact; they were welders, motor mechanics and the occasional spill clean-up crew. The PCB high exposure (4 workers) group who had primary contact with the PCB oils were the foreman, plant manager and the field service crew, all of whom had significant PCB exposure during transformer servicing and PCB spill clean-up. Two public health nurses with no known PCB exposure also submitted blood for analysis. Individual PCB levels are presented in Table 3.

The average level of PCBs for the nurses was 4 ppb. PCB levels in the low exposure group ranged from 5 ppb to 6 ppb with the group average at 6 ppb. The moderate exposure group PCB levels ranged from 10 ppb to 25 ppb with an average PCB level of 17 ppb. A range of 10 ppb to 128 ppb, with an average PCB level of 45 ppb, was present in the high exposure group.

The low exposure group average PCB level was in close approximation with the non-exposed nurses. Three moderately exposed workers' average PCB level was 4-fold higher than the non-exposed nurses. The average PCB level for high exposure group was 10-fold higher than the nurses. These findings are illustrated graphically in Figure 1.

VI. DISCUSSION AND CONCLUSIONS

A. Survey Observations

Although air-purifying respirators and cartridges were provided for some airborne exposure hazards, including PCBs and silica (sand) dust, the company had no respiratory protective program to insure (1) that respirators fit workers properly, (2) that appropriate cartridges are selected for the hazard, (3) that the respirators are inspected, repaired, cleaned and maintained in a sanitary and properly functioning condition, or (4) that the respirators are effectively providing the degree of protection anticipated or required. In the sand blast room, the operator had not been provided with an air-supplied abrasive blasting helmet to protect against the hazard of silica sand inhalation which could ultimately lead to silicosis, a disabling lung disease. Fortunately, this operation was of short duration, averaging approximately 30 minutes per day. The company was in the process of phasing out the sand blast area and substituting glove-box enclosures employing glass beads for cleaning. Heavy rubber boots and disposable coveralls were worn by employees removing PCB wastes from the warehouses; protective gloves were also furnished, but were very dirty and probably PCB-contaminated. Holley Electric Corporation had not implemented the guidelines[10] issued by NIOSH and OSHA in 1981 for protecting employees who work with PCBs; of major significance was the absence of any medical monitoring program for employees.

The removal of PCB-contaminated liquids and old transformers from the warehouses, and packaging and shipping for disposal at a hazardous waste disposal facility, were of concern. The industrial hygienists wished to evaluate whether employees were adequately protected during these procedures, since the highest potential contamination was anticipated in the two storage warehouses. However, removal and disposal of warehoused materials did not take place during the 3 days, or portions thereof, when the industrial hygiene survey was conducted. The removal and disposal of warehoused materials was completed within a short time after the industrial hygiene survey was conducted. Therefore, first-hand observation and evaluation was not possible. The company did describe the procedure used and protective measures taken.

The respirators which the company provided during warehouse cleanup were an air-purifying type, equipped with two replaceable cartridges for protection against acid gases and organic vapors. However, these respirators may not provide adequate protection, since workers might not be able to smell or otherwise detect PCB vapors if (1) the cartridges reached their absorption limit

(saturation), (2) the respirator seal against the face was not adequate; or (3) there was a malfunction or defect in the respirator. NIOSH considers PCBs as potential occupational carcinogens and as materials with poor warning properties, since no quantitative data are available concerning their odor or irritation thresholds.[10] Therefore, NIOSH guidelines stipulate the use of supplied-air or self-contained breathing apparatus.[4]

The disposable coveralls provided by the company for skin protection may not provide adequate protection. PCB fluids have been found to penetrate rapidly through most types of chemical protective clothing.[11] One of the most resistant garment materials to the permeation of PCBs is a product manufactured by DuPont called Saranex-Coated Tyvek; it has been found to delay detectable permeation for 1 to 2 hours.

B. Air and Surface Contamination

As a result of previous NIOSH studies involving PCBs, it has been found that uncontaminated surfaces generally have 0.5 micrograms or less of PCBs per 100 square centimeters of surface sampled (ug PCBs/100 cm^2). The levels found on working surfaces at Holley Electric generally ranged from 0.1 to 3 ug/100 cm^2. These levels are considered to represent only trace contamination. Higher levels were found on the floors in the shop area (28 and 30 ug/100 cm^2), probably residues from spills of transformer oils during transfers. Airborne PCB levels in the operating portions of the facility ranged from 1 to 4 ug/M^3, slightly higher than the NIOSH-recommended exposure limit of 1 ug/M^3.

The warehouses where PCB-containing liquids and old transformers were stored were considered contaminated based upon previous use and storage of PCBs. Surface wipe samples confirmed higher contamination of surfaces in the warehouses. In the two warehouses, PCB vapor levels ranging from 25 to 74 ug/M^3 were measured near the PCB storage drums and old electrical transformers. These results demonstrated that the highest potential worker exposures to PCBs at the Holley Electric facility would be in the warehouses.

C. Blood PCB Findings

The levels of PCBs found in these 12 workers' blood ranged from 5 ppb to 128 ppb. The average level for these Holley Electric workers was 25 ppb. Currently, individual PCB levels over 30 ppb can be considered abnormal levels. At levels between 5 ppb and 30 ppb no clear assessment of health effects can be given at this time since the body of knowledge concerning low level PCB body burdens is yet in its infancy. The one sample of 128 ppb indicated overexposure for that individual.

Past work practices involving direct contact with PCB fluids probably contributed substantially to PCB body burdens, and were reflected in the observed blood levels. The contribution of current exposures from residual facility contamination to observed blood levels is unknown. For this reason, the NIOSH investigators did not attempt, and do not recommend any attempt, to correlate the observed blood PCB levels and measured airborne PCB levels reported here.

VII. RECOMMENDATIONS

On June 24 a closing conference was held with the plant manager. Preliminary findings and future plans were discussed. Briefly, the major recommendations made by the NIOSH team were:

1. Holley Electric Corporation should develop and implement an 11-point respiratory protection program which meets the requirements of OSHA Standard 29 CFR 1910.134.[5] NIOSH provided reference materials to use as guidelines.

2. Until the sand blast room can be completely discontinued, an abrasive blasting hood should be used to provide clean and safe breathing air for the blasting operator. The use of sand as a blasting agent should be phased out as quickly as possible.

3. In the motor mechanic room, the worker who spray-paints motors should avoid standing or walking between the motor and the exhaust fan, in order to avoid inhaling paint spray aerosols and vapors. The worker should probably wear a NIOSH-approved respirator for paint, lacquers, and enamels (PLE), to minimize exposure to splash-back.

4. Cylinders of compressed gases should be secured to prevent falls which could result in ruptures or explosions.

5. Chemical protective gloves for skin protection from PCBs in the warehouses should probably be discarded daily. No effective method is known for cleaning chemical protective clothing of PCB contamination.

6. Copies of the 1981 NIOSH/OSHA Occupational Health Guidelines for Chlorodiphenyl (PCBs)[7] were provided, with the recommendation that Holley Electric Corporation implement these guidelines as soon as possible. Furthermore, the more stringent NIOSH Recommended Standard for PCBs (Sept. 1977)[4] was provided, and the company was encouraged to consider voluntary implementation for protection of employees who may be exposed to PCBs.

These recommendations were reported in writing in a letter report of July 7, 1983, and distributed to the plant manager, state health department,

and county health department. Supplemental reference material and guidance was provided to the plant manager in a letter on July 8, 1983, to assist the facility in implementing the above recommendations.

On July 15, 1983, the plant manager made a telephone request for technical assistance regarding practical methods for decontaminating the warehouses. Further recommendations concerning warehouse decontamination practices and materials were provided to the plant manager in a letter on July 19, 1983. Since that time, results of air samples have been received which indicate that the highest potential exposures to PCBs exist in the warehouses. Based upon these results, the following additional recommendations are made:

7. In accordance with the practices and materials provided by NIOSH on July 19, 1983 to the plant manager, NIOSH recommends that the warehouses be de-contaminated prior to further use.

8. The efficacy of the decontamination should be verified by surface and air sampling before the warehouses are returned to routine use.

XIII. AUTHORSHIP AND ACKNOWLEDGEMENTS

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X. DISTRIBUTION AND AVAILABILITY

Copies of this report are currently available upon request from NIOSH, Division of Standards Development and Technology Transfer, Publications 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 22161. 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:

1. Holley Electric Corporation
2. Georgia Department of Human Resources
3. Wayne County Health Department
4. U.S. Dept. of Labor, OSHA, Region IV
5. NIOSH Region IV
6. Other appropriate State agencies

For the purpose of informing the approximately 12 "affected employees", the employer will promptly "post" this report for a period of thirty (30) calendar days in a prominent place(s) near where the affected employees work.

XI. REFERENCES

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TABLE 1

PCBs DETECTED FROM SURFACE WIPE SAMPLES
Collected June 23, 1983

Holley Electric Corporation
Jesup, Georgia
HETA 83-281

Sample Location/Description	PCBs (ug/100 cm^2)
Front office Secretary's desk top	0.3
Front office; window sill in front of small window A/C unit	0.5
Shop Foreman's office; desk top	0.7
Rest break room; table top	0.5
Rest break room; surface of telephone receiver	0.7
Motor Rewind Dept; surface of work table at side door, near refrigerator	0.4
Motor Rewind Dept; surface of work table by cutter and wire winder	0.1
Motor Rewind Dept; surface of water cooler (hand rest area)	0.8
Motor Rewind Dept.; Restroom; surface of toilet seat	0.5
Motor Baking Oven; surface of handle	0.4
Back (east) warehouse ledge over Panel "F"	0.9

Sample Location/Description	PCBs (ug/100 cm2)
Back (east) warehouse; top surface of bulk storage tank #3 (where much contamination was suspected)	2700
Surface of seat, front end loader (Bobcat 610)	3
Back (east) warehouse; inside surface of work glove	1
Surface of steering wheel; fork lift (DSB)	3
Machine Shop; surface of tool box	0.3
Floor of shop, near transformer drainage area	28
Surface of switch box for 10-ton crane	0.3
Motor mechanic area; surface of work bench on west wall, by tool box	1
Surface of motor test control panel	0.2
Surface of steering wheel on Mercedes delivery truck	0.2
Warehouse across street (west); surface of large transformer	6
Surface of handle on front door of warehouse across street (west)	9
Palm of hand of motor mechanic	0.5
Palm of hand of machinist	0.4
Floor of machine shop; across aisle from lathe	30
Palm of hand of motor rewinder	0.5
Floor, Motor Rewind Dept.	1

TABLE 2

RESULTS OF AIR SAMPLING FOR PCBs
Sampled June 23, 1983

Holley Electric Corporation
Jesup, Georgia
HETA 83-281

Dept./Sample Description/Type Sample	Sample No.	PCBs micrograms/M^3
Motor Rewind Dept.-Motor Winder-personal	FG/FL 1	1
Motor Rewind Dept.-Motor Winder-personal	FG/FL 2	2
Motor Mechanic Room-Mechanic-personal	FG/FL 3	4
Motor Mechanic Room-Sandblaster/Utility Man-personal	FG/FL 4	2
Machine Shop-Machinist-personal	FG/FL 5	3
Machine Shop-Machinist-personal	FG/FL 6	4
West Warehouse-Near Transformers-area (across road)	FG/FL 7	74
East Warehouse-Storage tank area-area	FG/FL 8	25
West Warehouse-PCB Drums storage-area	FG/FL 9	34
East Warehouse-PCB/H_2O Drums-area	FG/FL 10	52
Front office-Above file cabinet-area	FG/FL 12	1
Rest Break Room-Under air conditioner-area	FG/FL 13	2
Sand blast Area-Drum Storage-area	FG/FL 14	9

Evaluation Criteria:

OSHA Permissible Exposure Limit (PEL)	1,000 ug/M^3
ACGIH TLV	1,000 ug/M^3
NIOSH Recommended Standard	1 ug/M^3

TABLE 3

*Individual PCB Values in Blood
by Exposure Groups

Holley Electric Corporation
Jesup, Georgia

HETA 83-281

Low exposure (motor rewinders, office personnel, summer help)

6	
6	
6	Range: 5 - 6
6	
5	Average level: 5.8

Moderate exposure (mechanic, welder, spill cleanup)

25	
10	Range: 10 -25
22	Average level: 15.6

High exposure (foreman, road crew, manager)

28	
10	Range: 10-128
13	
128	Average level: 44.7

*All values are in parts per billion

FIG 1: BLOOD PCB LEVEL VS EXPOSURE GROUP

HOLLEY ELEC CORP, JESSUP, GA HETA 83-281