This Health Hazard Evaluation (HHE) report and any recommendations made herein are for the specific facility evaluated and may not be universally applicable. Any recommendations made are not to be considered as final statements of NIOSH policy or of any agency or individual involved. Additional HHE reports are available at http://www.cdc.gov/niosh/hhe/reports

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U.S. DEPARTMENT OF VETERANS AFFAIRS
REGIONAL OFFICE AND INSURANCE CENTER
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NIOSH INVESTIGATORS:
Christopher M. Reh, M.S.

I. SUMMARY

On November 27, 1989, the National Institute for Occupational Safety and Health (NIOSH) received a request for a Health Hazard Evaluation from the American Federation of Government Employees (AFGE) Local 940, Philadelphia, Pennsylvania. The AFGE Local 940 requested NIOSH's assistance in assessing the extent of polychlorinated biphenyl (PCB) contamination after a spill of dielectric fluids in a transformer vault within the U.S. Department of Veterans Affairs Regional Office and Insurance Center (VAROIC).

The NIOSH investigators performed area air and surface sampling in the vault and adjacent open office areas on February 22, 1990. Results of the ten area air samples taken in the vault and office areas found no detectable levels of PCBs. Inside the vault, surface wipe samples measured PCB contamination ranging form 6 to 10541 micrograms per square meter of surface area (ug/m^2), with the average inside the vault being 1476 ug/m^2. The PCB contamination was found to be limited to the floors, which had an average PCB surface concentration of 2452 ug/m^2 (n=6), compared to an average wall concentration of 13 ug/m^2 (n=4). The highest PCB surface concentration (10541 ug/m^2) was found at the site of the spill, which had been previously cleaned and encapsulated. The Environmental Protection Agency (EPA) requires that PCB surface levels in a transformer vault not exceed 1000 ug/m^2.

Surface sampling in the open office area found that the only area with elevated PCB surface contamination was the carpet directly outside the vault door (388 ug/m^2). Since the open office area is normally occupied, the NIOSH investigators recommend that PCB surface concentrations not exceed 100 ug/m^2, based on data from previous studies of PCB contamination in non-PCB exposed buildings.[34-38]

On the basis of the data collected during this survey, the NIOSH investigator concludes that a health hazard exists from PCB surface contamination in the transformer vault and the carpet directly outside the vault room. Recommendations are made in Section VII of this report for cleanup of the PCB-contaminated areas inside the vault, for removal of the contaminated carpet, to report the spill to the EPA Regional Office, and for guidelines for the proper cleanup of PCB spills in General Services Administration (GSA)-maintained buildings.

KEYWORDS: SIC 9451 (Administration of Veterans Affairs, Except Health and Insurance), SIC 6321 (Accident and Health Insurance and Medical Service Plans), polychlorinated biphenyls (PCBs), Aroclor 1260, transformer vault, spill cleanup.

II. INTRODUCTION

On November 27, 1989, the National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from the American Federation of Government Employees (AFGE) Local 940. NIOSH was requested to evaluate possible contamination of a transformer vault and the surrounding office areas from a spill of dielectric fluids known to contain PCBs. The spill occurred during the removal and replacement of the transformers in the vault, which is located at the U.S. Department of Veterans Affairs Regional Office and Insurance Center (VAROIC) in Philadelphia, Pennsylvania.

NIOSH investigators performed an industrial hygiene survey on February 21-22, 1990 in the vault and surrounding open office areas to determine the extent of the PCB contamination. A response letter was written on March 9, 1990, to VAROIC management and the union, describing the activities during the NIOSH site visit, and offering recommendations pertaining to future transformer removal operations. On April 3, 1990, the results from the surface sampling were reported, along with recommendations for decontamination of the floor surfaces in the vault, on the removal of a section of carpet outside the vault door, and on notifying the EPA Regional Office that a spill had occurred.

III. BACKGROUND

The VAROIC facility is a large, two-story office building which is maintained by the General Services Administration (GSA). The first floor consists of a lobby, cafeteria, and some offices; the second story is a modern, open office area. Within the confines of the open office area is a transformer vault that contained two transformers with PCB-containing fluids. GSA contracted with private firms to remove the transformers, to install new transformers, and to provide industrial hygiene support during the removal phases. The removal procedure consisted of pumping the PCB-containing dielectric fluid into a container, then removing the transformer through a large opening in the vault wall. The procedure was performed on a weekend, though VAROIC employees were working overtime in the adjacent office areas. Improper hook-up of the pump resulted in a spill of the PCB-containing fluids. A noxious odor filled the adjacent office area, which was evacuated, and a cleanup was initiated. It is not known if the subsequent cleanup was performed according to the procedure specified in the U.S. Environmental Protection Agency's (EPA) Toxic Substance Control Act (TSCA, 40 CFR 761, April 2, 1987). After the cleanup, the spill areas within the vault were encapsulated with paint, and the employees returned to the area.

IV. SAMPLING AND ANALYTICAL METHODOLOGY-PCBs

A. Surface

A wet-wipe protocol was used to assess the surface concentrations of PCBs.[1] The surface wipe samples were collected using 3" x 3" Soxhlet extracted cotton gauze pads which had been wetted with
8 milliliters (ml) of pesticide-grade hexane. The sampling procedure consisted of marking the boundaries of a 0.25 square meter (m^2) area on the desired surface and wiping this area with the gauze pad. The sample pad was held with a gloved hand; a fresh non-linear polyethylene, unplasticized glove was used for each sample. The

surface was wiped in two directions (the second direction was at a 90° angle to the first direction). Each gauze pad was used to wipe only one area. The gauze pad sample was then placed in glass sample container equipped with a Teflon-lined lid.

The gauze samples were prepared for analysis by extraction in 40 ml of hexane with shaking for 30 minutes. The hexane was transferred to a concentrator tube, and the gauze was rinsed twice with 10 ml of hexane. The concentrated hexane eluent was cleaned on a florisil column, and the sample was brought to a final volume of 3 ml.

The gas chromatographic analysis was performed on a Hewlett-Packard Model 5731A gas chromatograph (GC) equipped with an electron capture detector and accessories for capillary column capabilities. A 25 meter (m) x 0.31 ml fused silica WCOT capillary column coated internally with DB-5 was used with temperature programming from 210°C (held for two minutes) to 310°C at a rate of 8°C/minute. Five percent methane in argon was used as the carrier gas. The injector was operated in the splitless mode.

The presence of PCBs in the surface samples was determined by comparison with standard samples of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260 obtained from the EPA. Quantitation was performed by summing the peak heights of the five major peaks of the standards and comparing those sums to those of the same peaks on the sample. The limit of detection (LOD) and limit of quantitation (LOQ) for the seven Aroclors are 0.2 and 0.5 micrograms per sample (ug/sample), respectively.

B. Air

General area air samples for PCBs were collected by drawing air through 150 mg florisil tubes using battery-powered sampling pumps at a pre-calibrated flow rate of 1.0 liter per minute for the duration of the shift.

For analysis (NIOSH Method 5503[2]), the florisil tubes were separated into their primary and backup sections. Each section, along with the glass wool plug which precedes the front section, was desorbed in one ml of hexane with sonication for 30-minutes. The gas chromatographic analysis was performed on a Hewlett-Packard Model 5730A gas chromatograph (GC) equipped with an electron capture detector and accessories for capillary column capabilities. A 30 m x 0.31 mm fused silica WCOT capillary column coated internally with DB-5 was used with temperature programming from 210°C (held for two minutes) to 310°C at a rate of 8°C/minute. Five percent methane in argon was used as the carrier gas. The injector was operated in the splitless mode. The presence of an Aroclor was determined by comparison with standard samples of Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260 obtained from the EPA. Quantitation was performed by summing the peak heights of the five major peaks of the standards and comparing those sums to those of the same peaks on the sample.

Two Aroclors (1242, 1254) were found during the evaluation. The analytical limit of detection (LOD) was 0.007-0.14 micrograms per sample (ug/sample) for Aroclor 1242 and 0.003-0.07 ug/sample for Aroclor 1254. The limit of quantitation (LOQ) was 0.02-0.47 ug/sample for Aroclor 1242 and 0.01-0.25 ug/sample for Aroclor

1254.

V. EVALUATION CRITERIA

As a guide to the evaluation of the hazards posed by work place 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 work place 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 become available.

The primary sources of environmental evaluation criteria for the work place are: 1) NIOSH Criteria Documents and Recommended Exposure Limits (RELs), 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLVs), and 3) the U.S. Department of Labor (OSHA) Permissible Exposure Limits (PELs). The OSHA PELs may be required to take into account the feasibility of controlling exposures in various industries where the agents are used; the NIOSH-recommended exposure limits, by contrast, are based primarily 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 those levels specified by an OSHA PEL.

A time-weighted average (TWA) exposure refers to the average airborne concentration of a substance during a normal 8- to 10-hour workday. Some substances have recommended short-term exposure limits or ceiling values which are intended to supplement the TWA where there are recognized toxic effects from high, short-term exposures.

A. PCBs

PCBs are chlorinated aromatic hydrocarbons that were manufactured in the United States from 1929 to 1977 and primarily marketed under the trade name Aroclor.[3] They found wide use because they are heat stable; resistant to chemical oxidation, acids, bases and other chemical agents; stable to oxidation and hydrolysis in industrial use; and have low solubility in water, low flammability, and favorable dielectric properties. Additionally, they have low vapor pressure at ambient temperatures and viscosity-temperature relationships that were suitable for a wide variety of industrial applications. PCBs have been used commercially in insulating fluids for electrical equipment, hydraulic fluids, heat transfer fluids, lubricants,

plasticizers, and components of surface coatings and inks.[4]

The different PCB mixtures marketed under different trade names are often characterized by a four-digit number. The first two digits denote the type of compound ("12" indicating biphenyl), and the latter two digits giving the weight percentage of chlorine, with the exception of Aroclor 1016. In other commercial preparations the number code may indicate the approximate mean number of chlorine atoms per PCB molecule (Phenoclor, Clophen, Kanechlor) or the weight percentage of chlorine (Fenclor).

Dietary PCB ingestion, the major source of population exposure, occurs especially through eating fish, but PCB residues are also found in milk, eggs, cheese, and meat. PCB residues are detectable in various tissues of persons without known occupational exposure to PCBs. Mean whole blood PCB levels range from 1.1 to 8.3 parts per billion (ppb), while mean serum PCB levels range from 2.1 to 24.2 ppb for persons without known occupational exposure.[5] Mean serum PCB levels among workers in one capacitor manufacturing plant studied by NIOSH ranged from 111 to 546 ppb, or approximately 5 to 22 times the background level in the community. Mean serum PCB levels among workers in transformer maintenance and repair typically range from 12 to 51 ppb, considerably lower than among workers at capacitor manufacturing plants.[6]

PCB toxicity is complicated by the presence of highly toxic impurities, especially the polychlorinated dibenzofurans (PCDFs)[7], which vary in amount depending on the manufacturer,[8] and percent chlorination,[9] and which are found in increased concentrations when PCBs undergo incomplete pyrolysis.[10,11] As well, different animal species, including man, vary in their pattern of biologic response to PCB exposure.[12]

Two human epidemics of chloracne, "Yusho" and "Yu-cheng," resulted from ingestion of cooking oil accidentally contaminated by a PCB heat-exchange fluid used in the oil's pasteurization.[13,14] Although PCBs were initially regarded as the etiologic agent in the Yusho study, analyses of the offending cooking oil demonstrated high levels of PCDFs and polychlorinated quarterphenyls, as well as other unidentified chlorinated hydrocarbons, in addition to PCBs.[15]

The results of individual studies of PCB-exposed workers are remarkably consistent. Among the cross-sectional studies of the occupationally exposed, a lack of clinically apparent illness in situations with high PCB exposure seems to be the rule. Chloracne was observed in recent studies of workers in Italy,[16] but not among workers in Australia,[17] Finland,[18] or the United States.[6,19-21] Weak positive correlations between PCB exposure, or serum PCB levels, and SGOT,[16,18-20] GGTP,[6,16,20,21] and plasma triglycerides have been reported.[6,22,23] Correlations between plasma triglycerides[24] and GGTP[25] have also been found among community residents with low level PCB exposures. Causality has not been imputed to PCBs in these cross-sectional studies.

The International Agency for Research on Cancer has concluded that the evidence for PCB carcinogenicity in animals and humans is limited. "Certain polychlorinated biphenyls are carcinogenic to mice and rats after their oral administration, producing benign and malignant liver neoplasms. Oral

administration of polychlorinated biphenyls increased the incidence of liver neoplasms in rats previously exposed to N-nitrosodiethylamine."[26]
In a mortality study among workers at two capacitor manufacturing plants in the United States[27], a greater than expected number of observed deaths from cancer of the liver and cancer of the rectum were noted. Neither increase was statistically significant for both study sites combined. In a recent update of this study[28], however, with follow-up through 1982, an excess in liver/biliary tract cancer was statistically significant (5 observed vs. 1.9 expected). The excess in cancer of the rectum was still elevated but not statistically significantly so. In this mortality study, the personal time-weighted average exposures in 1976 ranged from 24 to 393 ug/m^3 at one plant, and from 170 to 1260 ug/m^3 at the other. During the time period (1940-1976) when most of the workers were exposed, the levels were probably substantially higher. At one of the plants, the geometric mean serum PCB levels in 1976 were 1470 ppb for 42% chlorinated biphenyls and 84 ppb for 54% cholorinated biphenyls.

In a mortality study among workers at a capacitor manufacturing plant in Italy[29], males had a statistically significant increase in the number of deaths from all neoplasms. When these were analyzed separately by organ system, death from neoplasms of the digestive organs and peritoneum (3 observed vs. 0.88 expected) and from lymphatic and hematopoietic tissues (2 observed vs. 0.46 expected) were elevated. This study was recently expanded to include vital status follow-up through 1982 for all workers with one week or more of employment.[30] In the updated results, there was a statistically significant excess in cancer among both females (12 observed vs. 5.3 expected) and males (14 observed vs. 7.6 expected). In both groups there were statistically non-significant excesses in lymphatic/hematopoietic cancer and a statistically significant excess in digestive cancer among males (6 observed vs. 2.2 expected).

In February 1986, NIOSH reiterated its previous recommendation that exposure to airborne PCBs in the workplace not exceed 1 ug/m^3 (based upon the recommended sampling and analytical method in use at the time), determined as a TWA for up to a 10-hour workday, 40-hour workweek.[31] This recommended exposure limit was based on the findings of adverse reproductive effects in experimental animals, on the conclusion that PCBs are carcinogens in rats and mice and, therefore, potential human carcinogens in the workplace, and on the conclusion that human and animal studies have not demonstrated a level of exposure to PCBs that will not subject the worker to possible liver injury.[32]

In 1971, based on the 1968 ACGIH TLVs, OSHA promulgated its permissible exposure limits of 1 mg/m^3 for airborne chlorodiphenyl products (PCB) containing 42% chlorine and 0.5 mg/m^3 for chlorodiphenyl products containing 54% chlorine, determined as 8-hr TWA concentrations (29 CFR 1910.1000). The TLVs, which have remained unchanged at 1.0 and 0.5 mg/m^3 through 1989, are based on the prevention of (non-carcinogenic) systemic toxicity.[33] The OSHA PEL and the ACGIH TLV values include a "skin" notation, which refers to the potential contribution to overall exposure by the cutaneous route, including the mucous membranes and eyes, by either airborne or direct skin contact with PCB.

NIOSH recommends that occupational exposure to carcinogens be reduced to the lowest feasible level. Results of several investigations of PCB surface

contamination in office buildings with no record of PCB exposure indicate that there is a "background" level of surface contamination in the range of 50 to 100 micrograms per square meter (ug/m^2).[34-38] Therefore, for surfaces in the occupational environment that may be routinely contacted by the unprotected skin, NIOSH investigators recommend that PCB contamination not exceed 100 ug/m^2 (the lowest feasible level considering background contamination).

The U.S. Environmental Protection Agency has published a spill cleanup policy (April 2, 1987 - 52 FR 10688) which includes discussions of industrial surfaces contaminated from PCB spills.[1] In the "Development" section of the policy (Risks Posed by Leaks and Spills of PCBs), the EPA states that the estimated level of oncogenic risk associated with dermal exposures of 1.0 ug/100 cm^2 (100 ug/m^2) of PCBs on hard, indoor, high-contact surfaces is between 1 x $10^{-5}$and 1 x 10^{-6} (between 1 in 100,000 an 1 in 1,000,000 cancer deaths). A high-contact industrial surface was defined as "a surface which is repeatedly touched, often for long periods of time." Manned machinery and control panels were given as examples of high-contact surfaces. The policy also states, "Residual PCB levels of 10 ug/100 cm^2 (1000 ug/m^2) on indoor low-contact surfaces in industrial areas would not be expected to result in significant exposures." Examples of low-contact industrial surfaces included ceiling, walls, floors, roofs, roadways and sidewalks, utility poles, unmanned machinery, concrete pads beneath electrical equipment, curbing, exterior structural building components, indoor vaults, and pipes.

However in EPA's consideration of the costs/benefits, and a general lack of data on the incremental costs of decontamination to various levels of PCB contamination, the EPA spill cleanup Final Rule requires that high-contact and low-contact industrial surfaces be cleaned only to 1000 ug/m^2, or 10,000 ug/m^2 for low contact, non-impervious surfaces with encapsulation. It should be noted that the EPA TSCA Polychlorinated Biphenyls Spill Cleanup Policy is legally enforceable in all State and Federal agencies.1

VI. RESULTS AND DISCUSSION

The results from the surface sampling for PCBs are presented in Tables 1, 2, and 3. Levels of Aroclor 1260 were found on all the surface samples, with no other Aroclor being detected on these samples.

Table 1 presents the results of surface sampling performed in randomly selected areas away from the spill location. Since the samples were collected in the open office area, and it is not an industrial area, the NIOSH investigators recommend that PCB surface concentrations not exceed 100 ug/m^2. This sampling found that the average building background level for PCBs at VARIOC was 3.0 ug/m^2.

Table 2 presents the surface concentration data from the sampling performed in the transformer vault. Considering that the transformer vault is physically separate from the open office area, and that access to the vault can be controlled by locking the door, and that it is not an area where people work on a routine basis, the NIOSH investigators recommend that PCB surface concentrations in the vault not exceed the EPA TSCA PCB Spill Cleanup Policy standard of 1000 ug/m^2.[1] PCB surface levels ranged from 6 to 10541 ug/m^2, with the average for the vault being 1476 ug/m^2. The PCB contamination is primarily limited to the floors of the vault, which have an average PCB

surface concentration of 2452 ug/m^2, compared to the average wall concentration of 13 ug/m^2. Spill cleanup procedures and the encapsulation of the spill area did not effectively remove or reduce the PCB surface concentrations in the spill area to acceptable levels (surface concentration of 10541 ug/m^2 in the location of the spill).

Table 3 consists of the PCB surface concentration data from the surface sampling performed in the office areas adjacent to the vault. As with the above building background surface concentration data (Table 1), the NIOSH investigators recommend that PCB surface concentrations in the open office area not exceed 100 ug/m^2. The average PCB surface concentration in this office area and outside of the vault is 31 ug/m^2. This average is greatly influenced by the one surface sample of 388 ug/m^2, taken on the carpet outside the vault door. If this section of carpet is removed and replaced with new carpeting, then the average PCB surface concentration for this area would be reduce to approximately 8 ug/m^2. Other than in the carpet directly outside the vault door, PCB contamination has been limited to the vault and has not migrated to the adjacent office areas.

Area air sampling was performed inside the vault and in the adjacent open office area. Data from this area air sampling are presented in Table 4. All ten of the area air samples did not measure detectable levels of PCBs. Although this air sampling data cannot reconstruct the possible PCB exposures that may have occurred during and immediately after the spill, it can be concluded that workers in the open office area and those entering the vault are not currently exposed to airborne levels of PCBs.

VII. RECOMMENDATIONS

The following recommendations are offered based on the conditions encountered and the data collected during the NIOSH survey. These recommendations should augment the recommendations in the previous NIOSH letter dated March 9, 1990.

1. Access to the vault room should be restricted until the floors of the vault are cleaned to PCB surface levels below the EPA TSCA standard of 1000 ug/m^2. A new lock should be installed on the vault door, as the present lock is easily compromised using a credit card or coat hanger.

2. A cleanup of the floors within the vault should be initiated immediately. The cleanup should follow the procedures set forth in the EPA TSCA PCB Spill Cleanup Policy[1], and should procede until PCB surface levels within the vault are below the EPA standard of 1000 ug/m^2, as confirmed by clearance surface sampling.

3. The carpeted area around the vault door should be cordoned off, preventing all VAROIC personnel from walking in this area.

4. The carpet directly outside the vault door should be removed and disposed of as PCB-containing waste. The area of the carpet to be removed should be determined by defining the PCB-contamination boundaries with surface sampling. Disposal of the contaminated carpet should be in an EPA-licensed treatment, storage, or disposal facility approved for this type of waste.

5. In the EPA TSCA PCB Spill Cleanup Policy,[1] the EPA specifically states "where a

spill exceeds 10 pounds of PCB material (generally 1 gallon of PCB dielectric fluid) ... the responsible party will notify the appropriate EPA regional office and proceed to decontaminate the spill area in accordance with this TSCA policy in the shortest possible time after discovery, but in no case later than 24 hours after discovery." If the EPA has not been notified of the recent spill, either the GSA or VAROIC should notify the EPA regional office immediately.

6. All future transformer removal activities should be performed at times when there are no workers in adjacent areas. These areas should be cordoned off and marked "Do Not Enter".

7. The transformer and its dielectric fluids should be at room temperature before any removal procedure is initiated.

8. Any spills of PCB-containing fluids in GSA-maintained buildings must be evaluated and cleaned up according to the EPA TSCA Polychlorinated Biphenyls Spill Cleanup Policy.[1] At least one competent person, who is familiar with the Policy, should be on-site during any removal activity which involves PCB-containing fluids. When a spill occurs, this person should be given the authority to assume control over the spill, the spill areas, and any adjacent areas that may be effected by the spill; and should immediately implement a cleanup according to the Policy. NIOSH recommends that this person be either an industrial hygienist and/or safety specialist with experience in spill cleanups.

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IX. AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared by:	Christopher M. Reh, M.S. Industrial Hygienist Industrial Hygiene Section
Field Assistance	Charles J. Bryant, M.S., C.I.H. Industrial Hygienist Industrial Hygiene Section
Analytical Support:	DataChem Laboratories 960 LeVoy Drive Salt Lake City, Utah 84123
Originating Office:	Hazard Evaluations and Technical Assistance Branch Division of Surveillance, Hazard Evaluations and Field Studies
Report Typed By:	Sharon Jenkins Clerk (Typing) Industrial Hygiene Section

X. DISTRIBUTION AND AVAILABILITY OF REPORT

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1. Chief, Management Staff, VARIOC
2. Chief, Personnel Division, VAROIC
3. President, AFGE Local 940
4. Safety and Health Officer, AFGE Local 940
5. Electrical Engineer, GSA
6. Regional Administrator, GSA
7. NIOSH Cincinnati Region
8. OSHA Region 3

For the purpose of informing affected employees, copies of this report shall be posted by the employer in a prominent place accessible to the employees for a period of 30 calendar days.

Table 1

Results From PCB Surface Sampling
Building Background Concentrations

Veterans Affairs Regional Office and Insurance Center
HETA 90-078
February 22, 1990

Sample Location	Concentration[1]
Bookcase in randomly selected office	5.2
Top of filing cabinet in randomly selected office	2.8
Carpet in randomly selected office	1.6
Table top near entrance and escalator	2.4
Average Building Background Level (n=4)	3.0
NIOSH Guideline	100.0

[1] Surface concentrations expressed in micrograms of PCBs (Aroclor 1260) per square meter of surface area.

Table 2

Results From PCB Surface Sampling
Concentrations Inside the Vault

Veterans Affairs Regional Office and Insurance Center
HETA 90-078
February 22, 1990

Sample Location	Concentration[1]
Inside wall surface of the vault door, near door knob	9
Floor directly inside the vault doorway	252
Painted floor, front of transformers and near opening	76
Concrete wall near opening	29
Unpainted floor, front of transformers and near opening	2160
Backside wall surface of GRP #2	6
Backside wall surface of Sub M-9	8
Floor on side of vault opposite the door	440
Unpainted floor, behind transformers and in spill area	1240
Painted floor, behind transformer and in spill area	10541
Average PCB Concentration in Vault (n=10)	1476
Average PCB Concentration for Floors in Vault (n=6)	2452
Average PCB Concentration for Walls in Vault (n=4)	13
EPA TSCA PCB Spill Cleanup Policy	1000

[1] Surface concentrations expressed in micrograms of PCBs (Aroclor 1260) per square meter of surface area.

Table 3

Results From PCB Surface Sampling
Concentrations in the Office Area Adjacent to the Vault

Veterans Affairs Regional Office and Insurance Center
HETA 90-078
February 22, 1990

Sample Location	Concentration[1]
Outside wall surface of vault door, near door knob	14
Desktop between L-9 and file cabinet 81	2
Tabletop between L-9 and file cabinet 81	1
Top of file cabinet next to opening in vault	2
Desktop next to file cabinets 77-78	8
Top of file cabinet 80	2
Carpet in front of vault opening	19
Carpet in front of vault door	388
Carpet near file cabinet 81	16
Tabletop between K-9 and file cabinet 78	6
Tabletop by Unit Chief's Office	11
Surface of L-9	10
Outside wall of vault near opening	13
Cement floor in front of freight elevator	18
Floor in the mail area	3
Intersection of D Street and Ajudication Alley	3
Intersection of I Street and Ajudication Alley	4
Average PCB Concentration Outside of Vault (n=17)	31
NIOSH Guideline	100

[1] Surface concentrations expressed in micrograms of PCBs (Aroclor 1260) per square meter of surface area.

Table 4

Results From Area Air Sampling for PCBs
Concentrations in the Office Area and the Vault

Veterans Affairs Regional Office and Insurance Center
HETA 90-078
February 22, 1990

Sample Location	Sample Time	Sample Volume[1]	Conc.[2]
Filing Cabinets No. 81	0756-1533	457	ND
Filing Cabinets No. 79	0757-1533	456	ND
Table Near Unit Chief's Office	0758-1534	454	ND
Table Near Beam L9	0800-1500	420	ND
Filing Cabinet on the North Side of Vault	0801-1443	403	ND
Outside of Vault Door	0802-1633	511	ND
Center of transformers Inside Vault	0816-1635	441	ND
West Side of Vault Next to the Transformers	0815-1429	374	ND
East Side of Vault Next to the Transformers	0813-1535	444	ND
Table in Front of Opening in Vault South Wall	0754-1525	451	ND
NIOSH REL			1

[1] Sample volumes expressed in liters of air.

[2] Concentrations (Conc.) expressed in micrograms of PCBs per cubic meter of air. Each air sample was analyzed for the following PCBs (Aroclors): 1016, 1221, 1232, 1242, 1248, 1254, 1260.
ND-none detected; i.e., less than 0.1 ug/m^3