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February 13, 1987
HETA 86-241

Mr. William D. Steuteville
Environmental Scientist
Compliance Officer
Removal Enforcement Section (3HW14)
U.S. Environmental Protection Agency - Region III
841 Chestnut Street
Philadelphia, Pennsylvania 19107

Dear Mr. Steuteville:

This letter will report on the National Institute for Occupational Safety and Health (NIOSH) environmental investigation of the Southeastern Pennsylvania Transit Authority (SEPTA) facility in Paoli, Pennsylvania, for evaluation of airborne and surface polychlorinated biphenyls (PCB) contamination within the SEPTA car shop maintenance and repair building.

Background

On March 14, 1986, NIOSH received a joint request from the Environmental Protection Agency (EPA) and the Agency for Toxic Substances and Disease Registry (ATSDR) to provide technical assistance in an investigation of the SEPTA rail yard and surrounding community. Specifically, the request to NIOSH was for an evaluation of occupational PCB exposure among SEPTA employees at the Paoli yard, and to provide recommendations for exposure reduction.

The Paoli Rail Yard is a 23 acre site owned by AMTRAK and previously operated by Conrail. Since January 1983, the site has been leased to and operated by SEPTA. The rail yard includes a switching area, office and storage facilities, employee locker and lunchrooms, and a building where electrical powered commuter trains are repaired and maintained. PCB contamination of the repair building has been known since at least 1978. The contamination is assumed to be the result of the use of PCB-containing oils in the transformers of the commuter rail cars. During the summer of 1986, under an EPA stipulation, a partial clean up of the maintenance and repair building was undertaken by SEPTA.(1)

On March 26 and 27, 1986, a regional industrial hygienist and a medical officer from NIOSH and an EPA representative made a preliminary visit to the Paoli Rail Yard. Although access to the facility was denied on March 26 by SEPTA officials, a limited "silent" tour of the facility was granted on March 27. Based upon the observations of the investigating officials, several preliminary recommendations were made including the necessity of an environmental evaluation for determination of employee PCB exposure.(2,3)

As a follow-up to the March 1986 visit, three NIOSH industrial hygienists visited the facility on November 6 and 7, 1986. Entry to the facility was permitted by SEPTA with the following constraints: the NIOSH investigators were not permitted to collect personal (breathing zone) air samples for PCBs, speak with SEPTA employees (for any reason), or collect PCB-wipe samples from personal items of employees or within the rail cars (to determine the potential for spread of PCB contamination to off-site locations).

The focus of the environmental evaluation was the maintenance and repair building and adjoining lunch, locker, storage, and office areas. The maintenance and repair building contains four service rail tracks (numbered 2-5) running its entire length, accessed by bay doors at either end. Pits of approximately three feet in depth are located between the rails of the tracks which allow employee access to the underside of the self-powered electrical rail cars. Catwalks are located between the tracks to allow access to the tops of the rail cars. Tracks 2 and 3 are generally used for routine maintenance activities, consisting of 45 and 90 day mandated inspections. Tracks 4 and 5 are reserved for "heavier" work involving repair and/or removal and replacement of under carriage items. Two overhead cranes are located above 4 and 5 tracks which are used to raise the cars for placement on stands, thus allowing removal of items from the underside of the cars. Approximately 50 rail cars/week are serviced in the car shop.(4)

On either side and directly adjacent to the repair and maintenance operations area are facilities for welding, machining of parts, inspection of electrical components, battery charging, locker storage areas, parts storage and distribution, and management offices. Within close proximity of the shop are two locker rooms (one large, two story locker room with shower and break areas, and one small locker room) and a lunch room.

The facility operates on three shifts, with approximately 55 employees on 1st shift (roughly 7am to 3pm), 35 employees on the 2nd shift, and 15 on the 3rd. The primary job categories were described as mechanics and electricians. Although some yard (outside) work is necessary, the majority of the maintenance and repair operations occur within the building. Details concerning job descriptions and day to day activities were unattainable during the evaluation.

Methods

The NIOSH environmental evaluation protocol employed at the SEPTA facility included standard methods normally used by the Hazard Evaluations and Technical Assistance Branch for determination of both airborne and surface PCB contamination. Environmental air samples were collected from 29 stationary positions within the car shop and related offices, lunch room, and locker rooms during the 3pm - 11pm shift on November 6, and during the 7am - 3pm shift on November 7. The air samples were collected over the duration of the shift using standard 150 milligram dual-section florisil tubes connected to battery-operated air sampling pumps calibrated at 0.6 - 1.0 liter/minute. Surface sampling was also conducted at various locations within the car shop, offices, locker and lunch rooms. These 64 samples were collected using 3"x3" soxhlet extracted gauze pads pre-wetted with 8 milliliters of hexane and wiping surfaces of 100 cm^2 to 0.25 m^2 both horizontally and vertically.

The air samples were prepared for analysis by separating the initial and back-up sections of the florisil tubes and desorbing each section in one milliliter (ml) of hexane with sonication for 0.5 hr. Gas chromatographic analysis was performed on a Hewlett-Packard Model 5730A gas chromatograph equipped with an electron capture detector and accessories for capillary column capabilities. A 30 meter x 0.31 millimeter 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 the sums of the same peaks in the sample. The calculated limit of detection (LOD) was 0.05 micrograms (ug) PCB/sample, while the calculated limit of quantitation (LOQ) was 0.17 ug PCB/sample.

The gauze surface 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 blown down with dry nitrogen. The gauze was rinsed twice with 10 ml of hexane which was then added to the original extract and brought to a final volume of two ml. Extremely dirty samples were brought to a volume of five ml with one ml put into a concentrator tube and used for the completion of preparation. Two drops of concentrated sulfuric acid were added to the sample mixed on a evapo-mix and allowed to settle for 30 minutes. The solvent was then drawn off and rinsed through a micro-florisil column with 9 ml of hexane. The eluate was brought to a final volume of 3ml. A 1:10 dilution of each sample was put in a one-ml crimp top GC-vial with the rest stored in a refrigerator in a 5-ml amber vial. The gas chromatographic analysis was the same as previously described for the air samples. The calculated LOD was 0.15 ug PCB/sample, while the calculated LOQ was 0.51 ug PCB/sample.

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 recommendations, 2) the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values (TLV's), and 3) the U.S. Department of Labor (OSHA) occupational health standards. Often, the NIOSH recommendations and ACGIH TLV's are lower than the corresponding OSHA standards. Both NIOSH recommendations and ACGIH TLV's 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 exposure limits, by contrast, are based primarily on concerns relating to the prevention of occupational disease.

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.

NIOSH recommends that airborne exposure to PCBs in the work place be limited to, or below, the minimum reliable detectable concentration of 1 microgram of PCB per cubic meter of air (ug/m^3) (using the recommended sampling methods) determined as a TWA for up to a 10-hr workday, 40-hr workweek. The NIOSH Recommended Exposure Limit (REL) was based upon the findings of adverse reproductive effects in experimental animals, on the conclusion that PCBs are carcinogenic in rats and mice and, therefore, potential human carcinogens in the work place, and on the conclusion that human and animal studies have not demonstrated a level of exposure to PCBs that will not subject workers to possible liver injury.(6)

The Occupational Safety and Health Administration (OSHA) promulgated its permissible exposure limit (PEL) of 1 mg/m^3 for airborne chlorodiphenyl products (PCBs) containing 42% chlorine and 0.5 mg/m^3 for chlorodiphenyl products containing 54% chlorine determined as 8-hr time-weighted average (TWA) concentrations based on the 1968 Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH).(6,7) The TLVs, which have remained unchanged at 1 mg/m^3 and 0.5 mg/m^3 through 1986, are based on the prevention of liver injury in exposed workers. The ACGIH Short Term Exposure Limits (STEL) for airborne chlorodiphenyls are 2 mg/m^3 and 1 mg/m^3 for 42% and 54% chlorine products, respectively. The OSHA PEL and the ACGIH TLV and STEL 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 PCBs.

There are no standard evaluation criteria (RELs, PELs, or TLVs) for industrial surfaces contaminated with PCBs. In July of 1985, an advisory panel was convened to provide guideline recommendations for air and surface clean up for PCBs, dioxins, and furans for the State Highway Department Building in Santa Fe, New Mexico. Both NIOSH and the Environmental Protection Agency were represented on this panel. These guidelines included specifications for PCB concentrations not to exceed 50 ug/m^2 on "working" surfaces.(8) Examples of working surfaces included "high contact" items such as desk tops and chairs. Although application of these guidelines to the industrial environment is difficult, recent recommendations by NIOSH for surface clean up of PCBs in an aircraft maintenance facility proposed 250 ug/m^2 for low contact surfaces, and 100 ug/m^2 for actual aircraft parts, or "high contact" items.(9) In January 1987, the EPA proposed a standard of 100 ug/m^2 for high use areas, which was defined as "an area in which people can make frequent and regular skin contact with surfaces present in the area."(10)

Results

Table I presents results of the NIOSH environmental air samples by location and duration in ug PCB/m^3 of air. The initial entry for a specific location presents results of samples collected during the afternoon/evening shift on November 6, with the second entry presenting results of samples collected during the morning/afternoon shift on November 7, 1986. Results appearing in parentheses represent "trace" concentrations which were detected upon analysis, yet of an insufficient amount to meet prescribed limits for accurate quantitation (i.e. the results were between 0.05 ug/sample LOD and 0.17 ug/sample LOQ).

Airborne PCBs were detected at all sampled locations on at least one of the two days of sampling. Twenty-seven of 46 samples collected within the car shop area were reported below the LOQ (less than 0.17 ug/sample), with one reported as non-detectable (less than 0.05 ug/sample). Airborne PCB concentrations of 18 samples reported above the LOQ within the car shop ranged from 0.38 to 0.72 ug/m^3, averaging 0.50 ug/m^3. Airborne concentrations above the LOQ were also reported within the general foreman's office (0.41 and 0.42 ug/m^3), the supply room (0.48 and 0.43 ug/m^3), and the upper level of the large locker room (0.45 ug/m^3). Airborne PCB concentrations within the lunch room, small locker room, and the lower level of the large locker room were below the analytical level of quantitation (Table I).

Forty-one surface wipe samples were collected within the car shop area. Eight of these samples were obtained from the bottoms of the four maintenance pits, with PCB surface concentrations ranging from 17,000 to 330,000 micrograms per square meter (ug/m^2), averaging 90,000. Eight samples were also collected from the pit walls, with PCB concentrations ranging from 392 to 2,480 ug/m^2, averaging 1,264. PCB surface contamination reported from eight samples of floors and aisle ways within the shop ranged from 2,480 ug/m^2 (on a recently painted surface), to 490,000 ug/m^2 on the aisle way at the east end of the "Mileage line" work area. The remaining 17 samples collected within the shop area also indicate excessive and widespread PCB surface contamination, with concentrations ranging from 21 to 31,000 ug/m^2, averaging 5,500. Six surface samples collected from the floors or stair steps in the large and small locker rooms, lunch room, supply room, and foreman's office, ranged from 1,200 to 60,000 ug/m^2, averaging 20,000 (Table II).

Discussion

As presented in Table 1, at the time of sampling the airborne PCB concentrations within the repair facility were below the NIOSH REL of 1 ug/m^3. In general, due to the low vapor pressure/high molecular weight of the PCB molecules, vaporization at ambient temperatures is quite low. However, PCB molecules will bind with particulates which may aerosolize and thus present an airborne exposure situation. During the two days of monitoring at the SEPTA facility by NIOSH, surfaces outside the maintenance building were wet from recent rains, which may have made a significant contribution to the relatively low airborne PCB concentrations within the building. The potential for significant airborne PCB laden particulates was demonstrated by samples collected near the parking area by an EPA consultant where PCB soil contamination ranges from 162 to 3000 ppm.(11) Near the entrance gate to the parking area, an airborne concentration of 1 mg/m^3 was recorded.(12)

Surface PCB samples collected within the maintenance facility indicate excessive and widespread contamination. Based upon previous environmental monitoring, questionnaire data and subsequent recommendations by a SEPTA consultant, a program of decontamination of the interior surfaces of the access pits was undertaken during the summer of 1986.(13) The questionnaire data from the employees indicated that most workers spend the majority of their time at locations described as inside the pits or alongside the aisles, and therefore the clean up effort was directed at these locations.

Prior to the clean up effort, surface concentrations reported by the SEPTA consultant within the pits ranged from 159,000 to 1,006,000 ug PCB/m^2. Surface concentrations measured by NIOSH following the decontamination effort ranged from 17,000 to 330,000 ug PCB/m^2. Although lowered, these concentrations still present an unnecessary exposure situation and grossly in excess of the 100 ug/m^2 proposed standard for working surfaces. The present contamination of the pit surfaces may either be due to recontamination from non-cleaned areas, or seepage of PCB-ladened oils through the resurfacing materials.

Surface samples collected from floors throughout the facility consistently showed high levels of contamination. A probable contributing factor is the high concentrations of PCBs in soils surrounding the maintenance building which are constantly tracked into and throughout the structure. High levels of PCB contamination on floors was not limited to the repair and maintenance area. Samples collected from the floors in the lunch room, large locker room and small locker room were reported at 32000, 60000, and 1200 ug PCB/m^2, respectively. This same pattern was demonstrated from floor samples obtained in the foreman's office and supply room, reported at 20400 and 5200 ug PCB/m^2, respectively (unfortunately, the NIOSH investigators were unable to measure PCB contamination on employee's shoes). This situation causes concern not only for occupational exposure to the workmen, but also for migration of PCB contamination to off-site locations, including automobiles and homes of workers, and to the rail cars.

Recent monitoring by EPA has demonstrated surface contamination on the floors of rail cars serviced at the Paoli site as high as 1400 ug/m^2.(14) This finding is not surprising in light of the magnitude of PCB contamination within the facility. During the NIOSH site visit we observed maintenance employees using rail cars as thoroughfares within the shop when the car's position blocked side to side access. This practice undoubtedly caused PCB-laden materials to be tracked onto the floors of the cars. In addition, the maintenance custodians responsible for routine cleaning of the rail cars are also responsible for cleaning the pits (current pit cleaning schedule is each pit/month).(3) If any tools or apparel of the maintenance custodians are common to both sites, contamination of the rail cars probably results. Also, any activities in the yard area requiring entrance into the cars would also result in contamination of their floors, based upon the level of contamination of the yard soil.(10) This contamination of the rail cars presents an unnecessary exposure situation to the operators of the cars and off-site maintenance custodians responsible for daily cleanings, in addition to the general public.

A number of high contact items were sampled for surface contamination within the maintenance and repair areas, including such items as air hoses, handles to various tools, and crane controls, to represent surfaces which would normally be handled for long periods of time, usually with bare hands.

Results ranged from 21 to 9800 ug PCB/m^2. The car shop employees are required to own their small tools.(4) Although we were not permitted to sample the surfaces of personal items, the consistent level of high contamination found on SEPTA-owned tools indicates that the employee's tools are likewise contaminated. No information could be obtained regarding storage of personal tools or frequency of transport of these items to the residence.

Although results of high contact surface samples obtained in the lunch and locker rooms were substantially lower than those from the maintenance and repair area, a number of surfaces did show significant contamination. For example, PCB surface contamination on a window ledge directly above a utensil storage area was measured at 656 ug/m^2. Contamination on benches in the locker rooms ranged from 256 to 760 ug/m^2. As previously described, floor contamination in these areas was extremely high (1,200 - 60,000 ug/m^2).

It should be noted that there is an inherent variation involved with the collection procedures for surface samples. Differences in collection techniques between investigators and types of sampled surfaces introduce this variation. However, the variation is negative in nature (ie. not all of the surface PCB contamination is collected on the wipe sample). As can be seen from the data presented in Table 2, results of most sampled items, particularly floors, indicate extremely high levels of contamination.

Conclusions and Recommendations

The data contained in Table 1 indicate airborne concentrations of PCBs within the maintenance facility at levels below the NIOSH REL during the time of the evaluation. However, these data do not represent employee exposures, but rather airborne concentrations at stationary locations (samples from the breathing zone of employees were unattainable). Although a contribution to airborne PCB concentrations within the facility would be expected from airborne PCB-laden particulates, the extent of such an increase is only speculative without appropriate monitoring (ie. personal sampling during dry weather conditions).

The environmental surface sampling data collected during the NIOSH survey indicate extensive PCB contamination within the car shop. This finding is in general agreement with the May 8-9, 1986 evaluation conducted by a SEPTA consultant.(12) These levels of contamination are the highest encountered by NIOSH during a health hazard evaluation. In addition to hand held, high contact items with surface contamination as high as 31,000 ug/m^2, all areas tested showed high levels of contamination on the floors. This aspect is important not only with regard to an occupational exposure, but has implications for potential tracking of PCB contamination to off-site locations. Data obtained by EPA consultants also indicate a high level of contamination in the soils surrounding the maintenance building. This situation has probably made a significant contribution to PCB contamination within the building.

Contamination of the pit floors remains as high as 330,000 ug/m^2. It is uncertain whether the current contamination within the pits is a result of ineffective decontamination and resurfacing techniques or a result of recontamination.

The following recommendations are based upon the environmental data collected during the NIOSH evaluation, environmental data obtained by EPA and SEPTA consultants, information obtained from a deposition of a SEPTA management employee, and our visual observations of the facility and work practices of the SEPTA employees.

1. The only acceptable long-term solution for reduction of PCB exposures experienced by SEPTA employees is decontamination of the facility, including the maintenance and repair building and associated structures, plus the surrounding soil accessible by the workers.

    a. Previous decontamination efforts within the pits were shown to be ineffective. To meet the proposed EPA standard for PCB surface contamination of 100 ug/m^2, it may be necessary to conduct "pilot" studies of the various surfaces and items within the facility to demonstrate effective clean up/decontamination techniques, including a post-decontamination sampling protocol to ensure effectiveness.

    b. Stringent controls should be implemented to protect against recontamination of cleaned areas during the clean up effort, particularly through tracking of PCB contaminated materials and migration of PCB-laden particulates.

2. As an interim measure, employees should be made aware of and strictly adhere to the recommendations contained in the NIOSH interim letter/reports of April 9 and May 5, 1986. (1,2)

3. To prevent off-site contamination of worker's automobiles and homes, disposable Tyvek shoe covers should be used and discarded when traversing the area between the parking lot and the locker room. We emphasize that separate work shoes and street shoes be used. Also, tools or other items used on-site should remain on-site.

4. Rail cars should be cleaned with a non-ionic detergent, and a representative number of cars should be sampled to demonstrate surface contamination below the proposed EPA criteria.

a. Only necessary personnel should be allowed inside the cars while in the yard or repair facility.

b. Disposable shoe covers should be used upon entering the cars.

c. Tools used for routine cleaning of the cars (ie. brooms and mops) should not be used on any other surfaces within the facility, and must be stored in a non-contaminated area.

Conflicting information was obtained on the extent of the transformer oil retrofill program.(3,10) If the retrofill program has been completed and the levels of PCB contamination of the transformer oils meet prescribed criteria, the following recommendation may not be appropriate.

A. Since any employee may become involved in the initial clean up of a PCB spill (3), all should undergo appropriate training for proper use of personal protective equipment and clean up techniques.

If you have any questions concerning the information contained in this letter, or if you would like additional information, feel free to contact me at FTS 684-4374.

Sincerely yours,

Richard W. Hartle, C.I.H.
Supervisory Industrial Hygienist
Industrial Hygiene Section
Hazard Evaluations and Technical
Assistance Branch
Division of Surveillance, Hazard
Evaluations and Field Studies

Enclosure

cc:
Mr. Walters, EPA
Mr. Mortensen, ATSDR
bcc:
D. Tharr
R. Hartle
W. Ruch
HETA 86-241

REFERENCES

1. Letter (and attachment) from Ralph W. Siskind, Esquire, to The Honorable Frank W. Vanderheyden, Office of Administrative Law Judges, U.S. Environmental Protection Agency (Region III). December 23, 1985

2. Interim letter/report from P.R. Kerndt and F. Lewis, NIOSH, HETAB, to B.K. Mortensen, ATSDR. April 9, 1986.

3. Letter from P.R. Kerndt and F. Lewis, NIOSH, HETAB, to B.K. Mortensen, ATSDR. May 5, 1986.

4. USA v. SEPTA; deposition of Richard J. Hanratty, Jr., December 9, 1986.

5. National Institute for Occupational Safety and Health. Criteria for a recommended standard: occupational exposure to polychlorinated biphenyls. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1977. (DHEW publication no. (NIOSH) 77-225).

6. Occupational Safety and Health Administration. OSHA safety and health standards. 29 CFR 1910.1000. Occupational Safety and Health Administration, revised 1980.

7. American Conference of Governmental Industrial Hygienists. Threshold limit values for chemical substances and physical agents in the workroom environment and biological exposure indices with intended changes for 1985-86. Cincinnati, Ohio: ACGIH, 1985.

8. Kominsky, J.R. and Melius, J.M. Final certification report: New Mexico State Highway Department's General Office Building and Annex, 1120 Cerrillos Road, Santa Fe, New Mexico. HETA Report no. 85-414. National Institute for Occupational Safety and Health, Cincinnati, Ohio, September 1986.

9. Department of the Navy. "Minutes of expert advisory panel meeting regarding contamination caused by the PCB transformer fire in building V-60, Naval Air Rework Facility, Norfolk." Memo from J.H. Aldrich, Commanding Officer, Naval Air Rework Facility, Norfolk, VA, dated July 7, 1986.

10. Memorandum to Vickie Province, Deputy OSC, U.S. EPA, Region III from Peter Harnett, TAT, Region III. January 5, 1987.

11. Letter to J. Bainbridge from S. Wassersug, and attachments, including Memorandum to Robert Caron and Vickie Province, OSC's EPA, Region III from Andre P. Zownir, Environmental Engineer, Environmental Response Branch, U.S. EPA Region III., December 10, 1986.

12. Sample Memorandum at Paoli Railyard from Sella M. Burchette, EERU to Philip R. Campagna, ERT Task Monitor.

13. Draft Project Report SEP-86-1. "Evaluation of PCB concentrations in surface, air and water samples at SEPTA Paoli Railyard, Paoli, PA." From N.S. Jurinski and P. Neely, NuChemCo, Inc., to R. Fasy, SEPTA and C.G. Wynkoop, Blank, Rome, Comiskey & McCauley, September 1, 1986.

14. Letter to J. Bainbridge, HETAB, DSHEFS, NIOSH, from B. Smith, HWEB, U.S. EPA Region III. January 8, 1987.

TABLE I

AIR SAMPLE RESULTS FOR PCBs
SEPTA
PAOLI, PENNSYLVANIA

HETA 86-241
November 6-7, 1986

No. Location	Duration	Concentration (ug/m³)
5. #5 pit, 1/4 distance from E. end	1420-2224	(0.38)*
54. #5 pit, 1/4 distance from E. end	0718-1513	(0.40)
3. #5 pit, midway	1423-2223	(0.23)
57. #5 pit, midway	0718-1513	ND**
4. #5 aisle, midway	1425-2224	(0.24)
68. #5 aisle, midway	0719-1511	(0.31)
9. #5 pit, 1/4 distance from W. end	1427-2223	(0.23)
75. #5 pit, 1/4 distance from W. end	0721-1500	(0.25)
6. Machine shop, near aisle for #5 pit	1428-2224	(0.27)
53. Machine shop, near aisle for #5 pit	0721-1512	(0.27)
8. #4 pit, 1/4 distance from W. end	1430-2219	(0.38)
76. #4 pit, 1/4 distance from W. end	0722-1500	(0.19)
2. between #4-5 tracks, 1/3 distance to W. end	1432-2220	(0.22)
66. between #4-5 tracks, 1/3 distance to W. end	0723-1507	(0.22)
1. #4 pit, midway	1433-2217	(0.25)
79. #4 pit, midway	0724-1509	(0.47)
7. between #4-5 tracks, 1/3 distance to E. end	1434-2219	(0.37)
52. between #4-5 tracks, 1/3 distance to E. end	0726-1508	(0.30)
10. #4 pit, 1/4 distance to E. end	1435-2217	0.50
62. #4 pit, 1/4 distance to E. end	0726-1508	(0.40)
18. between #3-4 tracks, 1/3 distance to E. end	1438-2216	0.42
70. between #3-4 tracks, 1/3 distance to E. end	0727-1450	0.47
19. #3 pit, 1/3 distance to E. end	1440-2218	(0.30)
72. #3 pit, 1/3 distance to E. end	0729-1451	0.72
20. between #3-4 tracks, 1/4 distance to W. end	1441-2221	0.44
74. between #3-4 tracks, 1/4 distance to W. end	0730-1451	0.51
13. #3 pit, 1/4 distance to W. end	1443-2216	0.46
55. #3 pit, 1/4 distance to W. end	0731-1452	0.66

(cont.)

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TABLE I (cont.)

No. Location	Duration	Concentration (ug/m³)
12. #2 pit, 1/4 distance to W. end	1445-1743	(0.58)
64. #2 pit, 1/4 distance to W. end	0733-1456	0.41
17. #2 pit, 1/4 distance to E. end	1447-2214	(0.17)
63. #2 pit, 1/4 distance to E. end	0734-1455	0.60
16. Mileage area at lockers	1448-2214	(0.27)
67. Mileage area at lockers	0736-1455	0.41
14. Mileage area, 1/4 distance to W. end	1450-2214	(0.23)
71. Mileage area, 1/4 distance to W. end	0736-1456	0.53
15. Mileage gang foreman's office	1455-2205	(0.15)
65. Mileage gang foreman's office	0739-1458	(0.25)
11. S. catwalk, 1/3 distance to W. end	1456-2207	(0.30)
69. S. catwalk, 1/3 distance to W. end	0740-1500	0.46
27. S. catwalk, 1/3 distance to E. end	1458-2209	0.53
78. S. catwalk, 1/3 distance to E. end	0741-1459	(0.57)
28. catwalk between #2-3 tracks, 1/3 to W. end	1502-2209	0.38
77. catwalk between #2-3 tracks, 1/3 to W. end	0746-1302	0.47
29. catwalk between #2-3 tracks, 1/3 to E. end	1503-2208	0.47
58. catwalk between #2-3 tracks, 1/3 to E. end	0743-1503	0.48
26. supply room outside clerk's office	1508-2231	0.48
61. supply room outside clerk's office	0751-1514	0.43
21. general foreman's office	1509-2231	0.43
80. general foreman's office	0752-1515	0.41
22. lunch room	1530-2230	(0.30)
54. lunch room	0753-1303	(0.21)
25. small locker room	1531-2230	(0.22
73. small locker room	0755-1358	(0.15)
30. lower level of large locker room	1532-2050	(0.49)
51. lower level of large locker room	0756-1337	(0.38)
23. upper level of large locker room	1537-2229	(0.28)
59. upper level of large locker room	0757-1518	0.45

*Values in parentheses represent "trace" concentrations which are of an insufficient amount to meet prescribed limits for accurate quantitation (i.e. the results were between 0.05 ug/sample LOD and 0.17 ug/sample LOQ).
**ND = None Detected (less than 0.05 ug/sample).

TABLE II

SURFACE SAMPLE RESULTS FOR PCBs
SEPTA
PAOLI, PENNSYLVANIA

HETA 86-241
November 6-7, 1986

No.	Location (surface type)	Concentration (ug/m^2)
	Lunch Room	
W-1	2nd table from South end (formica)	40
W-2	table at South end (formica)	40
W-3	3rd table from South end (formica)	34
W-4	4th table from South end (formica)	52
W-5	floor near door (painted cement)	32,000
W-6	door; both sides plus handles (painted metal)	84
W-7	pay telephone; entire outer surface (plastic)	18*
W-8	window ledge above utensil storage (painted cement)	656
	Small Locker Room	
W-9	bench (porous wood)	760
W-10	basin of circular sink (conglomerate cement)	108
W-11	floor below fire extinguisher (porous painted cement)	1200
W-12	door; both sides including handles (painted wood)	68
	Large Locker Room	
W-13	floor in north-central area (porous painted cement)	1520
W-14	lockers - doors on #'s 233 & 235 (smooth painted metal)	23
W-15	hand rail of stairs to upper level (smooth painted metal)	316
W-16	stair step to upper level (corrugated metal)	60,000

(Cont.)

MONS 019204

TABLE II (cont.)

No. Location (surface type)	Concentration (ug/m^2)
Large Locker Room	
W-17 lunch table in upper level (formica)	68
W-18 bench between lockers (porous wood)	256
General Foreman's Office	
W-19 Foreman's desk top (formica)	192
W-20 door to office; both sides including handles (painted wood)	232
W-21 floor between door and desk (tile; slightly porous)	20,400
Supply Shop	
W-22 floor near entrance door (smooth painted cement)	5,200
W-23 clerk's desk (plastic blotter)	100
Maintenance and Repair Shop	
W-28 #5 pit S. wall; 30' from east end (painted cement)	392**
W-29 #5 pit floor; 30' from east end (porous cement)	87,000
W-30 #5 pit S. wall; midway (painted cement)	720
W-31 #5 pit floor; midway (porous cement)	20,000
W-32 #4 pit N. wall; 25' from east end (painted cement)	1,800
W-33 #4 pit floor; 35' from east end (porous cement)	69,000
W-34 #4 pit N. wall; 100' from west end (painted cement)	680
W-35 #4 pit floor; 30' from west end (porous cement)	17,000
W-36 #3 pit floor; 75' from west end (porous cement)	330,000
W-37 #3 pit N. wall; 50' from west end (painted cement)	1,640
W-38 #3 pit S. wall; 90' from east end (painted cement)	2,400

(Cont.)

TABLE II (cont.)

No. Location (surface type)	Concentration (ug/m^2)
Maintenance and Repair Shop	
W-39 #3 pit floor; 40' from east end (porous cement)	21,000
W-40 #2 pit N. wall; 25' from east end (painted cement)	1,120
W-41 #2 pit floor; 30' from east end (porous cement)	98,000
W-42 #2 pit S. wall; 85' from west end (painted cement)	1,280
W-43 #2 pit floor; 100' from west end (porous cement)	78,000
W-49 N. aisle at #5 track, exit to lunch rm (recently painted)	4,000
W-50 N. aisle at #5 track, exit to lunch rm (porous cement)	260,000
W-51 Tread-break area work bench (painted metal)	60
W-52 re-wipe of W-51	156
W-53 Cab signal room work bench (unfinished wood)	560
W-54 Machine shop floor (painted concrete)	4,800
W-55 vise handle in machine shop (metal)	21*
W-56 N. aisle at track #5 near weld shop (recently painted)	2,400
W-57 N. aisle at track #5 near weld shop (porous cement)	74,000
W-58 lower N. aisle, #4 track, 50' to W. end (porous cement)	79,000
W-59 crane cntrl between #4 and #5 tracks (painted metal)	287
W-60 floor between tracks #3-4 (wood cover to access pit)	110,000
W-61 jack handle (metal) between #3-4 tracks	1,475
W-62 main door to shop, both sides plus handles (painted wood)	26
W-63 work bench at E. end of Mileage line (painted metal)	1,240
W-64 floor at E. end of Mileage line (porous concrete)	490,000
W-65 compressed air hose at Mileage line (rubber)	9,868

(Cont.)

TABLE II (cont.)

No.	Location (surface type)	Concentration (ug/m²)
	Maintenance and Repair Shop	
W-66	window ledge at central Mileage line (painted concrete)	28,000
W-67	shelf of battery storage area (wood)	13,000
W-68	electric tow-fork handle in Mileage area (metal)	710
W-69	desk in Mileage area (glass blotter)	176
W-70	Bench in Mileage area (masonite)	680
W-71	rail of stairs to catwalk in S.W. corner (painted metal)	80
W-72	floor of catwalk in S.W. corner (porous wood)	11,000
W-85	support beam holding catwalk in S.W. corner (rusty metal)	720

*not m² surface area; entire surface of sampled item.
**distances are approximate