

VIII. REFERENCES

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IX. APPENDIX I

SAMPLING PROCEDURE FOR COLLECTION OF POLYCHLORINATED BIPHENYLS

General Requirements

(a) Air samples representative of the breathing zones of workers must be collected to determine the exposure from each job or from the specific operation in each work area.

(b) Suggested records:

- (1) Date and time of sample collection;
- (2) Pump model and serial number;
- (3) Sample tube type and number;
- (4) Sampling duration;
- (5) Total sample volume;
- (6) Location of sampling;
- (7) Temperature, pressure, and relative humidity at time of sampling;
- (8) Other pertinent information.

Calibration

Since the accuracy of environmental sampling can be no greater than the accuracy of the air volume measurement, the accurate calibration of the sampling pump is essential to the correct estimation of the volume of the sample that is collected. The required frequency of calibration is dependent on the use, care, and handling to which the pump is subjected. Pumps should be calibrated initially and recalibrated if misused or

repaired. If pumps receive hard usage, more frequent calibration may be necessary. Regardless of use, maintenance and calibration should be performed on a regular schedule and records of these should be kept.

The accuracy of calibration depends on the type of instrument used as a reference. The choice of calibration instrument will depend largely upon where the calibration is to be performed. Ordinarily, pumps should be calibrated in the laboratory. For laboratory testing, primary standards, such as a spirometer or a soapbubble meter, are recommended, although other standard calibration instruments, such as a wet-test meter or dry gas meter, can be used. The calibration setups will be similar for all instruments.

Instructions for calibration with the soapbubble meter follow. If another calibration device is selected, equivalent procedures should be used. Since the flowrate of a pump depends on the pressure drop across the sampling device, in this case a "Florisil" tube, the pump must be calibrated while operating with a representative tube in line. The calibration system should be assembled in series following this order: soapbubble meter, water manometer, Florisil tube, and pump.

(a) Check the voltage of the pump battery with a voltmeter to ensure adequate voltage for calibration, and change or charge the battery if necessary.

(b) Turn on the pump and moisten the inside of the soapbubble meter by immersing the buret in the soap solution and drawing bubbles up the inside until they travel the entire buret length without bursting.

(c) Adjust the pump rotameter to provide the desired flowrate.

(d) Check the water manometer to ensure that the pressure drop across the sampling train does not exceed 2.5 inches of water at 0.2 liter/minute.

(e) Start a soapbubble up the buret and measure with a stopwatch the time required for it to move between calibration marks.

(f) Repeat procedure (e) at least twice, average the results, and calculate the flowrate from the volume between the preselected marks divided by the time required for the soapbubble to traverse the distance.

(g) Record the volume measured, elapsed time, pressure drop, air temperature, atmospheric pressure, serial number of pump, date, time, and name of person performing the calibration.

(h) The rotameter reading should be corrected for temperature and pressure, if necessary.

Sampling

(a) Samples should be collected as near as practicable to the faces of workers without interfering with freedom of movement.

(b) Samples should be collected to permit determination of TWA exposures for every job involving exposure to PCBs and in sufficient numbers to express the variability of the exposures in the work situation.

(c) Apparatus for Breathing Zone Sampling

(1) Pump, battery-operated, with clip for attachment to the worker's clothing. Airflow through the pump should be controlled within 5% of the desired rate during the entire sampling period.

(2) Sorbent Tubes

Glass tubes at least 7 cm long with 4 mm I.D. and containing

two sections of 30/48 mesh deactivated Florisil. (Florisil, 30/60 mesh, is sieved to the proper mesh size.) The front section, preceded by a glass wool plug, contains 100 mg adsorbent, and the backup section contains 50 mg. A urethane foam plug is placed between these sections and also behind the backup section. The ends of the tube are flame-sealed to prevent contamination before use.

Deactivate the Florisil before packing the tubes by drying a weighed amount at 105 C for 45 minutes. After cooling to room temperature, add the Florisil to a round bottom flask which can be attached to a rotary evaporator. Add water at 3 ml/100 g of Florisil (ie, 3% W/W water) and turn the mixture in the rotary evaporator for 1 hour or until it is uniformly mixed (free-flowing).

(d) Collection and Shipping of Samples

(1) Immediately before sampling, break each end of the sorbent tube to provide an opening at least one-half the internal diameter of the tube (2 mm).

(2) The smaller, or backup, section of Florisil should be positioned nearest the sampling pump.

(3) The sorbent tube must be vertical during sampling. Tubes should not be placed in a horizontal position since this may lead to "channeling" of the sorbent bed.

(4) Do not pass air being sampled through any hose or tubing before it enters the tube.

(5) Collect the air sample at a flow rate of 200 cc/minute or less to obtain the total sample volume required. The recommended maximum sampling volume for this method is 50 liters.

(6) Cap the sorbent tubes with inert plastic caps immediately after sampling. Under no circumstances are rubber caps to be used. Label tubes and note precise location assignments.

(7) Handle one additional tube in the same manner as the sample tubes except that no air is to be drawn through it. Label this tube as a blank.

(8) If the tubes are to be shipped, pack them tightly to minimize breakage in transit.

(9) Do not subject the tubes to extremes of temperatures or to low pressures.

(10) Provide bulk samples of the PCB preparation whose presence in the environment is suspected to the analytical laboratory. Do not transport these bulk materials in the same container as the samples or blank tubes. If possible, also provide a bulk air sample to use for qualitative identification.