

**STANDARD OPERATING PROCEDURE**  
***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

**KEY WORDS**

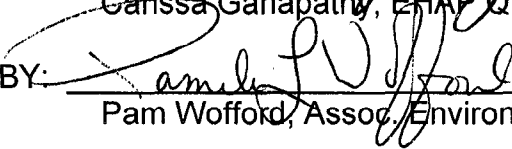
air sampling, low volume

**APPROVALS**

APPROVED BY:  DATE: 7/12/01  
Kean Goh, Management

APPROVED BY:  DATE: 7/12/01  
Mark Pepple, EHAP Senior Scientist

APPROVED BY:  DATE: 3/29/01  
Garissa Ganapathy, EHAP Quality Assurance Officer

PREPARED BY:  DATE: 7/12/01  
Pam Wofford, Assoc. Environ. Research Scientist

Environmental Hazards Assessment Program (EHAP) organization and personnel, such as management, senior scientist, quality assurance officer, project leader, etc., are defined and discussed in SOP ADMN002.

## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

## **1.0 INTRODUCTION**

### **1.1 Purpose**

This Standard Operating Procedure (SOP) discusses the calibration and use of SKC Inc. personal sample pumps for collection of air samples.

### **1.2 Scope**

This document will provide specific instructions for the use of SKC Inc. personal air pumps for the collection and estimation of pesticides in ambient air.

## **2.0 MATERIALS**

- 2.1 Constant flow, battery operated personal sampler (SKC # 224-PCXR8)
- 2.2 Adjustable low flow tube holders and plastic tubing
- 2.3 Sample tubes to be used in monitoring study
- 2.4 External batteries, 6-volt and connector cables
- 2.5 Film calibrator(s)
- 2.6 Rotameter
- 2.7 Tube breakers
- 2.8 Stakes or tripods
- 2.9 Extra-large binder clips
- 2.10 Battery and sample pump rechargers
- 2.11 A/C adaptors for sample pumps
- 2.12 Measurement equipment: compass, tape, rangefinder
- 2.13 Meteorological weather station
- 2.14 Dry ice and ice chest

## **3.0 PROCEDURES**

### **3.1 General**

Air sampling studies are usually conducted for the purpose of (1) determining the flux rate of a chemical following an application, or (2) estimating ambient air concentrations from off-site movement. The study objectives should be clearly stated in the study protocol so that study methods and sampling procedures may be designed accordingly. The chemical being monitored will determine the sample media and tube type.

## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

## **3.2 Calibration**

Flow rate is determined by the chemical being monitored and duration of the sampling period. The determination of the appropriate flow rate is the responsibility of the study project leader. The SKC personal sampler can be adjusted to sample smooth air flow for high volume flow (750 to 5000ml/min) as in section 3.2.1, or pulseless for low volume flow (5 to 500 ml/min) as in section 3.2.2. Calibration of samplers can be conducted in the laboratory before going to the field using the DryCal® Primary Flowmeters (section 3.2.3) or the Accuflow® film calibrator (section 3.2.2) or.

### 3.2.1 High flow settings

- 3.2.1.1 Charge SKC personal sampler pump for a minimum of 14 hours by connecting charger plug to sampler charging jack (Figure 1, #8), unless using AC power to run pump.
- 3.2.1.2 Remove the protective cap covering the regulator shutoff cap screw (#7). Using a screwdriver, make sure the adjustment screw is down all the way (do not overtighten).
- 3.2.1.3 Test the SKC personal sampler pump for full charge, unless using AC power, by turning the sampler on using "On" switch (#1). Press the "Hold" key (#2) then the "Flow and Battery Check" key (#3). Adjust the flow to 2 liters/minute using the flow adjustment control (#4 & #5). The LCD display should indicate "battery OK" in the upper left-hand corner. Connect to volt meter to determine the extent of the charge.
- 3.2.1.4 While in the battery test mode, connect the sample media to be used in the field to the filter housing intake (#6). Connect a flow calibrator to the inlet of the sample media. With the sampler running, adjust the flow to the desired rate using the flow adjustment control (#5). After completing the battery test and flow adjustment, turn off sampler.

### 3.2.2 Low flow settings (for use with either single or multiple adjustable low flow holders)

## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

- 3.2.2.1 Charge SKC personal sampler pump for a minimum of 14 hours by connecting charger plug to sampler charging jack (Figure 1, #8), unless using AC power to run pump.
- 3.2.2.2 Test the SKC personal sampler pump for full charge by turning the sampler on using "On" switch (#1) (Press the "Hold" key then the "Flow and Battery Check" key). Adjust the flow to 2 liters/minute using the flow adjustment control (#4 & #5). The LCD display should indicate "battery OK" in the upper left-hand corner.
- 3.2.2.3 Adjust the flow to 1.5 L/min (#4 & #5). NOTE: the flow is not critical but must exceed the combined sampling flow by at least 150 ml/min. After completing the battery test and flow adjustment, press the "Flow and Battery Check" key to halt the sampler.
- 3.2.2.4 Remove the protective cap covering the regulator shutoff cap screw (#7). If the sampler was previously used in the high flow setting, open the regulator shutoff valve by turning the adjustment screw 3 turns counter-clockwise with a small screwdriver. Replace the protective cap.
- 3.2.2.5 Connect an adjustable flow holder to the tubing attached to the filter housing intake (#6).
- 3.2.2.6 Connect the sample tube to be used in the field to the rubber or tubing connector of the adjustable flow holder. Be sure the tubing is connected to the correct end of the sample tube (air flow direction may be indicated on side of tube).
- 3.2.2.7 Connect a flow calibrator to the exposed end of the sample tubes (s). Loosen the anti-tamper cover on the manifold of the adjustable flow holder to expose the manifold's flow adjustment screw(s). Turn on the sampler and turn the manifold's slow adjustment screw(s) until the desired flow rate is obtained. Cover the manifold's flow adjustment screw(s) with the anti-tamper cover and tighten. Turn off the sampler.

## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

#### 3.2.3 Use of the DryCal® Primary flowmeter (5ml to 5000ml or 1L to 30L):

- 3.2.3.1 Connect tube from flowmeter to intake of sample tube.
- 3.2.3.2 Press the On button on the top of the flowmeter.
- 3.2.3.3 Turn on SKC personal sampler pump.
- 3.2.3.4 Press the Read button on the top of the flowmeter.
- 3.2.3.5 If the flow reading is more or less than 10% of the target flow, adjust the flow controller until the desired flow rate is reached.
- 3.2.3.6 Repeat reading to assure accuracy.

#### 3.2.4 Use of the SKC Accuflow® 712 Film calibrator (5 to 5000 ml/min):

- 3.2.4.1 Fill calibrator with soap solution to bottom of glass tube.
- 3.2.4.2 Constrict rubber bulb to create film bubble. Push the On/Reset button. Calibrator will read speed of bubble as it passes the two detectors.
- 3.2.4.3 If the flow reading is more or less than 10% of the target flow, repeat 3.2.4.2 and adjust the flow controller before creating next film bubble until the desired flow rate is reached.
- 3.2.4.4 Repeat reading to assure accuracy.

#### 3.2.5 Test rotameter against a calibrated sample pump before each study.

### **3.3 Sampling Site Location**

Sampling locations will be determined by the information required to fit the specific needs of the study objectives. For application monitoring, the sampling

## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

sites should surround the application to coincide with most possible wind directions and conditions. For ambient air monitoring, the samplers should be placed at locations relevant to the study. If stakes or tripods are used to hold samplers they should be securely placed at the location site and identified with a site location number. The sample pumps are placed at the location and the sample tubes are secured at a sampling height of approximately 1.2 m (4 ft). If the sampling location is near an electrical outlet, use the A/C adaptor to supply energy to the sample pump. For sampling in areas where electrical outlets are not available, the sample pumps have rechargeable nicad batteries. If the sample periods are scheduled to last longer than 6 hours, the sample pumps should be connected to external 6-volt rechargeable gel cell batteries with cables. The batteries should be exchanged with charged batteries at the beginning of each sampling period.

### **3.4 Sampling methods**

- 3.4.1 Immediately before the sampling period, prepare the sample tubes and attach to sampler in the end of tube connected directly to pump (#6) during high flow use or to low flow adaptor during low flow use. Secure sample tube(s) to stakes or supports.
- 3.4.2 The sample tube media should be protected from direct sunlight by either covering tubes with aluminum foil or placing extra-large binder clips over media in tubes. If there is a chance of rain, attach tubes to stakes so the open end of the sample tube chain is horizontal.
- 3.4.3 Turn the sample pump on. LCD reading on pump should be zero. Note time on the chain of custody (COC). Place the DryCal® primary flow calibrator or a calibrated rotameter over the intake end of the primary tube and turn sample pump on. Adjust to within 10% of desired flow. Remove calibrator or rotameter. Record flow reading of the COC.
- 3.4.4 At the end of the sampling period, place the DryCal® primary flow calibrator or a calibrated rotameter over the intake end of the primary tube and record the ending flow rate on the COC. Remove calibrator or rotameter and note LCD reading and time on COC. Turn sample pump off. All pertinent information should be recorded

## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

on the COC, and the sample tube(s) removed from the sample pump. The tube(s) should then be separated if necessary, capped and placed in the sample package bag and immediately placed on dry ice.

### **3.5 Troubleshooting**

If the pump does not run when turned on; check to see if the pump is in “hold” mode and correct, if not then replace the pump. If the pump turns on but does not pull air; check to see if the ball in the pump’s rotameter (#4) is moving, if not, turn off pump and shake upside down. If the pump still does not pull air, replace the pump with another pump. If the pump is off when at the end of the sampling period; record exact run time from the LCD display window on the COC and replace pump for next sample period. If the ending rotameter reading is more than 10% from the target flow rate, either recalibrate or replace pump with calibrated pump.

### **3.6 Meteorological station**

For all studies which require weather data measurements, a meteorological station should be set up next to or as close to the field as possible. The station should be placed away from any objects or structures which may impede wind flow. The meteorological sensors should be placed at a height of 10 meters from the ground. The data collection should be tailored to the needs of the study. The set up procedure for the meteorological station is described in SOP EQWE001.00.

## **4.0 REPORTING REQUIREMENTS**

### **4.1 Chain of Custody**

A chain of custody form should be completed for each sample according to SOP ADMN006.1. The following information should be recorded on the chain of custody

4.1.1 Study number

4.1.2 Sample number

## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

- 4.1.3 Sample location
- 4.1.4 Date and time of sampling
- 4.1.5 Machine identification
- 4.1.6 Flow rate of sampling pump
- 4.1.7 Exact run time for sampling pump
- 4.1.8 Sampling personnel
- 4.1.9 Identification of field or experimental plot
- 4.1.10 Chemical to be analyzed

## **4.2 Ancillary Information**

Other ancillary information should be recorded or included in the experimental notebook, including type of application, start of application, duration of application, application rate and total amount of chemical applied. Field applications require a map of the exact sampling location(s) in relationship to field layout, field soil type, weather conditions, application equipment, and specifics of any tarping material. Commodity fumigations require a diagram of fumigation chamber and area, holding time, exhaust type and rate, and commodity information. Structural fumigations require a diagram of structure, exhaust method, holding time, and specifics of covering material.

## **5.0 SAFETY**

Safety equipment should be available to personnel at all times in the field. It is the responsibility of the study field coordinator to determine the appropriate safety equipment necessary for the specific chemical being monitored. If a grab sampling detector tube is available for the chemical being monitored, air concentrations should be determined before working in an area in close proximity to an application. A measurement should be made at a sampling location closest to the application site.



## STANDARD OPERATING PROCEDURE

### ***Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps***

---

For Methyl Bromide Monitoring: Prior to any sampling period following application, ambient methyl bromide air concentrations should be determined before working in the area. A measurement should be made at a sampling location closest to the application site with a grab sample detector tube rated to measure concentrations to 0.5 ppm and detector tube pump. Self Contained Breathing Apparatus (SCBA) should be worn in areas determined to have high concentrations of methyl bromide.

## **6.0 STUDY-SPECIFIC DECISIONS**

The following study specific decisions are the responsibility of the study project leader, and should be made in consultation with the study field coordinator, senior scientists, and EHAP Quality Assurance Officer.

6.0.1 Sampling location

6.0.2 Flow rate

6.0.3 Sampling interval duration

6.0.4 Meteorological data

6.0.5 Sampling media

## STANDARD OPERATING PROCEDURE

### *Instructions for Calibration and Use of SKC Inc. Personal Sample Pumps*

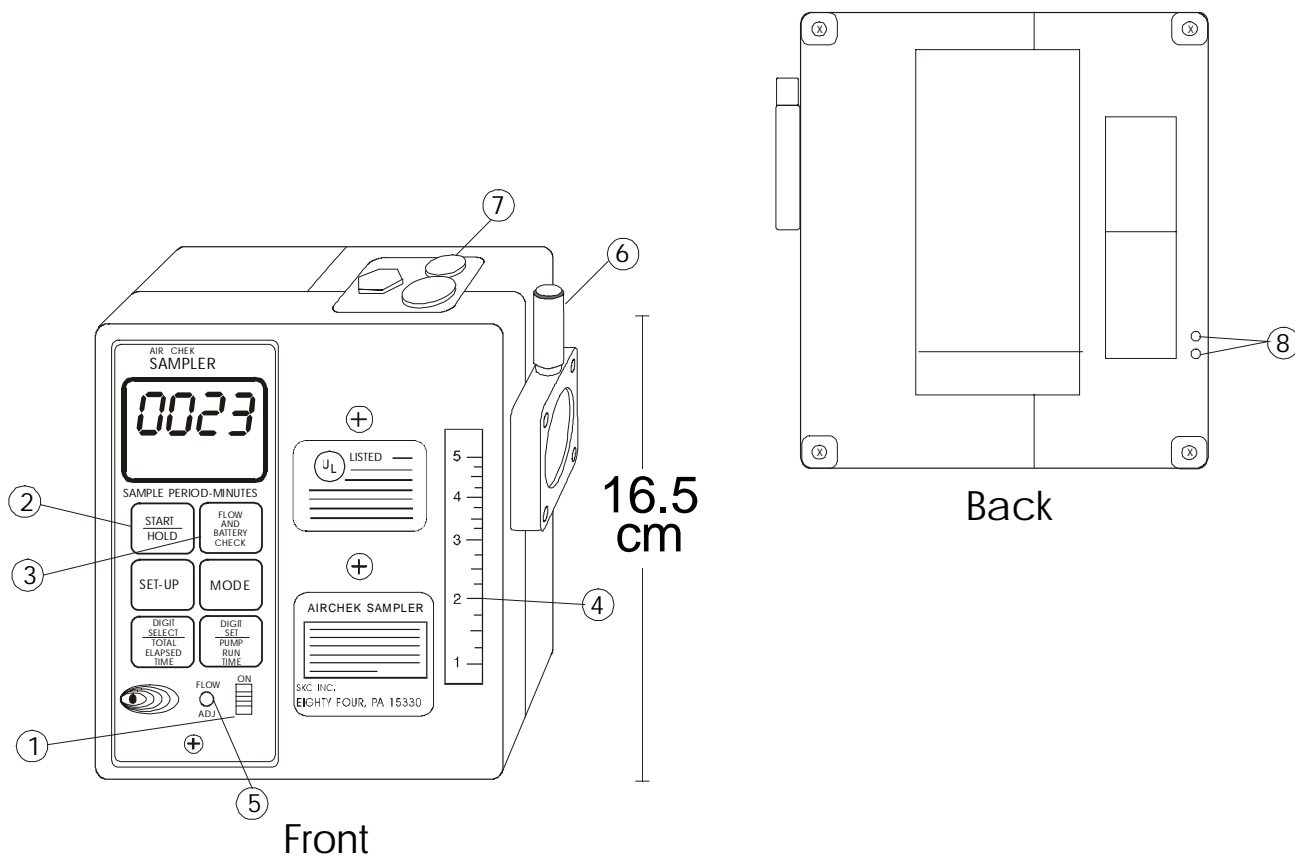


Figure 1. Low Flow Personal air sampler