

**APPENDIX B**

**Standing Operating Procedure**

Building #: \_\_\_\_\_

Room(s) #: \_\_\_\_\_

(Check all that apply)

\_\_\_Amendment

\_\_\_Chemical Agent

\_\_\_Biological/Toxin

\_\_\_Radiation

\_\_\_Lasers

\_\_\_Industrial

\_\_\_Pyrotechnics

\_\_\_Other (specify: \_\_\_\_\_)

**ABCD COMPANY**

**Title: Operation of Toxic Vapor Generator**

SOP#: XXX-XXX

Submitted by:

\_\_\_\_\_  
Team Leader

Environmental Quality Office: \_\_\_\_\_

Risk Reduction Office: \_\_\_\_\_

Approved by

\_\_\_\_\_  
Director

APPROVAL DATE: \_\_\_\_\_

**SOP TITLE**

**Operation of Toxic Vapor Generator**

I have read this SOP.

Signature

Date

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

## **Title: Operation of Toxic Vapor Generator**

### **I. Statement of Work** (Describe the intent of the SOP. An example follows.)

This SOP involves the operation of a multipurpose chemical vapor generation system for generating controlled toxic vapor concentrations over a wide range, in an approved hood or agent test chamber. This vapor generation system is primarily used for testing detection and alarm systems.

### **II. Additional Nonstandard Responsibilities** (List responsibilities of supervisors, operators, and all organizations involved in this operation)

### **III. Materials** (List necessary supplies, equipment, and substances to be used to support the operation. An example follows.)

- A. General laboratory chemicals
- B. Toxic chemical surety material (List surety compounds to be used.)
- C. Industrial chemicals (List all other TICs as needed.)
- D. Experimental compounds (List all experimental compounds considered.)

### **IV. Hazards Involved**

- A. General hazards involved
- B. Specific hazards: Refer to appropriate MSDS for chemicals.
- C. Equipment hazards: Refer to operator's manual for equipment hazards.

### **VI. Safety Requirements** (List safety requirements and/or related documents.)

### **VII. Procedures** (Explain the process. An example follows.)

The humidified agent vapor generator is used to provide a source of controlled humidified toxic chemical agent vapor for use in testing agent detection and warning devices. The agent vapor provided at the "sample port" may be delivered directly to the device being tested or to an optional glass cup or "test chamber" in which the device will be challenged. The "agent reservoir" can be either an agent bubbler or a "delta tube" that is loaded with a small amount of the chemical. An airstream passing over the deposited agent will carry the chemical vapor to the mixing manifold for dilution with a relative-humidity conditioned airstream to achieve the desired concentration.

***Preagent Operation Inspection and Test*** (Describe procedure to ensure integrity of the system and explain. An example follows.)

Set up equipment; examine all parts of the generator; label fittings of the agent reservoir and all generator connections; check for flow restrictions, loose connections, and proper flow connections throughout the system. List steps to complete the setup before adding surety material to the system (refer to Checklist A at the end of this SOP).

**List Operational Procedure** (List step-by-step and describe each step. Examples follow.)

- A. *Secure vapor source from storage hood:* Retrieve and transport the chemical agent from the “storage hood” to a working hood. The agent must be doubly contained during the transfer. Be sure to have a mask and a buddy available. Wear (TAP) or “approved” gloves for handling the agent container.
- B. *Check agent reservoir and agent bottle for external liquid contamination on outside of agent container* (example follows): Check agent reservoir and agent bottle for external liquid agent contamination on outside of agent container using the M8 paper. Wrap the top of the agent storage bottle with a piece of parafilm and place in a metal screw- or friction-top can containing vermiculite before returning the surety material to storage refrigerator. Do not touch the can with potentially contaminated gloves. Submerge all waste in a decontamination bath, wet thoroughly with decontamination solution, and dispose of in accordance to regulations.
- C. *Operation of vapor generator:* (Provide details of operation. Example follows.) In general, the operation would be performed by qualified personnel. Operators will read, sign, and observe the safety procedures listed in the SOP.
- D. *Sampling of agent vapors:* (List steps used for testing and sample collection and analytical methodology. An example for solid sorbent sampling of chemical vapor follows.)
  - a. A solid sorbent tube packed with a suitable sorbent is connected to a filtered suction line.  
Flow rate through the sorbent tube is accurately measured.
  - b. The sorbent tube is then inserted to the sample port to draw the sample for a length of time determined by the expected vapor concentration.
  - c. After the sample period, the sorbent tube is heat desorbed into a GC-type of instrument for analysis.
- E. *Decontamination:* Surety materials to be decontaminated will be collected in the appropriate decon solution following the established decontamination procedures.
- F. *Waste Treatment and Disposal* (example follows):
  - a. Solid wastes are removed from the decontamination bath, air dried, and collected in double-bag-lined toxic waste cans before capping and sealing with masking tape. The cans will be placed in fiberboard drums double-lined with plastic bags. The drums will then be transferred to the decon/detox facility for incineration or proper disposal. Waste

containing arsenic and Whetlerite carbon will be containerized separately and will not be incinerated. A hazardous waste contractor shall dispose of this waste. The spent decontamination solution, or liquid waste, will be combined with other spent decontamination solutions for proper disposal.

- b. Spent liquid decontamination solutions (bleach and/or sodium hydroxide) are placed in a jar, double-bagged and overpacked with vermiculite in a toxic waste can. The can is disposed of as per appropriate regulations.

- G. *Emergency shutdown procedures:* (List procedures to follow in case of power failure, fire, or other emergency incidents. An example follows.) In the event of an agent spill outside engineering controls, follow emergency procedures in the installation's emergency evacuation plan.

### **VIII. Emergency First-Aid/Self-Aid Procedures**

See *Related Document ABC (example)* for first-aid/self-aid procedures to be used in the event of emergency conditions arising during operations described in this SOP.

### **IX. Decontamination and Disposal of Toxic Chemical Agents**

- A. *Decontamination* (List procedure or related documents for decontamination procedure.)
- B. *Disposal* (List procedure or related documents for decontamination procedure.)

### **X. Site-Specific Contingency Plan for Spill Response**

- A. In case of a toxic or hazardous chemical spill resulting from fire, explosion, or other cause, the person discovering the spill will take whatever measures are immediately available to stop the discharge and contain the spilled material. This should be done only if doing so does not endanger the person's own health or safety or that of other employees in the area. The person will then immediately report the spill to:
  1. Installation-wide emergency number, XXX-XXXX or 911.
  2. Risk Reduction Office, XXX-XXX-XXXX.
  3. Environmental Quality Office, XXX-XXX-XXXX.
- B. Procedures outlined in Documents D, E, and F (examples), which are posted in all laboratory rooms, will then be followed. Action will be coordinated with the Risk Reduction Office and Environmental Quality Office.

**CHECKLIST A****Hazardous Operation (Surety)****Preoperational Checklist**

*Ensure That Is Present in the Room Prior to Start of Operations*

**General**

1. SOP contents applicable? \_\_\_\_\_
2. SOP current? \_\_\_\_\_
3. CSM use permit available and posted? \_\_\_\_\_
4. Posted at entrance? \_\_\_\_\_
5. Inventory record current? \_\_\_\_\_
6. First-aid kit available and updated? \_\_\_\_\_
7. Eyewash and shower tested? \_\_\_\_\_
8. Equipment properly marked? \_\_\_\_\_
9. Equipment in good repair? \_\_\_\_\_
10. Buddy present? \_\_\_\_\_
11. Supervisor notified? \_\_\_\_\_

**Ventilation**

1. Ventilation system approved? Hood # \_\_\_\_\_ Avg Velocity \_\_\_\_\_
2. Alarm activated? \_\_\_\_\_
3. Sash at approved level? \_\_\_\_\_
4. Hood face velocity checked? \_\_\_\_\_

**SOP Operation Preliminary**

1. Proper decon material available? \_\_\_\_\_
2. Toxic and hazardous waste container available? \_\_\_\_\_
3. Protective mask and clothing available? \_\_\_\_\_
4. Approved gloves available? \_\_\_\_\_
5. Eye protection used? \_\_\_\_\_
6. Lab coat worn? \_\_\_\_\_
7. Detection equipment available? \_\_\_\_\_

**Proceed to Operation:**

1. Visual examination of all parts of generator? \_\_\_\_\_
2. Generator ports labeled properly? \_\_\_\_\_
3. Necessary humidifier and dehumidifiers charged? \_\_\_\_\_
4. Check all lines for leaks or restrictions? \_\_\_\_\_
5. Test generator for proper flows as desired? \_\_\_\_\_
6. Turn off generator before connecting agent reservoir? \_\_\_\_\_
7. Agent reservoir attached properly and securely? \_\_\_\_\_
8. Double-check above steps? \_\_\_\_\_

Operators: 1. \_\_\_\_\_ 2. \_\_\_\_\_ Date: \_\_\_\_\_

**CHECKLIST B**

**Hazardous Operation (Surety)**

**Postoperational Checklist**

SOP # \_\_\_\_\_

DATE: \_\_\_\_\_

- 1. Generator turned off? \_\_\_\_\_
- 2. Agent reservoir properly capped or contained? \_\_\_\_\_
- 3. Gloves and other waste properly disposed? Registered? \_\_\_\_\_
- 4. Area cleaned up? \_\_\_\_\_
- 5. CSM material properly secured and accounted for? \_\_\_\_\_
- 6. Observed symptoms of possible exposure in buddy? \_\_\_\_\_
- 7. Washed hands with soap and water? \_\_\_\_\_
- 8. Secure hoods and room? \_\_\_\_\_

Operator 1. \_\_\_\_\_

Operator 2. \_\_\_\_\_

Date: \_\_\_\_\_

Time: \_\_\_\_\_