

BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division INDUSTRIAL HYGIENE GROUP Standard Operating Procedure	NUMBER IH75135
	REVISION FINAL Rev 0
SUBJECT: POLICY AND FIELD PROCEDURE: Mercury Spills- Area Clearance Testing	DATE 03-21-02
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3.0 Definitions

- 3.1 **Direct Reading Meter or Instrument:** An electronic meter with a sensor that detects mercury. The meter presents a real-time (instantaneous) display in concentration of the chemical sensed by the detector. An indicator tube, specific for mercury, and calibrated sampling pump can also serve as a direct reading instrument.
- 3.2 **Indicating Powder:** A commercial powder containing cuprous iodide, such as J.T.Baker Product Number 4509-01, that indicates the presence of droplets of mercury as a color change in the powder.
- 3.3 **Spill:** An unplanned release of mercury into the work environment.

4.0 Prerequisites

- 4.1 Prior to testing, the detection equipment must meet the requirements of its BNL method and manufacturer recommendations.
- 4.2 **Personnel Qualification**
- 4.2.1 Only persons who thoroughly understand this procedure and have demonstrated competency to the satisfaction of their supervision should conduct this testing.
- 4.2.2 Only persons who thoroughly understand the hazards of mercury and have documented training in Hazard Communication or Laboratory Standard should conduct this testing.
- 4.3 **Hazard Assessment of area:**
- 4.3.1 The task of using a direct reading meter in itself does not pose significant employee health risks. But by its very nature, this SOP may be performed in areas with mercury contamination. Do not perform sampling until a competent individual has assessed the hazards of the area.
- 4.3.2 Handling the indicator powder is hazardous and protective equipment must be used.
- 4.4 **Personal Protective Equipment:** Appropriate personal protective equipment to protect the person collecting the sample and handling the indicator powder and working around spilled mercury are:

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- **Hand:** Use disposable gloves. Exam-style, splash gloves are acceptable. Acceptable elastomers are: Nitrile, PVC, and Natural Rubber. Remove and dispose of the gloves immediately after spreading the powder. Don a second pair of gloves to further handle equipment.
- **Body:** If contact of the body with contaminated surfaces is anticipated, a disposable suit should be used. Acceptable CPC materials include: Tyvek®, KleenGuard®, and cotton. Disposable garments must be discarded as mercury waste if contact with contamination has occurred. If personal clothing items become contaminated, they must be surrendered for BNL cleaning or disposal.
- **Foot:** If contact of the feet is anticipated with contaminated surfaces, disposable shoe coverings, boots or booties should be used. Acceptable CPC material include: Tyvek®, KleenGuard®, and rubber. If personal shoes become contaminated, they must be surrendered for BNL cleaning or disposal.
- **Respiratory:** Under normal use, respiratory protection is not required. If mercury, chemical in the area exceed (as indicated by the direct reading meter) or are likely to exceed the OSHA, ACGIH, or DOE standards, respirators are required. A half face or full face APR or PAPR respirator with mercury cartridge or an air line respirator may be used up to the assigned protection factor listed in the BNL's Respiratory Protection Selection and Issuance SOPs.
- **Eye:** Safety Glasses with side shields are required in all laboratories, construction, and general industry work areas. If exposure is above the Occupational Exposure Limit (PEL/TLV), vapor-proof goggles or full-face respirator must be used.

4.5 **Work Planning:** All requirements of work permits and work planning system reviews must be met in performing this procedure.

4.6 **Environmental Impact and Waste Disposal:** Direct Reading meters do not have adverse impact on the environment or create waste for disposal. Indicator powders are considered hazardous waste and must be handled, transported and disposed of in accordance with BNL Waste Management Division requirements.

5.0 Precautions

5.1 Verify the testing personnel will not be exposed to hazardous airborne levels of the mercury by testing the highest probability source first. Test all sources in a manner that does not place the tester's breathing zone in vicinity with a suspected spill source, i.e. approach with meter in front of the employee. Move slowly to allow the meter to

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respond to mercury vapors. Use appropriate respiratory protection if indicated by the airborne vapor levels. The appropriate respiratory protection equipment used must be approved by the RCD Facility Support Group or SHSD IH Group.

6.0 Procedure

6.1 Equipment:

- 6.1.1 Appropriate PPE as determined in Step 4.4.
- 6.1.2 Mercury Indicator powder, J. T. Baker Product Number 4509-01, or equivalent.
- 6.1.3 Jerome Mercury Meter 431X, or equivalent.

6.2 Observe that the clean up of the spill follows an approved procedure and that appropriate PPE and exposure monitoring is conducted. After appropriate abatement, clearance testing may be initiated.

6.3 **Airborne Vapor test:** Using a direct reading meter, sample at a height of one (1) inch (2.54 cm) above the entire surface of the spill area. If no concentration above **0.010 mg/m³** is detected, the surface “passes” the *Airborne Vapor* test.

6.4 **Visual Inspection of spill area:** Visually examine surfaces and crevices for droplets of mercury (shiny, silvery droplets). If none are observed, proceed to *Indicator Powder* testing. If droplets are observed, instruct the appropriate personnel to repeat the approved clean-up procedure.

6.5 If the *Airborne Vapor* test and the *Visual Inspection* are successfully passed, the area not immediately involved in the spill may be released for limited re-occupancy. Place barriers, such as warning tape, to prevent access to areas where the indicator powder will be spread.

6.6 **Indicator Powder test:** Spread the indicator powder in a thin film over the entire surface of the spill area and extend at least six inches beyond areas cleaned on all sides. Minimize dust generation when spreading the powder. Allow the indicator powder to set on the surfaces. After **12 hours**, if no color change is seen in the powder (i.e. change from white to orange in any part of the powder), the surface “passes” the Indicator powder test. Have the indicator powder removed from surfaces with a HEPA vacuum by the appropriate personnel. After clean up of the indicator powder, the area may be released for re-occupancy.

The only official copy is on-line at the SHSD IH Group website.
 Before using a printed copy, verify that it is current by checking the document issue date on the website.

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- 6.7 If the area fails either the *Indicator Powder* test or the *Airborne Vapor* test, have the appropriate personnel repeat the approved clean-up procedure. Then repeat the *Airborne Vapor* and *Indicator Powder* tests.
- 6.8 **Documentation:** Record the test results on the *BNL Mercury Spill Clearance Test Record* (Attachment 8.1) or an equivalent.

Summary of Test Criteria

Sample Media	Passing Criteria
Air	<0.01 mg/m ³
Bulk	No color change (white to orange)

7.0 **References** none

8.0 **Attachments:**

- 8.1 *Mercury Spill Clearance Test Record*
- 8.2 MSDS of J. T. Baker Indicator Powder

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Attachment 8.1

Mercury Spill Test Record

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SUBJECT: POLICY AND FIELD PROCEDURE: <h2 style="margin: 0;">Mercury Spill Clearance Testing Record</h2>		

DATE:	SURVEYOR(S):
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I. AREA INFORMATION		
DEPT:	BLDG:	ROOM:
Description of Spill and Area:		

II. AIRBORNE VAPOR SURVEY INFORMATION Passina Criteria <0.010 ma/m³		
INSTRUMENT:	MODEL:	SERIAL#:
FACTORY CALIBRATION DATE:	PRE-CAL: BY:	POST CAL: BY:
TIME	LOCATION	MERCURY READING mg/m ³

III. INDICATOR POWDER TEST Passina Criteria = no color change
Spread powder over entire spill area, wait 12 hours , observe color
<input type="checkbox"/> No color change detected (passing) <input type="checkbox"/> Color Change detected (from white to orange)
Comments:

V. CONCLUSIONS & RECOMMENDATIONS			
<input type="checkbox"/> Area Passed Tests <input type="checkbox"/> Test Failed			
Comments:			
<table style="width:100%; border: none;"> <tr> <td style="border: none;">Area Release for Re-occupancy by: Name:</td> <td style="border: none; width: 50px;"></td> <td style="border: none;">Date:</td> </tr> </table>	Area Release for Re-occupancy by: Name:		Date:
Area Release for Re-occupancy by: Name:		Date:	
<table style="width:100%; border: none;"> <tr> <td style="border: none;">Return completed form to: IH Lab, Building 120</td> <td style="border: none; text-align: right;">FILE CODE: IH 75QR. FORM IH75135 8.1 (03/02)</td> </tr> </table>	Return completed form to: IH Lab, Building 120	FILE CODE: IH 75QR. FORM IH75135 8.1 (03/02)	
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Attachment 8.2

MSDS for Mercury Indicator Powder

See next page

MSDS

Material Safety Data Sheet

**From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865**



**24 Hour Emergency Telephone: 908-858-2151
CHEMTREC: 1-800-424-9300**

**National Response in Canada
CANUTEC: 613-496-6666**

**Outside U.S. and Canada
Chemtrec: 703-527-3887**

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.