



3116 Engineering Centers Building, 1550 Engineering Drive, Madison, WI, 53706

# Chemical Spill Response

## Revisions

| <b>Rev. No.</b> | <b>Change Summary</b> | <b>Revision Date</b> | <b>Revision By</b> | <b>Document Owner</b> |
|-----------------|-----------------------|----------------------|--------------------|-----------------------|
| R1              | Document initiation   | 5/19/15              | KAK                | Kurt Kupcho           |



3116 Engineering Centers Building, 1550 Engineering Drive, Madison, WI, 53706

## 1. PURPOSE AND SCOPE

1.1. The purpose of this document is to define different types of chemical spills and the appropriate lab user and staff responses. The scope of this document will also cover evacuations, spill cleanup, and proper disposal of contaminated materials and spill cleanup items.

## 2. DEFINITIONS

2.1. **Chemical spill:** Any chemical in WCAM that is released accidentally onto the cleanroom floor or other surface it does not belong on.

2.2. **Assessing the spill category definitions:**

| Category      | Volume     | Visual Size                     | Response                         | Treatment Materials                    |
|---------------|------------|---------------------------------|----------------------------------|--|
| <b>Small</b>  | <300ml     | Up to about 2 feet in diameter  | Chemical treatment or absorption | Neutralization or absorption spill kit |
| <b>Medium</b> | 300ml – 5L | Up to about 6 feet in diameter  | absorption                       | Absorption spill kit                   |
| <b>Large</b>  | > 5 liters | Greater than 6 feet in diameter | Call 911                         | Outside help                           |

2.3. **Chemical boom:** A long tubular sock filled with chemical sorbent used to put around a chemical spill in a circular fashion so the spill does not spread and indicates the danger area.

2.4. **Spill pillows:** An absorbent pillow used to put on top of a chemical spill inside a boom area to soak up the chemical.

2.5. **Chemical identification strips:** A pH strip with different zones when put into contact with an unknown liquid chemical spill will show color changes indicating if it is a weak or strong acid, weak or strong base, fluoride present, or if it is a solvent.

2.6. **Acid neutralizer:** A basic liquid solution used to neutralize an acid spill before cleanup. The neutralizer will change colors during neutralization and once the neutralization is complete the color no longer changes.

2.7. **Base neutralizer:** An acidic liquid solution used to neutralize a base spill before cleanup. The neutralizer will change colors during neutralization and once the neutralization is complete the color no longer changes.

2.8. **WCAM:** Wisconsin Center for Applied Microelectronics is a shared facility lab (cleanroom environment) on the University of Wisconsin engineering campus that this safety document has been written for.



3116 Engineering Centers Building, 1550 Engineering Drive, Madison, WI, 53706

- 2.9. **Emergency response cart:** A cart full of safety materials and documents for the support of safety situations that may occur in WCAM. Located at the entrance into the cleanroom main hallway.
- 2.10. **PPE:** Personal Protective Equipment. For working with corrosive materials in WCAM required PPE is a rubber apron, face shield, and chemical gloves over your normal cleanroom wear.
- 2.11. **SDS:** Safety Data Sheet. A document containing the information about a chemical and the dangers it poses. Also, goes thru exposure and disposal issues.
- 2.12. **ECB:** Engineering Centers Building. Building WCAM is located in on the 3<sup>rd</sup> floor.
- 2.13. **EH&S:** Environmental Health & Safety. The safety department for all of UW.
- 2.14. **Wet bench:** A fume hood where WCAM lab users use corrosive chemicals. At the very least they have acid and/or base drains for disposal and sinks with DI water available. Some wet benches also have: chemical dip tanks, water rinse tanks, N<sub>2</sub>, hotplates, Teflon wafer and small sample dippers, etc.

### **3. RESPONSIBILITIES**

#### 3.1. WCAM staff member

- 3.1.1. Teach the lab users about the hazards in the lab and the proper way to safely work with chemicals.
- 3.1.2. Ensure all chemicals are properly stored and that a SDS is readily available for all chemicals in use in WCAM.
- 3.1.3. Make sure there are plenty of spill response materials in the lab where there are liquid chemicals and in the emergency response cart.
- 3.1.4. Ensure PPE supplied by WCAM is in good condition and readily available to wet bench users.
- 3.1.5. Have a spill response plan in place (this document).

#### 3.2. Lab User

- 3.2.1. Read the SDS of the chemicals they work with.
- 3.2.2. Wear proper PPE when working with chemicals.
- 3.2.3. Follow the training they received from the WCAM staff on working with chemicals at wet benches.
- 3.2.4. Pass demonstrations to WCAM staff members on proper chemical use at wet benches, use of body and eye showers if exposed to a corrosive chemical, and basic spill response procedures.
- 3.2.5. Correctly label chemicals in secondary containers and beakers.

3116 Engineering Centers Building, 1550 Engineering Drive, Madison, WI, 53706

## 4. RESPONSE PROCEDURE

### Chemical Spill Response

#### Assessing the spill:

| Category | Volume     | Visual Size                     | Response                         | Treatment Materials                    |
|----------|------------|---------------------------------|----------------------------------|--|
| Small    | <300ml     | Up to about 2 feet in diameter  | Chemical treatment or absorption | Neutralization or absorption spill kit |
| Medium   | 300ml – 5L | Up to about 6 feet in diameter  | absorption                       | Absorption spill kit                   |
| Large    | > 5 liters | Greater than 6 feet in diameter | Call 911                         | Outside help                           |

A small or medium-sized spill is one that does not spread rapidly, does not endanger people or property except by direct contact, and does not endanger the environment outside the building.

#### Cleaning up a small or medium-sized spill:

1. Notify co-workers of the chemical spill and evacuate the area of all non-responders.
2. Close off the bay or area using the yellow stands, chain, and chemical spill warning sign. All are located on and by the emergency response cart. Contact a WCAM staff member if one is not present.
3. Retrieve booms and spill pillows from the bay the spill is in or from the emergency response cart.



3116 Engineering Centers Building, 1550 Engineering Drive, Madison, WI, 53706

- Put on a chemical apron, chemical gloves, and a face shield.
- From a safe distance place the boom(s) around the spill area to identify the spill area and stop it from spreading.
- If the identity of the chemical spill is unknown use the chemical spill identification strips in the spill cart by dipping the colored patterns in the unknown chemical spill and using the key to help identify what the chemical is: strong acid, weak acid, strong base, weak base, fluoride present (HF), solvent, etc. Identify the type of chemical and let fellow responders know what the chemical is.



- If the chemical spill was an acid, retrieve the acid neutralizer from the emergency response cart or if the spill was a base retrieve the base neutralizer.
- Spray the neutralizer from the outside of the spill inward inside the chemical boom area. Do not step inside the boom area. Let the neutralizer work for a few minutes to react and neutralize the chemical. The neutralizer will change colors when it is reacting with the chemical spilt. The neutralization is complete when the color no longer changes.
- Once the neutralization is complete place the appropriate amount of spill pillows on top of the liquid chemical/neutralizer inside the boom area. Work from the outside-in of the boom and don't step inside the boom area.





3116 Engineering Centers Building, 1550 Engineering Drive, Madison, WI, 53706

**Non-WCAM staff can stop here and wait until a staff member arrives to update them on the situation. WCAM staff put on all corrosives personal protective equipment (PPE): chemical apron, chemical gloves, and face shield, before entering the spill area.**

10. **WCAM Staff:** Obtain a heavy duty garbage bag and tape from the emergency response cart. Place the garbage bag in a secondary container in case the chemical leaks or eats through the garbage bag.

11. **WCAM Staff:** Once the chemical/neutralizer is soaked up into the spill pillows carefully place them all into the garbage bag.

12. **WCAM Staff:** Spray some more of the chemical neutralizer everywhere inside the chemical boom area and make sure the color does not change, indicating the chemical has been neutralized and picked up. Use some new spill pillows to wipe up the remaining chemical neutralizer until the floor is dry and carefully place them into the garbage bag. Repeat this step until the neutralizer indicates there is no more chemical to be neutralized by not changing color.

13. **WCAM Staff:** Pick up the boom surrounding the original chemical spill area and discard it into the garbage bag.

14. **WCAM Staff:** Place any other contaminated objects (clothes, PPE, pH strips, chemical spill identifiers, etc.) into the garbage bag.

15. **WCAM Staff:** Close the garbage bag real tight by twisting the top shut and taping it closed.

16. **WCAM Staff:** Place the garbage bag, in a secure secondary container, inside the shop fume hood until the safety department can come get it.

17. **WCAM Staff:** Using clean water, mop and wipe down areas where the chemical spill cleanup occurred.

18. **WCAM Staff:** Discard mop water and remove chemical apron, chemical gloves, and face shield.

19. **WCAM Staff:** Put everything back in the emergency response cart when done and re-order supplies that were used. Remove the yellow poles, chain, and chemical spill warning sign from the spill sight and re-open the area for use.



3116 Engineering Centers Building, 1550 Engineering Drive, Madison, WI, 53706

20. **WCAM Staff:** Fill out a surplus chemicals form available on the UW Safety Department website and affix to the garbage bag/secondary container of chemical spill cleanup waste in the fume hood.

<http://www.ehs.wisc.edu/documents/chem-whtfrm.pdf>

21. **WCAM Staff:** Fill out the online safety department chemical pickup request form and submit: <http://www.ehs.wisc.edu/chem-chemicaldisposalsurplus-chemicalwastesurpluspickuprequestform.htm>

### **Large Chemical Spill Response:**

1. Notify co-workers of the chemical spill and have everyone evacuate the cleanroom immediately. Designate someone to grab the MSDS binders on the corner desk in the gown room on the way out, if possible.
2. Close the cleanroom by putting the yellow chain across the gowning room entrance by the shoe cleaners and display the chemical spill warning sign on the yellow chain.
3. Call 911, answer all their questions, tell them you are at the UW (location is 1550 Engineering Drive, Engineering Centers Building, 3<sup>rd</sup> floor, room 3039), and stay on the line until they tell you it is okay to hang up.
4. Have someone look for and meet the emergency response personnel. Locate the MSDS for the chemical spilled and show it to the emergency response personnel when they arrive.
5. Contact a WCAM staff member if one is not present and wait for them to arrive to update them on what happened.
6. Let the emergency response personnel do what they need to and once they leave the WCAM staff will clean up the remainder of the spill and/or contact UW Environmental Health & Safety for help.