



NSU Micro & Nano-technology Center (MiNaC) Cleanroom User'

Cleanroom User's Manual

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POLICIES AND PROCEDURES

I. Introduction

A Class 100 Cleanroom is defined as having less than 100 particles of more than .5 microns in size within a cubic foot of air. Similarly, a Class 1, 000 Cleanroom has less than 1, 000 particles of more than 0.5 microns in size within a cubic foot of air. This level of cleanliness is necessary to maintain the reproducibility of newly developed state-of-the-art electronic device processes. To reach and maintain this level of cleanliness, the transfer of particles and chemical contaminations must be eliminated wherever they are found.

Attitude towards cleanliness will ultimately determine the success or failure of any Cleanroom policy. All the elaborate equipment installed to provide a microscopically clean controlled environment would be to no avail if users do not believe in and help enforce the policies. It is also recognized technology is continually changing and Cleanroom users are a tremendous resource of new ideas. With this in mind, it is strongly encouraged to recommend changes that may make the facility safer, cleaner, easier to use, or less expensive to maintain. When in the Cleanroom, be aware of your knowledge limitations. It is extremely important to seek help if are unsure about the operation of this facility.

II. Enforcement

The policies and procedures described here are intended to ensure the safety of all users, protect the very complex and expensive equipment in the Cleanroom and to create an environment in which many different research groups can co-exist. It is expected that Cleanroom users will police themselves by encouraging and assisting one another in adhering to these policies. Safe work offenders will be penalized, typically through suspension or expulsion from the cleanroom. The penalties are clearly defined in this manual.

III. Equipment Schedule Rules

Schedule runs in advance whenever possible, do not monopolize equipment. Comply with your schedule, 15 min. maximum hold of equipment before position is queue is lost. Remove tooling (boats, etc.) from systems and clean-up particles from process chamber after each use. Note and report any anomalies to the next user and staff.

IV. Access to the Cleanroom

The Cleanroom is equipped with a Card Access System, which limits access to authorized users only. Users must have their ID card in order to enter the Cleanroom. Except in the case of emergency evacuations, users will be required to exit the Cleanroom in the same way they entered. The card system will record the times of entry and exit for each user. This data will be

used for accounting purposes. Prior to being granted access to the Cleanroom, applicants must attend an orientation session on Cleanroom safety and procedures. Handouts will be provided at this session including the Norfolk State University General Laboratory Safety Manual and various policy and procedure handouts. Applicants must sign a form acknowledging they have read and understood the contents of the handouts. Applicants may also be required to take an exam on the contents of the handouts. The Cleanroom is open 7am to 7 pm Monday through Friday. Weekend access and Holiday access is to be provided by the Principle Investigator. Authorized users are able to come in at any time the Cleanroom is open. However, always use and follow the “Buddy” System.

V. Buddy System

The buddy system must ***always*** be used in the Cleanroom. As implemented here, the buddy system requires a minimum of two people inside the Cleanroom at all times and they should both be authorized users. This is to ensure the safety of all users. A list of emergency phone numbers is located in the hallway of the Cleanroom and in the corridor outside the Cleanroom.

VI. Visitors

Whenever possible, visitors should remain outside the Cleanroom (the entire facility may be viewed through the windows and through the chase). If a visitor must enter the Cleanroom, he/she must wear proper Cleanroom garments and sign in and out in the visitor's log. A qualified Cleanroom faculty/staff member must escort and remain with the visitors at all times. The escort will be responsible for ensuring visitors follow the facility policies and procedures.

VII. Safety Procedures

- Use special care to keep fume-hoods in ultra-clean conditions.
- Emergency exit doors are ***ONLY*** for **EMERGENCIES**, such as fire or explosion in the lab, or movement of very large pieces of equipment in and out of the cleanroom. In case of an alarm, exit immediately, DO NOT take time to remove your gown until you are clear of the building.
- ***IMPORTANT*** – Hot plates (one of the main causes of cleanroom fires):
 - Never leave them on when unattended.
 - Make ***SURE*** that the temperature is: 20⁰C BELOW flash point of contents and 20⁰C BELOW melting point of beaker materials.
 - Ask for help if you are unsure of any part of the process.
- Do not walk around unnecessarily and be cautious when approaching another user's work space.
- Personnel movement is to be restricted to minimize the stirring up of settled particulate matter.

- Storage of excess stuff in the Cleanroom is not permitted.
- If you turn it ON, remember to turn it OFF.

Examples:

- Vacuum Chuck: Because others may be on the system.
- Deionize Water: Because DI system will become empty.
- Nitrogen Gas: Because the Nitrogen Dewar will quickly deplete.
- Hot Plate: Because the lab and personnel might burn.

Exceptions:

Those pieces of equipment that must be left on all day for practical purposes:

- If you make a mess, clean it up. Return everything to its original condition, or better. This includes your entire set-up of experiments or projects.
- Only Cleanroom paper or plastic-laminated paper will be allowed in the Cleanroom. Cleanroom paper taken out of the cleanroom may be brought back into the Cleanroom.
- At no time will paper in any form be torn or mutilated within the Cleanroom. Corrugated cardboard, Styrofoam, or foam rubber **of any type** will not be allowed in the Cleanroom without plastic containment and prior approval.
- Remove cartons and packaging material **before** taking materials into the Cleanroom area.
- Pencils, erasers, and retractable pens shall not be used within the Controlled Environment. Non-retractable ballpoint pens are approved for writing purposes.
- Users will make proper entry into the logbook each time a piece of equipment that has a logbook is used.
- Be aware of supplies. If quantities of stock appear to be low, report it to the Cleanroom Staff.
- Do not remove dedicated items from the Cleanroom without the Cleanroom Staff's permission.
- If you require a special equipment set-up, consult the Cleanroom Staff or your P.I.
- If an incident may have adversely affected someone's work or equipment, find the owner and agree on a proper remedy for the accidental interference.
- Do not contaminate the Nitrogen blow guns.
- When spinning photoresist, do not allow it to bypass the wafer chuck. The photoresist will clog the vacuum port in the spindle, potentially causing a sample to fly off of the chuck.

VIII. Wafer Handling

NEVER sneeze, cough or spit towards a wafer, even with a mask on. The resulting spots are non-removable. If you do have to sneeze, turn head away from the wafer (preferably towards the middle of the bay), face the floor and sneeze towards the direction of the floor. Or sneeze in your hood.

- Never speak towards the wafer.
- Avoid passing anything over the wafer which may release particles (i.e., don't look down on the wafer; don't cover the wafer with a hand).
- Whenever possible, store wafers in **covered** containers.

IX. Tools and Repairs

- Vacuum or blow clean all equipment followed by an Isopropyl alcohol wipes before taking it into the Cleanroom (see Detailed Cleaning Procedures). No equipment will be modified without prior approval of the Cleanroom Staff. No new equipment will be moved into the Cleanroom without prior approval of the Cleanroom Manager and Safety Officer.
- Keep parts and tools in toolboxes at the workstation as clean and orderly as possible.
- Any work or tools dropped on the floor shall be considered contaminated, and must be cleaned.
- Never leave exposed critical parts on the workbench.
- Work on a clean surface.
- When using Microscopes, always wipe lenses before and after use.
- Operations such as lapping, filing, deburring, and heavy soldering are prohibited in the Cleanroom, except where contamination is isolated and exhausted from the clean areas.

X. Exercise Caution and good judgment.

- Obey signs on equipment or in specific areas.
- Refill empty squirt bottles.
- Let empty solvent jugs evaporate to dry. Rinse acid and base jugs three times with tap water before placing in appropriate cart.
- When working with acids, bases or solvents, wear chemical resistant nitrile/neoprene gloves and apron available at each wet hood. Before using the gloves, be sure they are in good condition. Replace them if they are torn.
- Do not dump solvents down the drains. Use the solvent waste jugs located at the Fume Hoods.
- When disposing of acid mixtures, dilute with lots of tap water.
- Label all unattended mixtures with Chemical Safety Warning Sheets available in the Cleanroom Hallway if being left.

XI. Habits

- If a glove touches bare skin, (e.g., a forehead) replace the gloves immediately.
- Avoid scratching or rubbing exposed skin areas.
- Never comb or brush hair within the Cleanroom or gowning area.

- Limit the use of cosmetics, colognes, and perfumes in the Cleanroom and gowning areas as much as possible.
- No eating, chewing, or smoking shall be allowed in any environmentally controlled area.

XII. General Precautions

- Personal items such as combs, cigarettes, matches, tissues, and similar particle-shedding products shall not be carried into the Cleanroom. Such items may be carried into controlled areas in street clothes pockets, provided they are not removed from the pockets within the clean area.
- Do not wear jewelry, except plain wedding bands, watches, and pierced ear studs.
- Report adverse changes in environmental conditions (particle generation or accumulation, marked changes in humidity or temperature) and/or personal changes in physical condition (profuse sweating, a nasal discharge, adverse skin conditions, etc.) to the Cleanroom Staff.

XIII. Personal Hygiene

Personnel with colds, temporary sneezing and coughing, and severe sunburns should not enter the Cleanroom until they have recovered. The high degree of cleanliness required necessitates the development of the following habits:

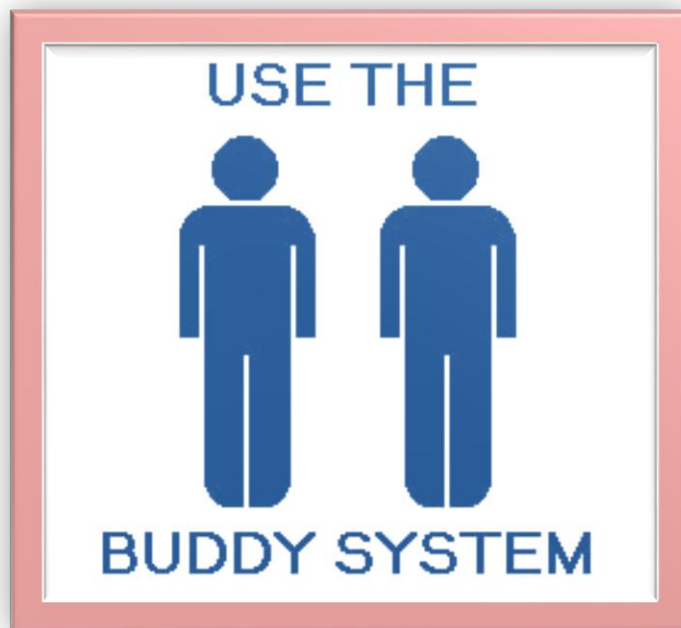
- Bathe frequently
- Shampoo hair regularly and take action to control dandruff.
- Wear clean under and outer garments.
- Do not wear open-toed shoes, sandals or torn clothes and shoes.

SPILL RESPONSE PROCEDURES

I. Introduction

The Cleanroom uses many hazardous chemicals and the possibility of a major spill always exists. Therefore it is necessary to know how to react quickly and properly to any chemical spill to avoid injury, death or major equipment damage. A large acid spill, HF for instance, might cause serious injury or even death if handled improperly. These procedures are intended only to provide guidelines. Common sense should always be used when dealing with any chemical spill. Safe practices should be foremost in mind whenever in the cleanroom.

You should never work alone in the Cleanroom (BUDDY POLICY). NSU Cleanroom policy dictates there must have at least one other person in the Cleanroom at all times.

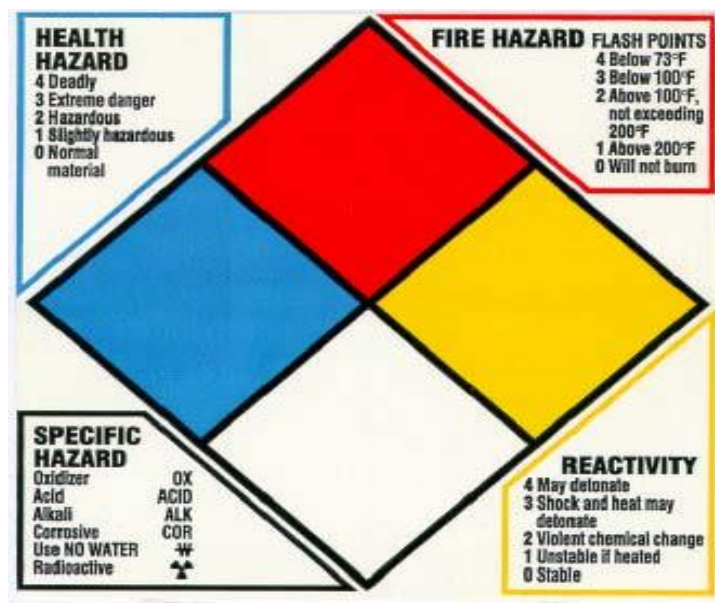


II. Spill Response Cart Items

The cleanroom spill response cart is located in the Storage/Testing/Inspection Bay. It is clearly marked as a spill response cart and contains the items you will need to combat a minor or major spill. **All spills must be reported to the Principle Investigator and documented on the Incident Report Form.**

The items included in the Cleanroom Spill Response Kit are,

- absorbent spill dam
- absorbent pillows
- acid neutralizer
- caustic neutralizer
- HF ointment (calcium gluconate 2.5%)
- pH paper
- two pairs of acid gloves
- two respirators with acid gas cartridges
- two pairs of vapor-resistant goggles
- trash bags
- 5 gal. Haz-Mat bucket w/ NFPA labels
- Tile Removers



NFPA Label

III. "I've spilled a Bottle of ----"

If you are the person responsible for the spilled chemical, clean up should be straightforward.

1. Did the chemical spill on you?

- If the chemical is a strong acid or base, remove contaminated clothing and run the affected area under water for 15 to 20 minutes. This should relieve some of the pain and reduce the danger of severe burns.
- If the chemical is HF, remove contaminated clothing and run the affected area under water for 15 to 20 minutes. Apply a liberal amount of Calcium Gluconate gel to the area, following the directions on the package. Seek medical attention as soon as possible.

2. Is the chemical hazardous?

If the chemical is hazardous and you feel you cannot handle it, alert others to its presence and evacuate the cleanroom. During the workday, notify the Cleanroom staff. If after hours, call the NSU Police @823-9000 first, and then notify the Cleanroom staff at: 823-0001

- If the chemical is a solvent or possesses a strong odor, evacuate the bay and put on a respirator and goggles before returning to clean up the spill.

3. Retrieve the spill response cart:

- If the chemical is acidic or basic, put on acid gloves, respirator and goggles before attempting to clean up the spill.
- Isolate the area around the spill.
- Select the proper equipment for the spill. For large spills, those from a half gallon bottle or larger, an absorbent dam will be necessary to prevent spreading. For small spills, only absorbent pillows are necessary. Select the proper neutralizer for the chemical (note:

solvents do not require a neutralizer).

4. Attack the spill:

- If using an absorbent dam, place the dam around the spill, approximately 4 inches from the liquid.
- Place the neutralizer bottle on the floor. Release the clamp and spray neutralizer, pushing the chemical into the spill dam. Be sure to cover the entire spill.
- For strong acids (HF and Sulfuric), use approximately an 8:1 ratio of neutralizer to chemical to completely neutralize the spill. The acid neutralizer will turn from purple to yellow to red when finished. Check pH, it should be around 7. If still acidic, continue adding neutralizer until pH=7.
- For strong bases (metal and ammonium hydroxides), you will need approximately a 6:1 ratio of neutralizer to chemical. The base neutralizer will turn from red to blue to yellow when finished. Check pH, it should be around 7. If still basic, continue adding neutralizer until pH=7.
- Once the reaction has ceased, allow liquid to cool. Check pH, it should be around 7. When cool, vacuum with the wet/dry vacuum cleaner.
- If dealing with a solvent spill, do not attempt to neutralize it. Soak up the chemical as soon as possible to avoid damage to the floor. Do not use water on the spill until after the entire chemical has been absorbed.
- **Please be aware that the Cleanroom Floor is a raised perforated tile floor, therefore the same treatment must be applied to the sub floor. The tools to remove the tiles are available in the Spill Kit.**

5. Clean up:

- Do not remove personal safety equipment until you have finished cleaning up. There may still be some active chemical on the floor.
- When the liquid has been completely absorbed, place the absorbent dam and pillows in a double trash bag.
- If any glass is involved, place the glass in a separate Haz-Mat bucket and label it as "SHARPS" along with the chemical the glass contained.
- Wipe down the spill area with the mop and DI water. When finished, place the mop head in a fume hood sink and rinse it thoroughly with DI water.
- Place the bag in a Haz-Mat bucket and apply an NFR diamond label, writing the chemical on the label.
- Put the lid on the bucket and place the bucket in the Cleanroom storeroom. Notify Cleanroom Staff to its presence.

IV. Cleanup of an Unknown spill.

Finding a chemical spill can be more dangerous than spilling the chemical yourself if the proper precautions are not taken. In most cases, the spill will be of a small amount of unknown chemical.

1. Assess any immediate hazards:

- Is there a strong odor? If so, evacuate the bay and put on a respirator before continuing.
- Is a violent reaction taking place? If so, it may be wise to wait until the reaction has finished.

2. Attempt to identify the chemical:

- Look for clues to the chemical's identity: labels, tipped containers, etc.
- Wearing an acid glove, use the pH paper to identify whether the chemical is an acid, base or solvent and its strength.
- If the chemical can be classified as an acid or base with the pH paper but not identified, assume it is a very strong acid (HF) or a very strong base (Sodium Hydroxide).

3. Is the chemical hazardous?

- If the chemical is suspected of being hazardous and you feel you cannot handle it, alert others to its presence and evacuate the Cleanroom. During the workday, notify MiNaC staff. After hours, call **823-9000** first and then notify MiNaC staff.

4. Retrieve the spill response cart:

- Put on acid gloves and goggles before attempting to clean up the spill.
- Select the proper equipment for the spill. For large spills, those from a half gallon bottle or larger, an absorbent dam will be necessary to prevent spreading. For small spills, only absorbent pillows are necessary. Select the proper neutralizer for the chemical. (**note: solvents do not require a neutralizer**)

5. Attack the spill:

- If using an absorbent dam, place the dam around the spill, approximately 4 inches from the liquid.
- Place the neutralizer bottle on the ground. Release the clamp and spray neutralizer, pushing the chemical into the spill dam. Be sure to cover the entire spill.
- For the strong acids (HF and Sulfuric), use approximately an 8:1 ratio of neutralizer to chemical, to completely neutralize the spill. The acid neutralizer will turn from purple to yellow to red when finished.
- For the strong bases (metal and ammonium hydroxides), use approximately a 6:1

ratio of neutralizer to chemical. The base neutralizer will turn from red to blue to yellow.

- Once the reaction has ceased, allow liquid to cool. When cool, place absorbent pillows over the spill and allow them to soak up the liquid.
- If dealing with a solvent spill, do not attempt to neutralize it. Soak up the chemical as soon as possible to avoid damage to the floor. Do not use water on the spill until after the chemical is absorbed by the absorbent pillows.
- **Please be aware that the Cleanroom Floor is a raised perforated tile floor, therefore the same treatment must be applied to the sub floor. The tools to remove the tiles are available in the Spill Kit.**

6. Clean up:

- Do not remove personal protective equipment until cleanup is finished. There may still be some active chemical on the floor.
- When the liquid has been completely absorbed, place the absorbent dam and pillows in a double trash bag.
- If any glass is involved, place the glass in a separate Haz-Mat bucket and label it as **"SHARPS"** along with the chemical the glass contained.
- Wipe down the spill area with the mop and DI water. When finished, place the mop head in a fume hood sink and rinse it thoroughly with DI water. The wet/dry vac can be used to vacuum small spills.
- Place the bag in a Haz-Mat bucket and apply an NFR diamond label, writing the name of the chemical on the label.
- Put the lid on the bucket and place the bucket in the Cleanroom Storeroom. Notify MiNaC staff to its presence.

V. First Aid

First aid is an important element of Cleanroom usage. The NSU Cleanroom environment contains many potential hazards, especially the chemicals used. This section presents only a simplified first aid procedure for a hazardous chemical spill. For more specific information, consult the MSDS.

1. Did the chemical spill on you?

- If the chemical is a strong acid or base, run the affected area under water for 10 to 20 minutes. This should relieve some pain and reduce the danger of severe burns.
- If the chemical is HF, run the affected area under water for 15 to 20 minutes and then apply a liberal amount of calcium gluconate gel following the directions on the package. Seek medical attention as soon as possible.
- If the chemical is a solvent, rinse the affected area for 10-15 minutes to reduce any irritation.

2. The chemical spilled on someone else:

- If the person is coherent, find out what chemical they were using.
- If the person is unable to communicate, have someone place them under a safety shower and remove visibly contaminated clothing while attempting to identify the chemical:
 - Look for clues to identify the chemical: labels, tipped containers, etc.
 - Wearing acid gloves, use a litmus paper to identify whether the chemical as acid, base or solvent and its strength.
- If the chemical can be classified as an acid or base with the pH paper but not identified, assume it is HF or Sodium Hydroxide.
 - Take necessary first aid action, including the use of HF ointment.
 - Notify Norfolk State University Police at **823-9000** as soon as possible and then notify Cleanroom staff.

CLEANROOM GOWNING PROCEDURE

I. Introduction

By far the dirtiest thing in the Cleanroom will be the people who use it. Even the most carefully manicured person generates a shroud of particles from their skin, hair, clothing and breath. Consequently, all Cleanroom users must wear Cleanroom garments which trap and hold the particles emitted by their bodies and clothing.

The Micro and Nano-technology Center has adopted the following gowning procedure for use in the Cleanroom. It is important that each person who enters the Cleanroom carefully follows this procedure.

Frequent Cleanroom users will be assigned a garment hanger. The coverall, hood and booties must be laundered approximately after one week of continual use. Infrequent users and visitors will not be assigned any hangers. They will use Tyvek Disposable Coverall which will be discarded after use.

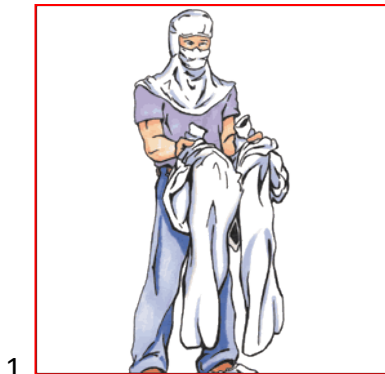
Gowning Sequence:

- **Clean shoes with shoe scrubber.** The shoe scrubber is located outside the gowning room entrance on the left. Turn the shoe scrubber on by pushing on the handle. Slide each foot between the rotating brushes for several seconds. The scrubber will turn off when you release the handle.
- **Put on shoe covers located inside at the entrance of the gowning room.** Only flat or very low-heeled shoes may be worn. No sandals or open-toed shoes may be worn.
- **Put on a bouffant cap and make sure all the hair is contained in the cap.** Put on a pair of gloves and cross over the bench.
- **Carefully put on a face mask and a hood.** The hood must completely cover your hair and mask. Adjust hood by using snaps on the back.

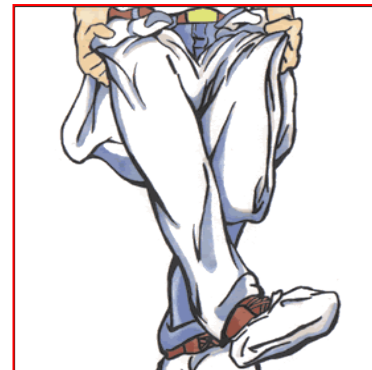


Hood and Face Mask

- **Remove your cleanroom garment from the hanger and inspect it.** The permanent gowns are stored on assigned hangers in the gowning area. Take time to make sure that the garment stays completely off the floor at all times. Inspect the garment each time it is worn for tears or soiling.
- **Put on coverall (gown/jumpsuit).** Gather coverall at waist level. Step into the jumpsuit legs, making sure that the garment does not touch the floor at any time. Put arms through the sleeves and shrug on the coverall. Straighten the coverall and **zip it all the way up and snap around neck.** While wearing a hood, make sure that the “skirt” of the hood is completely inside the collar of the jumpsuit. A mirror is provided.



1



2

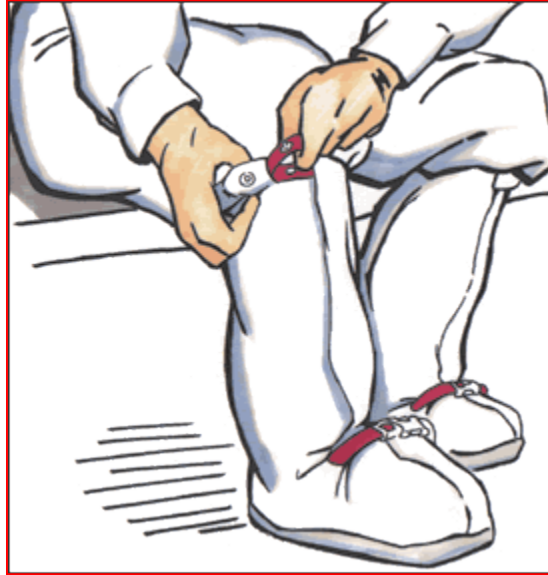


3



4

- **Put on booties.** To put on cleanroom booties, sit on the gowning bench. Be sure the top of the boot is over the bottom of the jumpsuit leg so that any particles falling down the jumpsuit leg will be trapped in the bootie.

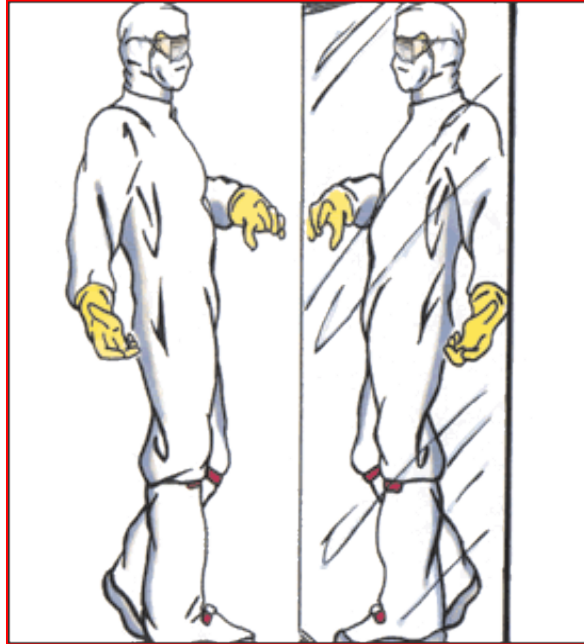


- **Put on Cleanroom Gloves.** Carefully put on the first glove, touching the outside of this glove as little as possible. Put on the second glove using the previously gloved hand, taking care not to touch skin with the gloved hand. Pull the cuff of the gloves over the sleeve of the jumpsuit so that any particles falling from sleeves are trapped in the glove. Gloves should be worn at all times, no bare hands or fingers.

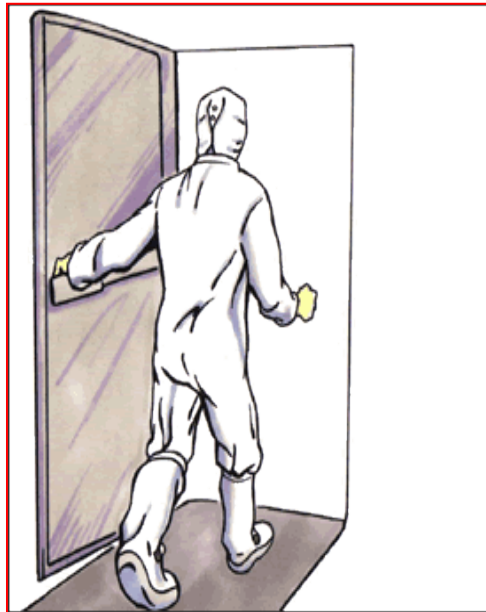


- Put on a clean pair of safety glasses/goggles: Isopropyl Alcohol is provided for cleaning safety glasses/goggles.
- After having fully gowned, check in the mirror to ensure that everything fits properly

with no gaps.



- Exit the gowning room towards the Cleanroom.



- **While you are in the Cleanroom**, keep your hands away from your exposed body parts. The oils on your skin can be transferred to the gloves and subsequently to the Cleanroom equipment or your sample.

II. Notes

- Cleanroom garments shall be worn only within the Cleanroom complex, except under emergency conditions.
- Do not wear soiled, dirty or lint-producing street clothes under Cleanroom garments.
- Do not hang street clothes or lab coats in the gowning area.
- Facemasks are to be worn over the top of the nose.
- Safety glasses/goggles can **ONLY** be removed when using a Microscope and **MUST** be put back on after use.
- Never open your gown in the Cleanroom.

CLEANROOM ETIQUETTE 101

I. Disposal of Damaged or Non-Functional Equipment

On occasion, lab equipment stops working or is damaged during normal use. In the case of countdown timers, make sure the batteries are working properly. Sometimes they just need new batteries. Whenever something stops working, please give it to a member of the Cleanroom Staff, who will then either repair it or dispose of it. Lab equipment is inherently expensive, and eventually much of the cost is passed on to the users, therefore it is mutually beneficial to maintain the equipment.

II. Broken and Stained Glassware/Wafers/Other Sharp Objects

With all the glassware used in the Cleanroom, breakage or permanent contamination will occasionally occur, or things will get contaminated beyond the point of being cleanable. If glassware meeting these criteria is observed, dispose of it into the container marked ***“Sharp Objects Only.”*** This includes the following: wafers, razor blades, needles, microscope slides and cover slips, and anything else questionable. Exercise care when disposing of any glass: injuries can occur when sharp objects are discarded improperly.

III. Laundry

When finished with a gown, zip it up and make sure it isn't inside out. Unfasten the booties from the gown and each other and put them into the soiled hamper.

IV. Chemical Warning Labels

Frequently, Cleanroom users will leave items under fume hoods overnight or for part of the day, unattended. The policy is simple: ANYTHING left unattended **MUST** be labeled with your NAME,

PHONE NUMBER WHERE YOU REALLY CAN BE REACHED,

WHAT IT IS THAT IS SITTING THERE,

DATE AND TIME of when you left it

DATE AND TIME of when you will return for it.

The staff will **THROW OUT** anything not appropriately labeled, no questions asked. For the protection of all, complete Chemical Safety Warning form available in the Cleanroom Hallway.

Any container not appropriately labeled will be disposed of.

V. Disposal of Solvent-and Photoresist-Soaked Materials

All materials used in the Cleanroom must be assumed as hazardous. There are several containers in the Cleanroom specifically for the disposal of solvent-soaked materials, and require they be used for the disposal of only such materials. While it may seem like a couple of TexWipes with photoresist on them isn't bad, remember the air in the Cleanroom is constantly recirculated, so all those vapors will find their way back in eventually for everyone to breathe. The following materials should be put in the solvent cans:

- Any alcohols (ethanol, methanol, isopropanol, etc.)
- Acetone
- TCE (Trichloroethylene)
- Chlorobenzene (this is particularly dangerous)
- Photoresist and related products

VI. What If I Don't Know How to Use Something, or if it malfunctions While I'm Using It?

If you need to use a particular piece of equipment and you are not absolutely sure on how to use it, **DON'T TRY TO LEARN BY DOING IT!!!** The staff is here to help you, and they can point you to the right person who can show you how to use it. If something malfunctions during a process, advise staff accordingly. DO NOT attempt to fix something without experience or prior approval. (There is a reason the technical manuals are kept outside the Cleanroom).

VII. What Are The Procedures For Cleaning Up?

All cleanroom users are responsible for cleaning up their work site. Store all tools, dispose of all wipers and thoroughly clean all glassware and leave to dry.

VIII. How Do I Store Things?

There will be tote boxes/dry boxes available in the Storage/Testing/Inspection Bay for users to keep their belongings. Just be sure they are properly labeled.

CLEANROOM RULES

The following describes proper cleanroom policies users must follow at all times. Failure to do so is a violation, and the penalties for the violations are listed below.

1. Unlawful use of any Cleanroom equipment without authorization

Every user operating any equipment must be authorized to use that equipment. In order to obtain authorization, a user is required to go through the Cleanroom orientation, training and testing on the equipment and subsequent check off.

Training sessions are held per need basis. More information is available from the Cleanroom Manager or the Tool Owner.

Once trained by an experienced user of the equipment, one should then schedule time with a trainer to obtain a check off after a minimum of one week from the training. Doing so gives one time to get ready for check off. Also, if there are other users who are currently authorized to use that particular equipment, you can operate the machine under the constant supervision of the users.

When you are ready for a check off, the trainer and trainee must meet for a check-off session. The trainee must demonstrate his/her ability to use the equipment without any assistance. If the trainer deems the user capable of using the equipment without causing any damage, he/she will grant access to the user, thereby making him/her an authorized user of the equipment. From this point on, the user can use the equipment without supervision. In cases where the trainer decides against granting access to the user, the trainer and trainee need to

schedule another check off session.

Penalty: Suspension from the cleanroom.

2. Granting access to an unauthorized user to use Equipment

No user can grant access to an unauthorized user to use any equipment without the user's constant supervision.

Authorized users are allowed to train other users on the equipment. They are responsible for any damage to the equipment caused by the trainee, as it will be regarded as an act of negligence of the authorized user.

Penalty: Suspension from the Cleanroom.

3. Using equipment with someone else's ID Card without being an authorized user and/or not under supervision.

A user is not allowed to use equipment without being an authorized user for the equipment (see Violation 1). He/she can only use the equipment under the full supervision of an authorized user or Tool Owner/Principal Investigator (see Violation 2)

Penalty: Suspension from the Cleanroom.

4 Allowing an authorized/unauthorized user to use equipment under your name (i.e. using your ID card) without supervision.

No user can grant access to another user, authorized or unauthorized, to use equipment without constant supervision. The authorized user who has ID card access to the equipment must be present at the equipment the entire time the other user is using the equipment.

The authorized user is allowed to train the other user on the equipment. The user whose card is being borrowed is responsible for any damage to the equipment caused by the other user, as it will be regarded as an act of negligence of the cardholder.

Penalty: Suspension from the cleanroom

5: Using Equipment reserved for another user.

A user is not allowed to sign in on equipment reserved by another user for the first 15 minutes of the first hour the equipment is reserved. If the person, who reserved it, does not show up in 15 minutes, any authorized user can use the machine after that time.

If a user's run exceeds his/her scheduled time, the next user who has reserved the equipment should reach a compromise with the previous user. The equipment belongs to the user who reserved it and it is entirely his/her decision to allow or disallow the previous user to continue using the equipment from using it.

The user should be careful in allowing the previous user to continue using the

equipment, as he/she faces the risk of violating a cleanroom policy (see Violation 7. Also, after 15 minutes is up, if another user finds the equipment not in use and begins using it, the machine belongs to this user. Therefore, if a user allows the previous user to continue, he/she must sign into the equipment after logging out the other user. The user should then be around the equipment to prevent Violation 4.

Penalty: Suspension from the cleanroom for three weeks.

6. Using equipment when it is undergoing maintenance and is marked not to be used or “Out of Service”.

Under no circumstances is a user allowed to perform any maintenance on any equipment. Any abnormalities while using the equipment must be reported promptly.

When a machine is undergoing maintenance/repairs, users must be cooperative and patient. No user is allowed to use equipment that is in a non-working condition or when it is going routine maintenance.

Penalty: Suspension from the cleanroom for three weeks.

7: Being logged in the equipment for longer than the equipment time limit.

All the equipment in the cleanroom have a time limit, which is the maximum number of hours the equipment can be used in one session. No user should be logged in any equipment exceeding this time limit. This is to ensure others have the opportunity to use the equipment.

If the equipment is not reserved by another user, it can be continued to be used. If the equipment time limit for usage is exceeded, skip the log out and log back in. This resets the timer for equipment log in.

Penalty: First Offense: Written warning. Second Offense: One week suspension from the cleanroom. Third and Subsequent Offenses: One week suspension from the cleanroom each time.

8: Failure to log in at the computer or Log Book.

All users must log in at the computer. If for any reason, the computer is not working, you have to report in the Log Book next to the computer.

From the moment you enter the Cleanroom until you are no longer using any equipment, you must remain logged in. If you are leaving the Cleanroom, but are still using the equipment, you should not log out.

Penalty: First Offense: Written warning. Second Offense: One week suspension from the cleanroom. Third and subsequent Offenses: One week suspension from the cleanroom each time.

9: Failure to log out from the computer or the log book.

All users must log out at the computer when leaving the Cleanroom provided they are not still using equipment. Use the Log Book if the computer is not working.

From entering the Cleanroom until exiting, users must remain logged in the computer. If leaving the cleanroom, but are still using equipment inside the cleanroom, do not log out. Only after using the equipment, should a user log out.

Penalty: First Offense: Written Warning. Second offense: One week suspension from the cleanroom. Third and subsequent Offenses: One week suspension from the cleanroom each time.

10. Leaving chemicals without proper documentation on Chemical Safety Warning Sheets.

Chemical Safety Warning Sheets are available in the Cleanroom Hallway and must be completed by providing all the information required on the form.

All chemicals left unattended must be properly documented by the use of the Chemical Safety Warning forms.

Penalty: a) The mislabeled chemical will be disposed of
b) The student will be issued with a written warning
c) Repeat Offenders – One week suspension from the cleanroom.

11: Not wearing proper safety equipment at the hood.

Personal Protective Equipment must always be used when handling chemicals at the Fume Hood and other situations where there is risk of injury or health effects.

Required Basic Cleanroom garment consists of a coverall, hood, shoe covers, booties, mask, gloves, safety glasses and a bouffant cap.

In addition, when dealing with chemicals, a face shield and an acid apron must be worn at the fume hood.

When handling acids, acid Gloves should also be worn.

Penalty: First Offense: Reminder to put on proper safety equipment. Second offense: Written warning. Third Offense: One week suspension from the Cleanroom. Fourth Offense: One month suspension from the Cleanroom. Subsequent Offenses: One semester suspension from the Cleanroom.

12: Not participating in clean-up.

Cleanup will be held every Friday and the scheduled time is 2pm. However, a user can perform their duties any time before Friday when scheduled for cleanup.

It is preferable to reschedule before the next specified time. Only in emergency situations will a cleanup be rescheduled.

Penalty: Their account privileges will be suspended.

13: Unauthorized entry into the Cleanroom by following another user.

Each user should use their ID Card to enter into the Cleanroom and get into the gowning area.

Penalty: Suspension from the Cleanroom for three weeks.

14. Allowing a user to enter the Cleanroom behind you when they did not swipe their card.

Be careful that no one follows you into the Cleanroom without swiping his/her card. Each user must swipe their card to enter the cleanroom. No one should follow another user into the Cleanroom. This is to prevent unauthorized users into the Cleanroom.

Penalty: Suspension from the Cleanroom for three weeks.

15. Damage to the equipment.

Damages resulting from a user's negligence are the user's responsibility, and cost of repair/replace. The charges that the individual can pay as a result of their negligence will vary by case.

Penalty: Users are responsible for damages to machines that are a result of negligence.

16. Not following proper gowning and de-gowning procedures.

Normal Cleanroom garment consists of a gown, hood, shoe covers, booties, gloves, safety glasses, mask and bouffant cap. They must be methodically attired as shown in the pictures.

Do not put feet (with/without shoe covers/booties) on the bench in the gowning room at any time.

NOTE: Safety glasses/goggles are mandatory.

Penalty: First Offense: Demonstration of proper gowning and de-gowning procedures. Second Offense: Written warning. Subsequent Offenses: One week suspension from the Cleanroom for each offense thereafter.

17. Removing supplies and/or equipment from the Cleanroom.

All supplies in the Cleanroom, such as the solvent squirt bottles, tote boxes and hot plates are for Cleanroom use **ONLY**. These supplies and equipment are for Cleanroom related research only.

Nothing should be removed from the Cleanroom for use by other laboratory or department. The lack of supplies and equipment hinders other users from making progress in their research.

Penalty: Suspension from the Cleanroom for three weeks.

18. Changing the equipment settings:

The computers attached to any equipment are exclusively for equipment use only. They

are to be used for applications only.

No additional software should be installed in any equipment as this violates equipment warranty.

No one should modify any software setting in any system as this often leads to equipment malfunction.

Penalty: Suspension from the Cleanroom for three weeks.

19. Not leaving the Cleanroom during an emergency.

During an emergency, the emergency lights and horns will be activated.

- In such cases every user must immediately leave the Cleanroom.
- Users should not take time to de-gown. Just leave the Cleanroom with garments on.
- Users must exit the building through the nearest exit in an orderly manner. All exits are clearly marked.

Penalty: Suspension from the Cleanroom for three weeks.

Finale:

The intent of these policies and procedures is to ensure an environment where researchers can work together safely and productively while maintaining the integrity of the Cleanroom environment and equipment. These policies and procedures will certainly change with time as the personality of our Cleanroom becomes more clearly understood. Users are strongly encouraged to make suggestions on how we can more effectively meet our goals.