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Specification
for

Hazardous Waste Management

REVISION

Rev No.	DCN No.	Change Summary	Release Date	DCN Initiator	Document Owner
7	DCN0993	Updated plan to include more information on Broken wafers (Attachment 7).	11-13-13	K. Brust	R. Segura

Prior revision history, if applicable, is available from the Document Control Office.

1. INTRODUCTION

This procedure is for use at the College of Nanoscale Science and Engineering (CNSE) facilities to assist in maintaining compliance with the state and federal environmental regulations which apply to the management of hazardous waste. The content of this specification and the attached hazardous waste inspections/audit checklists is not intended to address every aspect of hazardous waste management regulations. It is intended to provide an overview of the role each CNSE employee in complying with the sections of the regulations that relate to their activities at CNSE.

2. PURPOSE

2.1 To provide a written procedure on the proper handling, storage and shipment for disposal of solid and liquid chemical waste products. For general purposes of this procedure, these chemical products shall be referred to as “Hazardous Waste.” See definitions below for the specific regulatory definitions.

2.2 To meet all Local, State, and Federal hazardous waste management requirements.

2.3 To ensure the safe handling, storage, shipping and disposal of our hazardous waste.

2.4 To reduce costs associated with removal of hazardous wastes from our site by minimization through proper segregation and/or consolidation.

2.5 Provide written documentation on the tracking of our hazardous waste from its point of generation to its final disposal destination.

NOTE: All additions or deletions to this specification shall be under a Document Change Notice (DCN), coordinated by Document Control with sign-off required by but not limited to the EHS Department.

3. SCOPE

3.1 This procedure should be followed utilizing the definitions below, along with the instructions for completing the appropriate hazardous waste labels to maintain compliance with the waste generation and management regulations at every applicable level within the CNSE facilities. Attachment 3 – Hazardous Waste Container/Storage Area Inspection Log will need to be completed by each laboratory, cleanroom, or other hazardous waste generation point at the CNSE facility.

4. DEFINITIONS

The following definitions apply to this procedure and the corresponding Hazardous Waste Management Guidelines and Accumulation Point Compliance Audit Checklists:

4.1 **Hazardous Waste** – to be considered hazardous waste something must first be considered a solid waste. For the purposes of the federal regulations, solid waste can be a solid, liquid or gas that has been declared surplus, scrap and otherwise no longer wanted or needed, or is inherently waste-like. Hazardous waste can be either a specifically listed waste or a characteristic waste.

4.2 **Listed Hazardous Waste** – includes any solid waste that is specifically listed as generated from either non-specific sources, specific sources, or off-spec or discarded commercial products, and spill residues from these products.

- Non-Specific Wastes (so called "F" list wastes) include halogenated and non-halogenated degreasing solvents, plating bath solutions and sludge, wastewater and sludge from treatment of various process effluents.
- Wastes from Specific Sources ("K" list wastes) such as distillation still bottoms from production of various organic compounds, such as plastics, pesticides, pharmaceuticals, as well as sludge from treatment of primary metal process wastewaters.
- Acute Hazardous Wastes ("P" and "U" list wastes) are primarily off-spec commercial chemical products and intermediates.

4.3 **Characteristic (of) Hazardous Waste** – includes wastes that demonstrate the general characteristics of ignitability, corrosivity, reactivity, or toxicity.

- Ignitable Wastes (EPA code D001) are those with a flash point less than 140 degrees F, by a Pensky-Martens closed cup or similar test method.
- Corrosive Wastes (D002) have a pH less than or equal to 2 or greater than or equal to 12.5, or corrodes steel at a rate greater than 0.25 inches per year.
- Reactive Wastes (D003) are those that are normally unstable, readily undergo violent change without detonating, react violently with water, form potentially explosive mixtures with water, generate toxic gases or vapors when mixed with water, or are capable of detonation or explosive decomposition with or without addition of heat and pressure.

4.4 **Toxic Wastes (D004 through D043)** exhibit the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, the extract from a representative sample of the waste contains any of the contaminants listed in the federal regulations at a concentration equal to or greater than the respective value. Where the waste contains less than 0.5 percent filterable solids, the waste itself, after filtering using the methodology outlined in Method 1311, is considered to be the extract. Such regulations are available for review in the EHS Office.

4.5 **Generator (of Hazardous Waste)** – is any person, by site, whose act or process produces hazardous waste as defined in Part 371 (see 4.1- 4.3 above). Each individual researcher, student, intern or staff member who utilizes hazardous materials and decides they are no longer useful and need to dispose of them is a generator.

4.6 **Satellite Accumulation Area** – means an area located at or near the point (lab, clean room, tool, etc) where the generation of hazardous waste initially occurs, and is under the control of the operator of the process generating the waste.

5. RESPONSIBILITIES

5.1 It is the responsibility of each CNSE project manager, tenant (tool owner/operator) or individual who generates a hazardous waste on CNSE property to ensure that the proper procedures are followed for handling and disposing of the hazardous waste generated. The generator is responsible to properly characterize, package and label the waste with the appropriate hazard information.

5.2 It is the responsibility of each CNSE Manager (host), who contracts the services of contractor/ vendor personnel (contractor) to perform work on CNSE property, to ensure that the contractor is aware of the potential hazards associated with the required work and the proper procedures for handling and disposing of the hazardous waste generated by their activities.

5.3 Outside contractors/vendors whose job requires them to work with or around, or generate hazardous waste shall adhere to all requirements of this specification.

5.4 Contractors shall remove all hazardous materials which they brought on-site after the completion of their job, and follow all applicable regulatory requirements.

5.5 Contractors shall not remove hazardous materials which arise from the work that they perform on-site.

5.6 It is the responsibility of the each CNSE Manager (host), who contracts the services of contractor/vendor personnel (contractor) who performs work on CNSE property, to arrange for the proper disposal of Hazardous Waste through the Environmental Engineer or Hazardous Waste Technician. Whenever possible, disposal arrangements should be made prior to the generation of the hazardous waste.

5.7 It is the responsibility of the hazardous gas and chemical handling firm (contracted by CNSE) to collect the hazardous wastes generated at point of generation (e.g. labs, cleanrooms, equipment rooms, etc.) and transport them to the appropriate permitted hazardous waste storage location.

5.8 It is the responsibility of the hazardous gas and chemical handling firm to maintain the daily and weekly records, including inventory log of waste in storage and inspections of drums and other containers of waste in storage.

6. HAZARDS OF CURRENT WASTE STREAMS

The potential hazards which may be encountered when handling hazardous wastes generated by activities at CNSE, [remembering that hazardous wastes can be a solid, liquid or gas that has been declared surplus, scrap and otherwise no longer wanted or needed, or is inherently waste-like], include the following:

6.1 Solvent Waste

- Ignitable - most solvents (alcohols, acetone, Propylene Glycol Monomethyl Ether Acetate (PGMEA), etc.) are flammable, thus it is important that they are isolated from ignition sources.

- Reactive - can result in extreme reactions if contacted with acids, bases or other incompatible materials (e.g. Hexamethyldisilazane (HMDS) & water).

- Toxic - may cause skin irritation due to contact. Inhalation of high concentrations may cause nose and throat irritation, lung, kidney and liver damage (e.g. n-methyl-2-pyrrolidone -NMP).

- Volatile - odor easily detectable at low concentrations (PGMEA).

6.2 Corrosive (Acid or Caustic) Waste

- Corrosive (Acidic pH < 2.0) – such as Hydrochloric (HCl) or Sulfuric Acid (H2SO4) can cause chemical bums to skin and eyes if contacted.

Some, like Hydrofluoric Acid (HF) are particularly dangerous and require special medical attention, if contacted.

- Corrosive (Caustic/Basic pH >12.5) – such as Sodium Hydroxide (NaOH) or Ammonium Hydroxide (NH4OH) can cause severe burns to the skin and eyes on contact. Tetramethyl Ammonium Hydroxide (TMAH), in addition to causing burns on contact can be fatal if significant quantities are absorbed through the skin.

- Reactive – Acids and caustics may cause extreme reactions if mixed together. Concentrated acids (e.g. fuming Nitric acid >30%) are strong oxidizers and should not be mixed with organic materials including organic acids (e.g. acetic or lactic acid) or solvents. Concentrated acids (e.g. >50% Sulfuric Acid) or caustics (e.g. > 50 % Sodium Hydroxide will react with water resulting in splattering.

  NOTE: See the Chemical Incompatibility Table in EHS-00005 Chemical Handling Procedure, Figure #2 for other examples of incompatible chemicals that should not be mixed together in hazardous waste containers.

- Toxic - prolonged breathing of vapors can cause moderate to severe respiratory irritation, (e.g. Nitric Acid) which can also progress to death.

6.3 **Toxic/Poison Waste**

6.3.1 **Toxic/Poison** - depending upon material, can cause organ damage due to inhalation (e.g. HBr, HCl, and HF), ingestion (e.g. Formaldehyde) or absorption through skin (e.g. TMAH, nitric acid, phenol).

6.4 **Oxidizer Waste**

- Corrosive - can cause chemical burns to skin and eyes if contacted (e.g. 30% Hydrogen peroxide, Nitric Acid).

- Reactive – may cause extreme reactions if mixed with organics (e.g. 30% Hydrogen peroxide)

6.5 **Mixed Wastes**

6.5.1 Piranha Solutions are mixtures of (1 part) sulfuric acid, (1 part) hydrogen peroxide and (15 parts) de-ionized water.

6.5.1.1 Piranha solution can be explosive. Mixing the solution is exothermic. The resultant heat can bring solution temperatures up to 120°C. One must allow the solution to cool reasonably before applying any heat. The sudden increase in temperature can also lead to violent boiling, or even splashing of the extremely acidic solution.

6.5.1.2 Piranha solution that is no longer being used should never be left unattended if hot. It should not be stored in a closed container. Mixing piranha with organic solvents (acetone, isopropyl alcohol, etc.) will cause an explosion. Adding anything to the piranha solution (such as a substrate that may have organic residue), must be done slowly and carefully, giving the solution time to stabilize.

6.5.1.3 Prior to disposal, the gases from the piranha solution must be allowed to dissipate and the solution must be allowed to cool, before being placed in a labeled, high-density plastic container with a vented cap. Under no circumstances should used piranha solution ever be disposed of by flushing it down the drain.

6.5.2 Mixed Solvent Waste solutions often contain a mixture of flammable solvents (e.g. Alcohols, PGMEA).

6.5.3 Mixed Acids Waste streams often contain several mineral acids (e.g. HCl, Sulfuric acid, Nitric Acid). Care should be taken not to mix mineral or inorganic acids with organic acids or with corrosive caustic materials (e.g. NaOH, NH4OH) or with organic solvent waste streams.

7. TRAINING REQUIREMENTS (FOR PERSONNEL HANDLING HAZARDOUS WASTE)

Personnel who generate, handle, transport, or ship hazardous waste shall receive the following training. It is the responsibility of the employee's Manager to ensure that they receive this training within six months after they are first hired, or transferred into their position, and annually thereafter. All training sessions must be documented and a copy submitted to the EHS Department.

7.1 Generators

7.1.1 Hazard Communication - upon entry into job function; Periodic

7.1.2 Area Specific Hazardous Waste Procedures - upon entry into job function; Annual

7.1.3 Lab Chemical/Advanced Safety - Annual

7.2 Hazardous Material Handlers (in addition to all of the above)

7.2.1 Hazardous Waste Training (RCRA) - upon entry into the job function & Annual

7.2.2 Respirator Use - Annual

7.2.3 Personal Protective Equipment

7.3 **Emergency (Chemical Spill) Response Team (ERTs)**

7.3.1 In addition to all of the above:

7.3.2 Chemical Spill Clean-Up Training - Annual

7.4 **Shipping of Hazardous Waste**

7.4.1 Hazard Communication - Upon entry into job function; Periodic

7.4.2 DOT HM181 Training (Initial and Annual refresher)

8. WASTE SEGREGATION AND LABELING

8.1 The generator is responsible for properly segregating hazardous waste at the point of use/generation, to minimize the potential for incompatible chemicals mixing with adverse chemical reactions. See the Chemical Incompatibility Table in EHS-00005 Chemical Handling Procedure Figure #2 for specific chemicals.

8.2 Generators are responsible for ensuring that wastes are compatible with the collection system/containers they are placed in. For example, never place hydrofluoric acid waste in glass containers.

8.3 Hazardous Waste Accumulation Container Label (applicable to containers in 90-Day Storage Area)

All containers holding hazardous waste products shall have a (red) Hazardous Waste label affixed to them (see Attachment #1). The label shall be filled out to include:

- Waste type (liquid or solid (list articles))
- Chemical contents (product name and major chemical component if different)
- Associated hazard (ignitable, corrosive, poison, reactive, oxidizer)

NOTE: If waste product does not possess one of the above hazards, it requires a green “Non-Hazardous Waste” label (see attachment #2). Contact EHS department for extra labels or assistance in completing.

- Start Date (date material first placed within container)
- Full Date (date container is full)

- If available on label, generator name and telephone number (name of individual filling the container)
- If available on label, department (specific work area, lab or tenant generating the waste)

8.4 **Satellite Accumulation Area Container Labels**

8.4.1 All containers holding hazardous waste products at satellite locations shall also have a (red) Hazardous Waste label affixed to them (see Attachment #1).

8.4.2 Labels for such containers shall have word “Satellite” written in the space next to the word “Accumulation”. The label shall also be filled out to include:

- Waste type (liquid or solid (list articles))
- Chemical contents (product name and major chemical component if different)
- Associated hazard (ignitable, corrosive, poison, reactive, oxidizer)
- Start Date (date material first placed within container)
- Full Date (date container is full) and the waste handlers then have three days to remove such containers to the Hazardous Waste Storage Building (90-Day Storage Area).
- Generator name and telephone number (name of individual filling the container)
- Generator department (specific work area, lab or tenant generating the waste)

8.5 Preprinted labels shall be made available by the EHS department to ensure that all containers of hazard waste are marked with the words ‘hazardous waste’ and other words identifying the contents in accordance with the requirements set forth in 6 NYRCC 372.2 (a) (8)(i)(a). The waste container will be provided by the gas and chemical handling firm.

IMPORTANT: During spill clean-up, it is the responsibility of the Emergency Response Team to ensure that the generated hazardous wastes are properly segregated, contained and labeled.

9. CONTAINER TRANSPORTATION

9.1 Persons required to handle, transport or ship containers of hazardous waste shall wear the appropriate Personal Protective Equipment (PPE) as outlined in EHS-00010 Personal Protective Equipment procedure.

9.2 Any PPE or chemical container coverings that are contaminated during the course of handling, transporting or shipping containers of hazardous waste shall be placed in the appropriate contaminated solid hazardous waste bin.

9.3 Persons required to transport containers of hazardous waste shall do so using a dedicated hazardous waste cart.

9.4 Persons required to ship containers of hazardous waste shall follow all guidelines set forth by the Department of Transportation under 49 CFR Part 105-107, 171-180 and 390-397.

9.5 Containers must have their tops/covers and/or bungs secured firmly in place whenever being transported.

9.6 Persons responsible for transporting containers of hazardous waste from the generating area or satellite location shall also provide that area with an empty container upon request.

10. HAZARDOUS WASTE CONTAINER AND STORAGE

A container holding hazardous waste must not be opened, handled, or stored in a manner which may rupture the container or cause it to leak.

10.1 <u>All waste containers must:</u>

10.1.1 Have their tops, covers and/or bungs secured firmly in place except when adding waste to the container.

10.1.2 Be placed on a surface which does not show any cracks or gaps and is impervious to the hazardous waste being stored.

10.1.3 Be stored in separate aisles/areas from virgin chemical materials.

10.1.4 Be maintained and cleaned properly of any spill residues.

10.1.5 Be placed so that their labels are visible.

10.1.6 Be compatible with the waste that is being accumulated.

10.1.7 Have no mechanical or electrical equipment stored on top of the Hazardous Waste Storage Container. The requirements set forth in Specification EHS-00005 "Chemical Handling and Storage Requirements" are applicable to Hazardous Waste, unless specifically addressed in this specification.

10.1.8 For flammable (Ignitable) hazardous waste containers, greater than one (1) gallon, either be in a steel closed-top (DOT 17-E) drum obtained from the sub fab through the gas and chemical handling firm, or in a metal receptacle (Solvent can) with a self-closing lid and be grounded to prevent sparking. For hydrofluoric acid (HF) waste, it should only be stored and transported in HDPE drums, never in glass or metal containers.

10.2 <u>All hazardous waste accumulation areas must comply with the following:</u>

10.2.1 Secure against unauthorized entry.

10.2.2 Clearly delineated (e.g. walls, fence, tape or other visible barrier) and be separate from any points of generation.

10.2.3 Clearly posted with a sign or label with the words "HAZARDOUS WASTE". Words must be a minimum of one inch in height and be in capital letters.

10.2.4 Constructed with secondary containment (outdoor storage). This secondary containment may consist of a berm or a dike with an impervious surface and must be large enough to hold:

- 10% of the total volume of all containers, or
- 110% of the volume of the largest container, whichever is larger.

10.2.5 Accumulation and storage areas should be kept neat and orderly with adequate aisle space for access in the event of a release or for an inspection.

10.2.6 All containers and storage areas must be inspected weekly by completing the Hazardous Waste Inspection Log (see attachment #4).

10.3 **Satellite Accumulation Locations**

10.3.1 When hazardous waste is stored within its area of use (e.g. laboratory or cleanroom) the area is determined to be a Satellite Hazardous Waste Location and is in full compliance with 6 NYCRR (372.2) if:

10.3.2 The waste is generated from a process within the area.

10.3.3 The area is managed by the person directly responsible for the process producing the waste.

10.3.4 No more than one container (up to a 55 gallon drum) per waste stream is in use at any one time.

10.3.5 As soon as waste is placed inside a container, the container must be dated under ‘start date’.

10.3.6 When the container is full, it is again dated under ‘full date’ and relocated immediately to the dedicated satellite accumulation storage area/bin, if applicable, and then transported to the Hazardous Waste Storage Building within three working days.

10.3.7 In cases where the satellite accumulation containers house solid hazardous waste, such containers shall be a metal, step-on-can type container, lined with a yellow, 6 mil or similar, hazardous waste bag and have a label on the outside that identifies the waste that is contained inside. The bag/liner must be labeled with a red hazardous waste sticker that identifies the content prior to being placed in the container.

10.4 There are numerous waste accumulation areas, including satellite accumulation areas on site, new accumulation locations are reviewed and approved by the EHS Department only. See Attachment 5 for a list of the satellite accumulation areas we have on site and the checklist that is used for inspecting these areas.

10.5 The purpose of this review is to ensure that the proper approvals, training, labeling, and storage requirements are considered and acceptable.

10.6 Once the waste stream is reviewed and the necessary requirements met, a waste profile has been created or can be included in an existing waste profile the waste stream will be approved for use. See Attachment 6 for a list of the CNSE Waste Profiles.

11. REGULATED MEDICAL WASTE

11.1 Movement of Regulated Medical Waste onsite shall be moved only if it’s in a secondary container.

11.2 Shall be placed in a hard walled container that is leak proof and puncture resistant as well as closable

11.3 Sharps containers should never exceed the fill line.

11.4 Sharps containers may serve as the secondary container.

11.5 Primary Container:

- Must provide protection from the elements and exposure to employees and the public.
- Be prominently labeled with either the biohazard symbol or the words “biohazard”.
- Be impervious to moisture, secure and situated, so as to not leak or pose the risk of losing the contents.
- Be in a low traffic area, and vermin and insect free.

11.6 Secondary Container:

- Shall be any container that is used to house a primary container (e.g. cardboard box, sharps container, or drum)

11.7 The CUB has been designated as the Regulated Medical Waste storage area and must have the following:

- Proper signage designating it as a regulated medical waste storage area
- Limited access
- Provide protection from vermin and the elements
- Be temperature controlled to prevent decomposition and odor
- Proper ventilation
- Clear separation from any other waste

11.8 Shipping of Regulated Medical Waste from site must comply with the following:

11.8.1 Waste will not have been stored more than 30 days.

11.8.2 Waste must be shipped through a regulated medical waste transporter

11.8.3 All waste must be in a secondary container with a label affixed that provides the following:

  - Name and Address of the generating facility
  - A marking that discloses that the contents are infectious or regulated medical waste

11.8.4 All shipments are to be accompanied by a Regulated Medical Waste Tracking Form as required by NYSDEC.

11.9 Records of all shipments must be retained for 3 years from the date of disposition.

11.10 A report containing the amount of medical waste generated annually segregated by quantity and type shall be submitted to the commissioner of Environmental Conservation, upon request.

12. UNIVERSAL WASTE

12.1 Universal wastes generated at the CNSE facility include such items as hazardous batteries, hazardous mercury-containing thermostats, certain pesticides, and hazardous lamps.

12.2 The CUB has been designated as Universal Waste Accumulation area.

12.3 Universal wastes must be handled in such a manner that prevents releases of any universal waste or component of a universal waste to the environment.

12.4 The universal wastes must be contained in a container that remains closed, is structurally sound, is compatible with the waste it is containing, and that lacks evidence of leakage, spillage, or damage that could cause leakage under reasonably foreseeable conditions.

12.5 **Labeling**

12.5.1 As soon as the universal waste is placed in an accumulation container, the generator must date the container and identify the contents as follows:

12.5.2 Universal waste batteries (i.e., each battery), or a container in which the batteries are contained, must be labeled or marked clearly with any one of the following phrases: "Universal Waste - Battery(ies)," or "Waste Battery(ies)," or "Used Battery(ies);"

12.5.3 Universal waste thermostats (i.e., each thermostat), or a container in which the thermostats are contained, must be labeled or marked clearly with any one of the following phrases: "Universal Waste - Mercury Thermostat(s)," or "Waste Mercury Thermostat(s)," or "Used Mercury Thermostat(s)".

12.5.4 Each lamp or a container or package in which such lamps are contained must be labeled or marked clearly with one of the following phrases: Universal Waste-Lamp(s), or Waste Lamp(s), or Used Lamp(s).

12.6 Heavy items should not be placed on top of lamps or boxes that contain lamps/bulbs.

12.7 Broken bulbs or mercury containing lamps must be placed in a fifty-five (55) gallon bucket and labeled as Hazardous Waste – Mercury Contaminated Solids.

13. EMPTY CONTAINERS COLLECTION

13.1 Empty container collection bins are available for collecting empty bottles that once had flammables/solvents or corrosives materials in them.

13.2 The bins are labeled either “Hazardous Waste - Flammable/Solvent Empty Bottles Only” or “Hazardous Waste - Corrosive Empty Bottles Only”.

13.3 A pair of bins for empty bottles can be found in:

13.3.1 The NFN Fab level tool move-in area.

13.3.2 The NFN Subfab level tool move-in area.

13.3.3 The NFSX loading dock.

13.4 Empty chemical containers MUST be capped before placing into the correct bin.

13.5 Other trash should not be placed in these bins.

13.6 If you are unsure of which bin is appropriate for your empty bottle, ask your supervisor or call the EHS department for confirmation.

13.7 Empty bottle bins will be picked up by waste handlers and taken to be triple rinsed, labeled with a triple rinsed label and then discarded.

14. EXPIRED/UNWANTED CHEMICALS

14.1 If a chemical has expired or is no longer needed the EHS department must be notified to determine of other chemical users on site could benefit from the use of this chemical.

14.2 If the chemical user does not receive notification within five days of their original request the chemical shall be deemed ‘waste’ and labeled in accordance with the guidelines outlined in Section 8.4 of this procedure.

14.3 This labeled waste container shall be placed in the designated satellite accumulation area where it shall be picked up by the site waste handlers

and transported to the Hazardous Waste Storage Building within three days.

14.4 Please note that small containers (<250 mLs) may be placed in a ziplock bag/white 5 gallon bucket with a hazardous waste label affixed to the outside of the bag/bucket, as soon as the first container is placed in there; instead of individually labeling each bottle.

15. ATTACHMENTS

15.1 **Attachment 1** - Hazardous Waste Accumulation Label Example

15.2 **Attachment 2** - Non-Hazardous Waste Accumulation Label

15.3 **Attachment 3** - Universal Waste Accumulation Label

15.4 **Attachment 4** – Hazardous Waste Area Weekly Inspection Log

15.5 **Attachment 5** – Satellite Accumulation Storage Area Inspection Log

15.6 **Attachment 6** – Waste Profiles

15.7 **Attachment 7** – Broken Silicon Wafers (Non-III-V) with Chemical Contamination

ATTACHMENT 1
HAZARDOUS WASTE ACCUMULATION LABEL EXAMPLE

HAZARDOUS WASTE

ACCUMULATION (Check box if satellite ☐)

☐ Solid Waste ☐ Liquid Waste ☐ Mixed Waste

☐ Ignitable (Flashpoint < 140°F)_____

☐ Reactive ☐ Toxic

☐ Corrosive (pH<2.0) or (pH>12.5)_____

Start Date____/____/____ Fill Date____/____/____

Contact Name:_____ Department/Building/Tenant:_____

Chemical contents (product name or major chemical component):

_____

_____

HANDLE WITH CARE!
CONTAINS HAZARDOUS OR TOXIC WASTES

ATTACHMENT 2
NON-HAZARDOUS WASTE ACCUMULATION LABEL

ATTACHMENT 3
UNIVERSAL WASTE ACCUMULATION LABEL

ATTACHMENT 4
HAZARDOUS WASTE AREA WEEKLY INSPECTION LOG

HAZARDOUS WASTE AREA WEEKLY INSPECTION LOG

AREA: _____

STREAM NAME: _____

DATE	LABEL LEGIBLE		LABEL CORRECT		BUNG/LID SECURE		LEAKING		BULGING		ODORS		DRUM FULL		OTHER		SIGNATURE
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	

NOTE: Please circle your finding for each compliance item during inspection/audit, and note any corrective action needed and taken below. An answer in a shaded box would indicate corrective action necessary (i.e. leaking drum repaired/overpacked or pumped immediately, bung replaced or secured if missing or loose,etc.).

DATE: _____ CORRECTIVE ACTION TAKEN: _____

DATE: _____ CORRECTIVE ACTION TAKEN: _____

DATE: _____ CORRECTIVE ACTION TAKEN: _____

ATTACHMENT 5
SATELLITE ACCUMULATION STORAGE AREA INSPECTION LOG

Inspector: _____

Date: _____

Date	Label Legible		Label Correct [1]		Bung/Lid Secure			Leaking/ Damaged/ Bulging		Area Posted		Odors/ Evidence of Spilled Material		# of Containers Over 3 Days Old	
NFN - Pass Through	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFN - Sub-Fab Pass Through	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFN - Titan Units (2)	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFN - Copper Sulfate Units (2)	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFN - ISMT cleanroom	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFS 381 - AtoTech lab	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFS Track Carboys	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFSX Track Carboys	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFSX - TXW01 Carboy Units	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFSX Pass-Through	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFSX - Copper Sulfate Unit	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFC - Fab	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFC - Titan Units (2)	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFE - 4902, 4903, 4904	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
4905	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFE - 4906	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFE - 4907	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
NFE - 4908	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
CESTM - L126	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
CESTM - L128	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
CESTM - L135	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
CESTM - L136	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
CESTM - L233	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
CESTM - L237	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO
CESTM - L324	YES	NO	YES	NO	YES	NO		YES	NO	YES	NO	YES	NO	YES	NO

NOTES:
1. “Label Correct”: Check that the label includes the following: Contains the words “Hazardous Waste”, waste is identified in words, waste hazards are included, accumulation date is on full bags/containers, waste is less than 3 days old.
2. Please answer Y/N for each compliance item during inspection/audit, and note any corrective action needed and taken below.
3. An answer in a shaded box would indicate corrective action necessary (e.g. leaking drum repaired/over packed or pumped immediately, bung replaced or secured if missing or loose, etc.)

Date: _____ Corrective Action Taken: _____

Date: _____ Corrective Action Taken: _____

Date: _____ Corrective Action Taken: _____

ATTACHMENT 6
WASTE PROFILES

Clean Harbors Profile No.	State (Solid/Liquid/ Mixed)	Waste Codes	Waste Label Description	Characteristic (Ignitable, Corrosive, Reactive, Toxic)	Hazardous Waste	Non-Hazardous Non-DOT Regulated	Universal Waste	Label Color	Area/ Tool Generated
CH233203A	Liquid	D001, D002	ACETIC ACID SOLUTION	Corrosive- Acid	X			Red	Various
CH365468	Liquid	D001, D002	ACETIC ACID SOLUTION, MORE THAN 50 PERCENT BUT LESS THAN 80	Corrosive- Acid	X			Red	HPM/ Air Liquide
CH604531	Mixed	none	Acid Scrubber Sludge	N/A		X		Green	FOG
CH194892	Solid	D002	Acidic Corrosive Solids - spill debris (Nitric Acid, Sulfuric Acid)	Corrosive-Acid	X			Red	Step-on Can
CH501686	Solid	D009	Acidic Corrosive Solids - spill debris (D009)	Corrosive- Acid, Toxic	X			Red	FOG
CH256624	Solid	D004	Arsenic Debris	Toxic	X			Red	CNI01/02, L136, L128
CH573475	Solid	D002, D004	Arsenic/HCL Debris	Corrosive-Acid, Toxic	X			Red	
CH194893	Solid	D002	Basic corrosive solids spill clean-up (Sodium Hydroxide, Ammonium Hydroxide)	Corrosive - Base	X			Red	Step-on Can
CH589092	Liquid	none	Benzotriazole Solution (oscol 6000)	N/A		X		Green	HPM/ Air Liquide
CH458396	Solid	none	Biomedical Waste	N/A		X		Green	East Labs/ ERT
CH384316	Liquid	none	Cerium Oxide CMP Slurry	N/A		X		Green	MNC02/03, AXC01
CH560260	Liquid	D002	clean-100	Corrosive-Acid	X			Red	HPM/ Air Liquide
CH129629	Mixed	none	CMP Slurry	N/A		X		Green	MNC02/03, AXC01

Clean Harbors Profile No.	State (Solid/Liquid/ Mixed)	Waste Codes	Waste Label Description	Characteristic (Ignitable, Corrosive, Reactive, Toxic)	Hazardous Waste	Non-Hazardous Non-DOT Regulated	Universal Waste	Label Color	Area/ Tool Generated
CH362194	Solid	F006	COPPER CONTAMINATED FILTERS	Toxic	X			Red	WWT
CH362194-offc	Solid	F006	COPPER CONTAMINATED FILTERS WITH WATER	Toxic	X			Red	WWT
CH125423	Liquid	D002	Copper Plating Rinsewater	Corrosive - Acid	X			Red	MNW02, SNW03, OXW01, HPM/Air Liquide, L233
CH562474	Solid	D009	CRUSHED FLUORESCENT LIGHT BULBS FOR STABILIZATION	Toxic	X			Red	FOG
CH598116	Solid	none	Cryocooled System Filters	N/A		X		Green	FOG
CH64347	Liquid	none	developer/solvent rinsewater	N/A		X		Green	
CH194891	Liquid	D002	Dilute Hydrofluoric Acid Solution	Corrosive-Acid, Toxic	X			Red	NFS -ISMT, L136, L136, Analytical Room
CH560266	Liquid	none	ECP Clean	N/A		X		Red	HPM/ Air Liquide
CH556481	Liquid	D002	Electroplate anolyte makeup solution	Corrosive- Acid	X			Red	HPM/ Air Liquide
CH129631	Liquid	D002	Ethanolamine Solution	Corrosive - Base	X			Red	TXW01
CH194889	Liquid	none	Ethylene Glycol	N/A		X		Green	FOG
CH194890	Solid	none	Ethylene glycol spill debris	N/A		X		Green	FOG
CH163348	Solid	none	Fluoride//DI Water Treatment Sludge	N/A		X		Green	WWT
CH163301	Liquid	D001, D002	Hydrogen peroxide 30%	Reactive	X			Red	HPM/ Air Liquide
CH560272	Liquid	none	iP9632, N3103C	N/A		X		Green	HPM/ Air Liquide
CH581667	Liquid	none	l-proline	N/A		X		Green	HPM/ Air Liquide
CH64324	Solid	none	mercury vapor lamps	N/A			X	Purple	FOG

Clean Harbors Profile No.	State (Solid/Liquid/ Mixed)	Waste Codes	Waste Label Description	Characteristic (Ignitable, Corrosive, Reactive, Toxic)	Hazardous Waste	Non-Hazardous Non-DOT Regulated	Universal Waste	Label Color	Area/ Tool Generated
CH64322	Liquid	D002	Mixed Acids (Sulfuric Acid, Hydrochloric Acid)	Corrosive- Acid	X			Red	L135, L136, L233
CH194888	Solid	none	Mixed solvent spill debris	N/A		X		Green	Step-on Can
CH194887B	Liquid	D001	Mixed Solvent Waste (Isopropanol, Cyclohexanone)	Ignitable	X			Red	FOG- Bulk Tank
CH194887	Liquid	D001	Mixed Solvent Waste (Isopropanol, Cyclohexanone)	Ignitable	X			Red	ASL02, PXL02, CNL02, CNL04, TNL02, L135, L136
CH256680	Liquid	none	Non-regulated polymer and water	N/A		X		Green	L126
CH561875	Solid	none	Non-regulated polymer and water (rcra Empty)	N/A		X		Green	WWT
CH515851	Liquid	D002	Off-spec metal removal solution	Corrosive - Base	X			Red	
CH608586	Liquid	none	oil and water	N/A		X		Green	FOG
CH608583	Solid	none	OILY DEBRIS	N/A		X		Green	FOG
CH614804	Mixed	none	OILY sludge	N/A		X		Green	FOG
CH600792	Liquid	none	Perfluorocarbon Chiller Fluid_Galden	N/A		X		Green	FOG
CH535986B	Liquid	none	Propylene Glycol Bulk	N/A		X		Green	FOG
CH593120	Mixed	none	Scrubber Media Balls and Salts	N/A		X		Green	FOG
CH581660	Liquid	D002	Sodium hydroxide / water	Corrosive - Base	X			Red	WWT
CH433427	Solid	none	Soil and spill cleanup debris contaminated with diesel fuel	N/A		X		Green	FOG
CH269367	Solid	D001, D008, D035	Soil contaminated with oil-based paint	N/A		X		Green	FOG

Clean Harbors Profile No.	State (Solid/Liquid/ Mixed)	Waste Codes	Waste Label Description	Characteristic (Ignitable, Corrosive, Reactive, Toxic)	Hazardous Waste	Non-Hazardous Non-DOT Regulated	Universal Waste	Label Color	Area/ Tool Generated
CH606462	Liquid	D002	TETRAETHYLAMMONIUM HYDROXIDE SOLUTION (TEAH)	Corrosive - Base	X			Red	
CH223382	Liquid	D002	TMAH Solution	Corrosive - Base	X			Red	L135, L136
CH583867	Liquid	D002	TMAH/Water from MNW02	Corrosive - Base	X			Red	MNW02
CH310517	Liquid	D002	virgin nitric acid	Corrosive-Acid	X			Red	HPM/ Air Liquide
CH163255	Liquid	none	Waste Oil	Corrosive - Base		X		Green	FOG

ATTACHMENT 7
BROKEN SILICON WAFERS (NON-III-V) WITH CHEMICAL CONTAMINATION

1. PURPOSE

To establish a procedure for dealing with silicon (whole or broken) wafers that contain no III-V elements (e.g. Arsenic, Indium, Phosphorus, Gallium, etc.) [See Figure 1] but are contaminated with other hazardous chemicals.

2. SCOPE

This procedure is limited to clean rooms and labs where silicon (non III-V) wafers are generated or processed.

3. DEFINITIONS

Silicon (non III-V) Wafer - any wafer that ***does not*** contain arsenic or any elements in the III-V columns in the periodic table (See Figure 1)

Hazardous Chemical - any chemical that is ignitable, reactive, toxic, or corrosive

EHS- Environmental Health and Safety

4. PROCEDURE

4.1 In the event of a wafer break you must first verify the wafer is not a III-V wafer by contacting the process engineer or the Tool Owner.

4.2 If there are hazardous chemicals on the silicon wafer then you must first wipe all of the residual chemicals off with wipes in a fume hood while wearing the appropriate PPE including cut resistant gloves.

4.3 All wipes must be discarded in the appropriate step-on can or bagged as hazardous waste. (See Figure 2).

4.3.1 If you need additional guidance on labeling the wipes in the event they do not fit into one of the pre-established step-on cans please contact the EHS office at CNSEEHS@Albany.edu

4.4 Once the wafer is free of hazardous chemicals the wafer can be disposed of through the typical broken wafer procedures listed below:

4.4.1 If the wafer breaks offline, in a lab or Engineers office:

4.4.1.1 It can be disposed of in the broken wafers barrel in the vestibule across from EHS room N-225.

4.4.2 If the wafer breaks in the fab on the line:

4.4.2.1 It can be brought to the control center for disposal as they will bring the wafers to the drums in N-225.

***IMPORTANT:** For broken wafers containing III-V deposited layers, **call the emergency number (518-437-8600)** and follow the Broken Wafer Recovery Procedures in EHS-00052 (Arsenic Protection Program, Appendix B)

5. FIGURES

FIGURE 1- List of III-V Elements

FIGURE 2- Disposal Flow Chart

FIGURE 1- List of III-V Elements

ALUMINUM
GALLIUM
INDIUM
PHOSPHORUS
ARSENIC
ANTIMONY
BISMUTH
TANTALUM
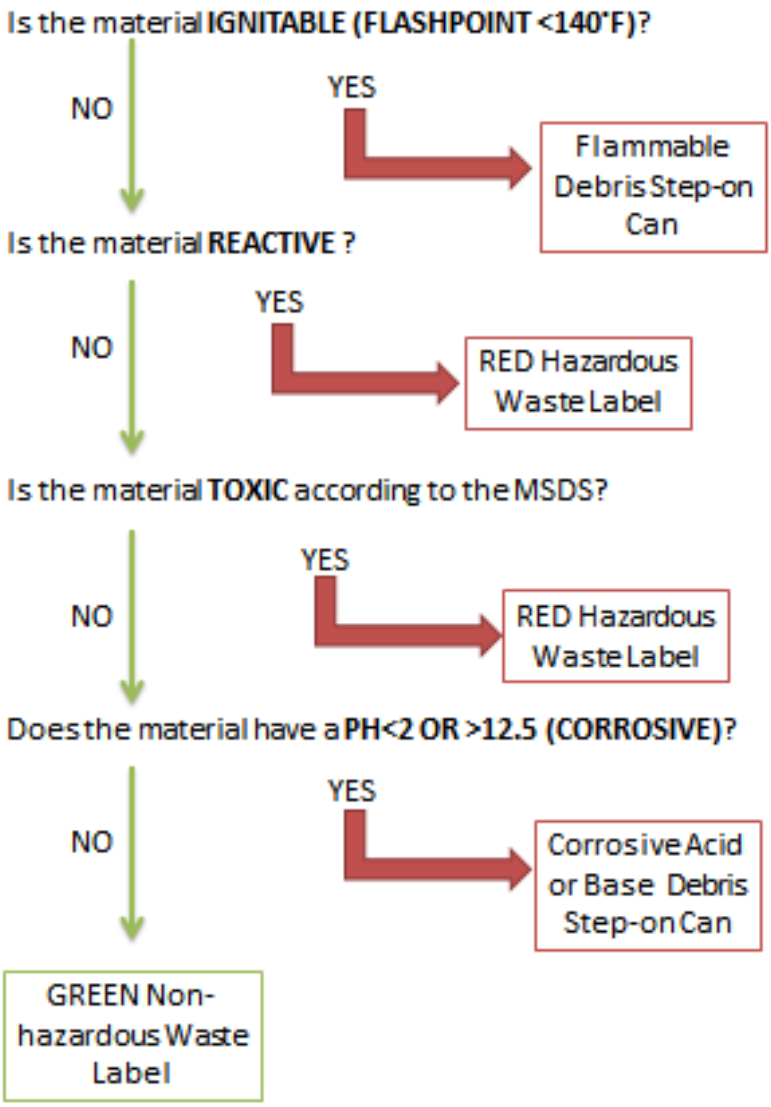
FIGURE 2- Disposal Flow Chart