

## Guide for Lab Safety & Facility Evaluation Checklists

EHS inspectors will wear protective lab coats and safety glasses during an evaluation. Inspectors may wear protective gloves while performing evaluations. They will also be carrying a picture ID associating them with the university and with EHS.

EHS inspectors will announce themselves at the beginning of a lab evaluation and attempt to identify a safety representative from the lab to ask questions and share results with. They may communicate with any lab personnel during the evaluation.

EHS inspectors may photograph areas of concern in laboratories and ask for a list of lab personnel (First Name, Last Name, and EID) to verify training history.

EHS inspectors may have flyers/handouts such as emergency instructions, notice to employees, emergency eyewash tags, waste tags, non lab-safe refrigerator labels, and chemical labels. Any of these items are available upon request.

**Lab Safety Evaluation Items are generally the responsibility of the Principal Investigator (PI) of the lab. The responsible party for Lab Facility Evaluation Items is generally someone other than the PI. The PI, or other responsible party, will be notified of issues identified during the lab evaluation. Critical items** are areas of concern that are immediately dangerous to life and health which require prompt attention and corrective action.

### Critical Items may include:

1. Hazardous chemicals/waste in containers or stored such that they are leaking or likely to result in a release. (Example: containers leaking, bulging, with heavy corrosion, storage shelf about to collapse, etc.)
2. Flammable chemicals stored in a household refrigerator. (> 2 L)
3. More than 20 gallons of flammables stored outside a flammable storage cabinet.
4. Peroxide formers expired. (> 1 year past expiration; > 1 year since last peroxide test)
5. Gas cylinders not secured. (fall hazard)
6. Toxic gases used outside ventilated containment. (regardless of ventilated containment availability)
7. Damaged electrical cords on equipment in use.
8. Needles in trash cans/glass waste boxes or protruding outside a sharps container.
9. Egress is significantly impeded. (walkways and/or exits blocked)
10. Access to emergency equipment is blocked. (not readily moveable)
11. Emergency equipment not functional.
12. Appropriate personal protective equipment not available in the lab. (LHL3 – high hazard labs)

### Lab Safety Evaluation Items

#### Chemical Storage (Items 1 – 15)

1. Chemicals segregated by hazard class
  - flammables are away from oxidizers
  - acids and flammables are separated

- acids and bases are separated
  - nitric acid is separated from other organic acids
  - incompatible gases (e.g., oxidizing and flammable gases) stored at least 20 ft apart
2. Chemical containers in good condition
    - unacceptable conditions include: rusty containers (including gas cylinders), leaking containers, and broken caps
  3. Chemical containers properly labeled
    - primary original containers need to have a label on and the label must be readable
    - lab personnel need to tape labels on if they are falling off or make a new label that includes chemical name, hazards, and manufacturer (if this information is known)
    - secondary containers that are used for storage (e.g., squeeze bottles) need to be clearly labeled with the chemical contents
  4. Chemical containers closed
    - containers should have proper lids or covers (aluminum foil and parafilm are not proper covers)
    - container lids or covers should be firmly secured unless actively pouring
  5. Glass chemical containers not stored on the floor
    - glass containers holding liquid chemicals (even water) or hazardous solid chemicals cannot be stored on the floor unless they are positioned in such a way (e.g., pushed way under a table) that they cannot be broken
  6. Hazardous chemicals not stored above eye level
    - hazardous chemicals must be stored at or below eye level; reaching for chemicals stored above eye level increases the risk of eye/face exposures
  7. Lab-safe refrigerator/cold flammable storage complies with guidelines
    - there can be no flammables stored in a refrigerator, cooler, or cold room, that is not manufactured as lab-safe (e.g., a household refrigerator)
    - lab-safe refrigerators have no internal electrical components (e.g., internal light sockets)
  8. Flammable storage cabinets used for flammable storage > 10 gallons
    - any amount of flammables over 10 gallons per lab has to be stored in a flammable storage cabinet
  9. Unstable chemicals dated/ not expired (peroxide forming)
    - check for expiration dates of peroxide forming chemicals, including:
      - Dioxane
      - Ethers
      - Furans (e.g., tetrahydrofuran or “THF”)
      - Picric Acid
      - Perchloric Acid
      - Sodium Amide
    - if there is no expiration date, the chemical container should be marked with a received date and an opened date; dispose of the chemical if it has been stored for over 1 year or open for more than 6 months

- if performing peroxide testing to confirm the absence of peroxides, mark the chemical container with the testing date; peroxide testing should be performed every 6 months
10. Acids stored in acid cabinet or secondary containment
    - acids must be stored in an acid cabinet OR in a wooden cabinet or shelf inside a plastic tub, with the cabinet labeled "ACID"
    - nitric acid should be physically separated from organic acids, i.e., in its own plastic tub, in a separate cabinet, or in a separate part of the acids cabinet
    - cardboard boxes and styrofoam containers do not provide adequate secondary containment
  11. Gas cylinders properly secured/ lecture bottles stored upright
    - all cylinders must be secured snugly with a strap or chain that is near the middle of the cylinder (a single chain can be used to secure several cylinders as long as each cylinder is secured on at least three sides – properly nested)
    - chains are preferred over fabric straps/webbing
    - lecture bottles must be stored upright and firmly secured
  12. Gas cylinder safety caps in place
    - all cylinders without a regulator, even empty cylinders, need to have a safety cap screwed on top - Exempt: lecture bottles
  13. Hazardous gas cylinders properly ventilated
    - hazardous gases include those with a NFPA Health Hazard Rating of 3 or 4 and those with a Health Hazard Rating of 2 if there are no physiological warning properties
    - if the hazardous gas is in a full size cylinder, then the cylinder needs to be stored in a sprinkled ventilated cabinet or enclosure
    - small cylinders (e.g., lecture bottles) of hazardous gases can be stored in a fumehood or glovebox, but not more than 2 cylinders per hood
    - if a gas cylinder cabinet is not available and is needed, this is recorded on the Facility Evaluation checklist
  14. Fume hood not used as permanent storage/ no clutter in fume hood/ no power strips in fume hood/ fume hood knobs are clear
    - fume hood should not be used as a permanent storage cabinet
    - fume hood should not be overly cluttered
    - fume hood sash should not be blocked by items or objects; fume hood sash should close all the way
    - fume hood knobs should be kept clear; lab coats, electrical cords, etc. should not be hung on the fume hood knobs
    - all work should be performed at least 6 inches behind the sash of the fume hood
    - all equipment should be raised 1-2 inches off the surface of the fume hood
    - back baffle of fume hood should be clear of obstruction
    - power strips should not be used inside the fume hood; power strips should remain outside the fume hood at all times
  15. Fume hood sash closed when unattended/ at or below 18 inches when attended
    - the sash must be pulled down so that the vertical opening is no greater than 18 inches
    - if the sash has horizontal-sliding panes, these panes should be closed when the fume hood is unattended

### Ignition Sources (Items 16 – 17)

16. Vacuum pumps and other ignition sources are segregated from flammables/combustibles
  - vacuum pumps and other significant sources of ignition (e.g., a Bunsen burner) cannot be stored near flammable chemicals or combustible material like paper or cardboard
17. Electrical cords are in good condition/ extension cords not permanent
  - all electrical cords (that can reasonably be checked) should be in good condition, i.e., the insulation should not be worn, split, or frayed; the plug should not be separated from the cord; and the cord should not be pinched in a door or in any other way
  - extension cords are not used as permanent wiring; extension cords should not be in use > 30 days
  - power strips are not connected in series (daisy-chained)
  - electrical cords should not be draped over hanging light fixtures or pipes

### Chemical/Sharps/Glass Waste (Items 18 – 25)

18. Less than 55 gallons of chemical waste in area
  - less than 55 gallons total for each lab, liquids and solids are both included
19. Chemical waste containers properly labeled
  - labeled to indicate that the material is waste and **ALL** the contents have to be indicated
  - using the waste tag to identify it as waste without writing the word "waste" is fine
  - name of generator, phone #, and location must be provided on the waste tag
  - the original contents label **MUST** be defaced or removed
  - the word "hazardous" cannot be written on the label
  - a list on a clipboard can be used for indicating the contents as long as it is near the waste container and it is very clear which list goes with which container (the container itself still needs to be labeled as "waste")
20. Chemical waste/waste containers compatible
  - incompatible chemical wastes should be disposed of in separate waste containers (e.g., flammable and acid wastes, organic and inorganic wastes, organic and corrosive wastes)
  - chemical waste should be disposed of in compatible containers (e.g., dispose of acid waste in a plastic or glass, not metal, waste container)
21. Chemical waste containers closed
  - always kept closed if not being added to
  - funnels only allowed if they are actively pouring waste in or funnel has a closed lid and is firmly secured to the waste container
  - if tubes are inserted, use a lid with a hole just large enough for the tube to fit; at a minimum, cover with parafilm
22. Chemical waste stored at point of generation
  - chemical waste containers must be stored in the room where the chemical waste was generated
23. Chemical waste stored on floor in is secondary containment
  - chemical waste that is located on the floor must be stored inside plastic secondary containment
  - cardboard boxes and styrofoam containers do not provide adequate secondary containment
24. Glass waste disposal box properly used
  - should not be more than 3/4 full

- should not contain hazardous materials (look for unclean chemical bottles or untreated biological material)
- should not have liquids (look for signs of water damage to the cardboard or containers containing liquid)
- should have structural integrity (check to see if the bottom is rotting)

25. Sharps containers properly used/ properly disposed when full

- sharps containers should not be more than 3/4 full
- sharps containers should not have bottles, beakers, etc. in them unless that glassware is INFECTIOUS
- sharps containers should not have paper/glove waste (paper/gloves contaminated with infectious materials should be disposed as biological waste)
- needles should NOT be recapped before disposal
- sharps cannot be discarded anywhere other than sharps containers
- reusable sharps (including razor blades) must be stored in a hard-walled container, or in a way where the blade is not exposed, when not in use

Good Practices (Items 26 – 29)

26. Lab was secured

- if no one is present in the lab, the doors should be locked

27. Excess clutter was not present in the lab

- look for signs of cluttered lab benches, fume hoods, and floors that goes beyond daily use (> 24 hours)

28. Items were not stored within 18 inches of the ceiling

- look for any items stored within 18 inches of the ceiling; clearance is required across the entire room, not just directly below the fire sprinkler heads

29. Food/drinks were not in the lab

- look for signs of food/drink in the lab (on desks, in trash cans, etc.)
- storage of food/drink is not allowed

Emergency Equipment and Egress (Items 30 – 34)

30. Exits and aisles clear of obstruction/ no tripping hazards

- walkways should not be cluttered—need at least 3 feet of clearance in aisles
- up to two exits in each lab need to be free from obstructions and be usable
- look for any tripping hazards in the lab (electrical cords, hoses, etc.)

31. Emergency equipment clear of obstruction

- emergency equipment (e.g., showers, eyewashes, spill supplies, and fire extinguishers) need to be unobstructed

32. Doors not propped open

- doors from main hallways or entrances to labs with hazardous materials should remain closed
- doors to rooms within a suite do not necessarily have to remain closed; it depends on the hazards present in each room in the suite

33. Appropriate spill supplies available (including chemical and biological)

- one chemical spill kit is needed per lab group (if contiguous)

- if the chemical spill kit is water-damaged, it should be replaced
  - if work with infectious agents is conducted, then biological spill supplies are needed
34. Electrical panels/disconnects clear of obstruction/panel doors closed
- will usually be gray colored boxes
  - items/waste should not be stacked in front of electrical panels
  - any modifications to electrical panels and/or electrical wiring must be performed by a licensed electrician

Emergency Preparedness (Items 35 – 42)

35. Eyewash flushed in the past week/ documented in the past month
- lab personnel must turn the eyewash “on,” and let the water run for a couple of minutes to flush out impurities (e.g., rust and bacteria)
  - report problems with the operation of the eyewash, such as low water pressure or no water at all, to the Facilities Service Center (512-471-2020)
  - record the date and initials of the person flushing the eyewash on an EHS eyewash tag or a logbook located near the eyewash (call EHS, 512-471-3511, for eyewash tags)
  - Facilities should test the eyewash annually
36. Lab personnel have completed required training (OH 101, OH 102, OH 201, OH 202, OH 238, FF 205 & OH 204, OH 207, OH 218 OH 241, OH 601 as needed)
- ask lab contact to verify the list of lab personnel while you are there
  - provide lab contact with training flyers (training summary, site-specific training record, etc.) as needed
  - verify training records of PI, lab contact, and any known lab personnel in EHS Assistant
  - a few courses are required on a recurring basis; due dates are available in EHS Assistant
37. Lab personnel have PPE available (including fire-resistant lab coats as needed – required for pyrophorics)/ lab coats laundered commercially or in-house
- the clothing must be available and lab personnel must have the ability to obtain additional clothing as needed (fire-resistant lab coats must be available for work with pyrophoric chemicals)
  - lab coats must be laundered commercially or in-house (no at-home laundering) – disposable lab coats are also acceptable
38. Lab personnel wear/use proper PPE while in lab (lab coat, gloves, eye protection, etc.)/ shorts/sandals are not worn in the lab
- if working in the lab, at a minimum, lab personnel need to wear eye protection, gloves, a lab coat, long pants, and closed-toe shoes (i.e., shoes that cover the entire foot)
  - open-toed shoes (e.g., sandals) and shorts are not allowed
39. Self-evaluations submitted to EHS (Lab Safety, Controlled Substance, Select Toxin)
- lab safety self-evaluations must be submitted in the fall and spring semesters; lab safety self-evaluations are due 60 days after the start of the semester
  - controlled substance and select toxin self-evaluations must be submitted annually if working with these materials
40. Chemical inventory submitted to EHS/ updated within last 6 months
- log on to EHS Assistant to view your chemical inventory and update it as needed (at least once every 6 months)

- complete the inventory review statement in EHS Assistant after you have updated your inventory (review statement must be signed every 6 months)
41. Written SOPs/JHAs/RAs are available (verified by EHS)
    - use the template available on the EHS website to create standard operating procedures (SOPs) for highly hazardous chemicals
    - create job hazard analyses (JHAs)/risk assessments (RAs) for experiments
    - written procedures should be available in the lab – EHS will verify during evaluation
  42. Homemade pressure vessels approved/ high pressure (> 500 psi) safety protocols in place
    - homemade pressure vessels should not be used without EHS approval
    - ensure safety protocols are in place for high pressure vessels

Other (Item 43)

43. Miscellaneous
  - anything that stands out as being a safety hazard needing corrective action that has not already been identified in any of the other evaluation items (e.g., damaged/cracked tubing connected to a Bunsen burner)

**Lab Facility Evaluation Items**

Emergency Equipment (Items 44 – 48)

44. Eyewash available
  - eyewash must be available within 10 seconds normal travel time and accessible (e.g., not behind a locked door)
45. Emergency shower available
  - emergency shower must be available within 10 seconds normal travel time and accessible (e.g., not behind a locked door)
46. Emergency shower has been tested within the past year
  - inspection tag must be marked showing that the shower has been tested within past year; testing is performed by Facilities Services
47. Fire extinguisher is available, mounted and clearly marked
  - fire extinguishers must be mounted near the door and must also be marked with a prominent sign if the extinguisher is obstructed from view
  - fire extinguishers must be readily available if there are hazards present that could potentially cause a fire
48. Fire extinguishers are charged and have safety pins and seals.
  - is the pressure gauge fully charged? The arrow should be in the green zone and oriented towards the “12:00” position if you were reading it like you would a watch or clock
  - the safety pin should be firmly in place
  - the safety seal (a piece of plastic ty wrap) should be connected to the safety pin and handle of the extinguisher
  - carbon dioxide cylinders will not have a pressure gauge so we will only look for the safety pin and seal on these types of units
  - check to see whether or not the fire extinguisher has been used or tampered with; the pressure gauge, safety pin, and seal will help us determine if usage or tampering has occurred

Lab Design (Items 49 – 50)

49. No penetrations in walls, floor, or ceiling/ all ceiling tiles in place
- look for punctured holes in the walls that were used to secure objects
  - manufactured floor drains do not count as a deficiency
  - check to see if any penetrations have not been sealed with fire retardant material
  - look for ceiling tiles that are missing, damaged, or out of place
50. Oxygen monitoring present if cryogenics use/dispensed in confined area
- if cryogenics (e.g., liquid nitrogen) are used/dispensed in a small, confined area, then the area should be equipped with oxygen monitoring

Labeling/Signage/Lab Usage (Items 51 – 58)

51. Refrigerators/cooling equipment properly labeled
- non lab-safe refrigerators/freezers/coolers will need a black and white sticker with the wording “Do not store flammable solvents in this refrigerator”
  - the stickers (labels) are provided by EHS
52. Current lab signs/inventories posted at lab entrance
- a current EHS lab sign indicating chemical hazards in the lab and the laboratory emergency contacts must be posted near the entrance
  - if lab uses RAM, lasers, or biological materials then appropriate signs must be in place at the entrance
  - if lab does not use these hazards and misleading signs are present indicating otherwise, then this would be a deficiency as well
  - verify whether or not other unusual hazards associated with the lab warrant signage such as electrical hazards, asbestos, electromagnetic area, strong radio frequencies, etc.
53. Emergency instructions posted/current
- verify whether or not the lab has emergency instructions posted in the lab – ideally near phones or the entrance
  - EHS provides emergency instructions – verify whether or not they are present and whether the information at the bottom has been completed/is current
54. Inspection is current for pressurized, UT-owned cryogenic vessels
- look for evidence of current inspection for pressurized, UT-owned cryogenic vessels
  - collect information about the vessel (size, type of cryogen, manufacturer, serial #, UT tag #)
55. Mercury thermometers not used in lab
- consider exchanging alcohol thermometers for the mercury thermometers used in the lab – EHS may be able to provide replacement alcohol thermometers
56. Propane not used in lab
- 16 oz or smaller containers of propane are permitted
  - use of propane containers larger than 16 oz is subject to approval by Fire Prevention Services (FPS)
57. Lab personnel do not ship research materials (chemicals, biological materials, dry ice)
- verify whether lab personnel ship research materials – shippers must be currently certified/ additional training may be needed



58. No safety concerns/incidents since last evaluation

Chemical Ventilation Control (Items 59 – 61)

59. Lab room pressure was negative with respect to the hallway

- Air pressure should be negative with respect to the hallway; directional airflow should be inward from the hallway

60. Ventilated storage available for toxic/hazardous gas cylinders

- mark this as "N" if gases are present that require ventilated storage and sufficient ventilated cabinets are not available; gases requiring ventilated storage include those with a NFPA Health Hazard Rating of 3 or 4 and those with a Health Hazard Rating of 2 if there are no physiological warning properties

61. Fume hood has been tested within the past year

- look for the test date on the small EHS inspection sticker on the front of the hood – current inspection stickers are brightly colored; the color of sticker used changes each year