Laboratory Specific Standard Operating Procedures

TITLE: SOP for the safe use of Picric Acid (2,4,6-Trinitrophenol)

Date: **7/20/18** Review: Date Revised:

Principal Investigator:

Authors (Names):

Department, Building, Room(s):

Contact Phone Number:

This SOP must be kept on file for all laboratory employee training and review.

Section 1: (Check One)
There are three methods that can be used to write SOPs. They are: by process (distillation, synthesis, chromatography, etc.); by individual hazardous chemical (benzene, phenol, arsenic, etc.); and by hazardous chemical class (flammable, corrosive, oxidizer, etc.).

_____ Process ___X__ Chemical _____Hazard Chemical Class

Section 2: Describe Process, Hazardous Chemical or Hazard Class
This SOP presents guidelines and procedures for the safe use of picric acid (CAS # 88-89-1). In addition to use of this SOP, persons working with picric acid should be thoroughly familiar with general guidelines for high hazard chemicals identified in the High Hazard Chemical Policy (EHS 200.09) and all other applicable LSUHSC chemical safety policies. All current applicable Safety Data Sheets (SDSs) should be available and reviewed prior to use.

Picric acid is an organic compound with the chemical formula $C_6H_3N_3O_7$ or $C_6H_2(NO_3)_3OH$. It is a bitter, yellow, odorless solid that is used as a laboratory reagent, in the manufacture of explosives, the manufacture of colored glass, and in electric batteries. It is often found in Bouin's solution at 10%. Bouin's solution is utilized as a fixative in histology.

Other names for picric acid include: 2,4,6-trinitrophenol (the preferred IUPAC name); picronitric acid; trinitrophenol; carbazotic acid; 2-hydroxy-1, 3,5-trinitrobenzene; melinite; nitroxanthic acid; phenol trinitrate; bitter acid; phenol-2, 4, 6-trinitro-; 1, 3, 5-trinitrophenol; and C.I. 10305.

Section 3: Potential Hazards
Physical Hazards

- Incompatibilities and reactivities: friction, impact, strong bases, ammonia, reducing agents, heavy metals and heavy metal salts, heat, fire, ignition sources, flammable hazards.

Health Hazards

- Acute oral toxicity of picric acid is high.
- Picric acid vapor can cause tissue damage to areas it contacts.
- Picric acid is acutely hazardous to the skin as a corrosive and irritant.
- Chronic exposure can lead to organ damage.
- Picric acid has not been shown to be carcinogenic or to show reproductive or developmental toxicity in humans.

An employee demonstrating symptoms which might be a result of exposure to picric acid shall report immediately to a supervisor who shall request an evaluation by EH&S.

Section 4: Personal Protective Equipment

- Proper Laboratory Attire - pants or dresses/shorts/skirts below the knees, sleeved shirt, closed-toe shoes
- Lab Coat - fully buttoned lab coat with sleeves extending to the wrists. Coat may be reused before laundering if it has not been contaminated with picric acid.
- Chemical Apron – a synthetic chemical apron can be utilized in conjunction with a lab coat to maximize protection.
- Eye / Face Protection
  - Splash goggles are required for all circumstances of use.
  - Ordinary (street) prescription glasses do not provide adequate protection.
- Hand Protection
  - Disposable nitrile gloves (NOT latex). Double-gloving is recommended when working with pure picric acid or concentrated solutions. Change gloves frequently and when contaminated, punctured or torn.
- Laboratory personnel should thoroughly wash hands with soap and water before and immediately upon removal of gloves.
- Respiratory Protection - EH&S (568-6585) should be contacted prior to initial use (and when processes of use change) of picric acid to evaluate exposures and need for respiratory protection.

Refer to EHS-400.03, Personal Protective Equipment for more information.

Section 5: Engineering Controls

- Picric acid should be purchased in the minimum concentrations necessary to mitigate hazards.
- Ventilation shall be provided to ensure airborne concentrations are kept below thresholds.
- All picric acid solutions must be prepared and handled in a certified chemical fume hood.
  - Use of a Biological Safety Cabinet is especially not appropriate for working with picric acid.
  - The working surfaces of any fume hood for which picric acid is used should be protected with plastic backed absorbent pads to insure containment of any spills. The side and back walls shall be covered to a minimum height of 12”.

- Work at least 6" inside of fume hood and set sash at lowest possible position.
- Any fume hood for which picric acid is used shall be posted with a warning sign that identifies the hazards and necessary controls.

Section 6: Special Handling and Storage Requirements

- Pure picric acid and concentrated solutions should be secured from unauthorized access.
- Store pure picric acid and its concentrated solutions in appropriate, sealed containers within an unbreakable secondary containment. **Note** – never use metal containers as a means of containment. Label all containers, including secondary containment, with the chemical name and hazard warning.
- Prevent this material from dehydrating. 30% wetting is recommended. Dehydration leads to a risk of explosion.
- Individuals using picric acid shall inspect the container for crystal formation. Picrate salts are even more sensitive than the base compound. – **Note** if crystals have formed, contact EH&S for assistance (568-6585).
- Take precautionary measures against electrostatic discharge, including grounding containers.
- Avoid shock or friction.
- Picric acid shall not be stored by flammables.
- Avoid incompatibles such as heat sources (including direct sunlight), oxidizing agents, reducing agents, metals, and alkalis.
- Ensure the area is well ventilated or use appropriate respiratory protection.
- When moving pure picric acid to a chemical hood, do not remove it from the secondary containment until it is in the hood.
- Prepare the smallest amount of solution necessary for the procedure.
- Avoid contact with picric acid including vapors.
- Prior to conducting any work with picric acid, the Principal Investigator must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures, to include review of this SOP and applicable SDS.

Section 7: Spill and Accident Procedures

- The availability, location, and contents of chemical spill clean-up kits must be confirmed prior to handling or beginning any work with picric acid. All labs maintaining picric acid must have an inert absorbent material such as kitty litter, vermiculite, and/or sand available for spill clean-up and neutralization.
- Immediately notify all lab personnel of spills (with the details of the spill and actions being taken) and regulate access to the area.
- Laboratory personnel should be prepared to respond to spills in accordance with the guidance provided in LSUHSC Chemical Spill Response Procedure (EHS 200.02).
- All spills of picric acid should have personnel contact University Police.
- Personnel cleaning the spill shall, at minimum, wear the same PPE required for handling/use
- Do not touch the spilled material.
- Keep away from sources of ignition.

- Spill procedures
  - Small Spill
    - Dilute with water and mop up or absorb with a dry, inert, non-combustible material like sand or soil.
  - Large Spill
    - Absorb with a dry, inert, non-combustible like sand.
    - Keep substance damp with a water spray. Use spray to divert vapor drift. Prevent entry into areas such as sewers and basements.
  - Dispose of the neutralized mixture as hazardous waste as directed in Section 9.
  - After all spills have been absorbed and the area confirmed to be neutralized, wash with soap and water solution to complete decontamination.
- In the event of skin contact, immediately remove contaminated clothing and wash affected areas with soap and copious amounts of water.
- In case of contact with eyes, immediately flush eyes with copious amounts of water for at least 15 minutes.
- All exposed persons should seek immediate medical attention (subsequent to initial decontamination for skin contact).
- Report all spills, regardless of size, to laboratory PI, who will report to LSUHSC EH&S.

Incident and accident reporting must be done electronically via the on-line fillable forms located on the EHS website. For more information about appropriate form selection, refer to EHS-400.06, Incident and Accident Reporting and Investigation Policy.

Section 8: Decontamination Procedures

- Picric acid is a strong corrosive that will cause burns regardless of route of entry that can cause tissue damage.
- Where the eyes or body of any person may be exposed to picric acid, a safety shower/eye wash must be available for immediate use. Personnel must be aware of location of the nearest Safety Shower/Eye Wash and verify that a current certification of performance tag is present.
- Personnel shall rinse any picric acid exposed areas of skin and/or eyes with copious amounts of water for no less than 15 minutes.
- If exposed to picric acid, obtain medical attention immediately.
- In the case of inhalation, move the victim to a better ventilated area. Never perform mouth to mouth. Instead use artificial respiration via a one way valve.
- If picric acid has been ingested, do not induce vomiting. Rinse out the mouth. Severe swelling is to be expected.

Section 9: Waste Disposal Procedures

Picric acid waste is considered hazardous and must be disposed of in accordance with LSUHSC Chemical Waste Management Procedures (EHS 200.04).

- Waste storage – Picric acid waste should be placed in a tightly sealed and labeled plastic container with the words "HAZARDOUS WASTE" clearly marked, the primary constituents of the waste, and the starting accumulation date.
- To schedule a waste pick-up by EH&S, use the bob.lsuhsc.edu service request system.

Section 10: Laboratory Specific Protocol(s):

Attach laboratory protocol for specific handling and operational practices.