



Safe Operating Procedure

(Revised 3/20)

SAFETY PROTOCOL: I-125

Use of radioactive materials requires a safety protocol be submitted to the UNL Radiation Safety Committee (RSC) for approval. This is a safety protocol. To obtain RSC approval:

- Submit an Authorization for Radioactive Material Use request for review by the UNL RSC. Contact the UNL Radiation Safety Officer (RSO) for specific instructions.
- Agree to use this safety protocol or submit an alternative and equivalent procedure that you develop to meet your unique needs.

All radiation workers must be at least 18 years of age and have completed required radiation safety training. **Never handle radioactive material prior to the completion of radiation safety training.**

All research protocols involving the radioactive material must be approved by the RSC.

Physical Data

- Half-life of I-125 = 59.4 days.
- X-rays and gamma-rays are the primary radiation hazard.
- Major X-ray / gamma-ray energy and intensity = 27 keV (114%), 31 keV (26%) and 35 keV (7%).
- Half-value layers for shielding X-rays / gamma-rays = 0.01 cm (lead), 0.08 cm (iron), 0.23 cm (aluminum) and 0.54 cm (water).

Radiation Protection Procedures

1. Special equipment or procedures
 - a. Use transfer pipettes, spill trays, and absorbent coverings to confine contamination.
 - b. Volatile chemical forms should be handled in a certified fume hood.
 - c. Use lab coats, safety glasses, and disposable gloves.
 - d. Replace gloves as needed.
 - e. Regularly monitor and promptly decontaminate gloves and work surfaces to maintain contamination and exposures As Low As Reasonably Achievable (ALARA).
 - f. Select gloves appropriate for chemicals handled.
 - g. Do not work over open containers, as practical.
 - h. Charcoal filtration may be necessary for millicurie quantities in closed systems.

2. Shielding requirements
 - a. Handle and store millicurie or greater quantities behind lead shielding of approximately 3 mm in thickness (adjust thickness of alternative materials as appropriate).
3. Surface contamination survey schedule
 - a. A survey meter should be used to monitor work surfaces after use.
 - b. A removable contamination (swipe) survey utilizing a smear and appropriate counter must be performed each month in which radioactive material is used (including sewer disposal). The RSC may require a higher contamination survey frequency depending on the amount of material in process.
 - c. The action limit for cleanup of removable contamination is 220 dpm/100 cm² . Any indication above this limit on a swipe survey or above two times background with a survey instrument is considered to be contamination. Any accessible area found to be contaminated above this limit shall be decontaminated.
4. Bioassay requirements
 - a. Thyroid bioassays are required during use with unbound form of I-125 and when a suspected or actual intake has occurred. A base-line bioassay is required prior to initial use of unbound I-125. Contact the Radiation Safety Officer for instructions regarding thyroid monitoring procedures.
5. Dosimetry
 - a. I-125 can pose an external dose hazard.
 - b. The thyroid is the critical organ for I-125 uptake. Individual uptake and metabolism vary greatly. The thyroid may be assumed to accumulate 30% of soluble radioiodine uptake and retain the iodine with a 138-day biological half-life. All radioiodine in the body can be assumed to be eliminated via the urine.
 - c. The annual limit of intake through ingestion is 0.04 mCi.

Waste Disposal

EHS procedures for disposal of hazardous and/or radioactive wastes are to be followed. I-125 waste should be segregated from other radioactive waste. Lead or similar shielding may be needed on waste containers depending upon the amount of waste stored.

Survey Meters

A survey meter is required to work with I-125. A thin crystal NaI detector is necessary to detect I-125 and perform thyroid bioassay.

Personnel Monitoring

Dosimeters are required when any individual will receive or is likely to receive in any period of one year an occupational dose in excess of 10% of the applicable limits. At UNL, all users of I-125 are issued whole-body and ring dosimeters.