

Permit Conditions for Iodine-125 Bioassay and Effluent Monitoring

Background

Permit Holders requesting the use of milliCurie quantities of iodine-125 must take special care to prevent the release of radioiodine to the environment.

This document describes the additional procedures involving thyroid bioassay and effluent monitoring that must be accomplished for certain operations involving I-125.

**In this
Document**

This document covers the following topics:

Topic	See Page
Policy	2
Bioassay Limits	2
Effluent Limits to Unrestricted Areas	2
General Precautions	3
Storage of iodine-125	3
Instrument Calibration	3
Records Retention	4
Using Program Forms and Worksheets	4
Questions	4

Continued on Next Page

Policy

A thyroid bioassay and effluent monitoring is required:

If the operation is conducted in a ...	And the activity of volatile or dispersible I-125 exceeds:	Or the activity of non-volatile or non-dispersible I-125 exceeds:
Open room or on a laboratory benchtop	0.1 mCi	1.0 mCi
Fume hood of adequate face velocity	1.0 mCi	10.0 mCi
Glove box or mini-hood with charcoal filter	10.0 mCi	100.0 mCi

Individuals who are involved in a series of operations during any five day period whose total activity meets or exceeds these limits are also required to have a bioassay. The results of the bioassay shall be recorded using the Thyroid Bioassay Worksheet (RSS-50).

Bioassay Limits

This table shows the limits on uptake of iodine-125 in the thyroid.

Criteria	Limit
Weekly Limit for Thyroid Uptake	600 nCi
Permit Holder Investigation Level	120 nCi
Radiation Safety Staff Notification Level	60 nCi

The Permit Holder shall notify the RSS if any bioassay value exceeds 60 nCi.

The Radiation Safety Staff, during its review of the thyroid bioassay forms will contact the facility LRPO and the Permit Holder if any of these limits are exceeded.

Effluent Limits to Unrestricted Areas

The concentration of iodine-125 released to unrestricted areas can not exceed an average of 3×10^{-10} $\mu\text{Ci} / \text{ml}$.

This value can be averaged over a period of time that exceeds the actual time of the operation. It is RSS policy to limit the time to 8 hours. Additional time can be allowed upon approval of the RSS.

The results of effluent monitoring shall be recorded using the Radioactive Iodine Effluent Monitoring Worksheet (RSS-60)

Continued on Next Page

**General
Precautions**

All procedures involving iodine-125 (where the iodine-125 compound is or could become volatile) must be conducted in an operating chemical fume hood with a minimum air flow rate of 100 linear feet per minute. This includes:

- Opening of packages containing iodine-125 as NaI;
- Dilution of stock solutions; and
- Chemical procedures such as iodinations.

Individuals handling iodine-125 shall wear a lab coat and protective gloves.

Extreme care must be exercised in isolating and cleaning up spills.

**Storage of
iodine-125**

All sodium iodide (I-125) solutions shall be stored in a well ventilated area, preferably in a fume hood or glove box.

All waste containing iodine-125 shall be placed in tightly closed containers to prevent leakage and escape of gases and shall be stored in well ventilated areas until disposed or decayed.

Solutions must not be made acidic. Chlorine bleach must not be added for any reason. These actions will release the bound iodine.

**Instrument
Calibration**

A portable survey instrument having a sodium-iodide (NaI) detector and a thin end window are preferred to survey for iodine-125 contamination. These instruments are also adequate for thyroid bioassay.

A properly calibrated laboratory gamma counter or a portable scaler is adequate for counting contamination wipes or for counting charcoal filters used for effluent monitoring.

Any instrument used to monitor an individual's thyroid as part of a program to assess iodine-125 uptake, must be calibrated on an annual basis. In addition, the counting efficiency using a thyroid phantom must be determined every two years.

Instruments used to analyze effluent monitoring must be calibrated using known standards on an annual basis.

NOTE: The RSS has a thyroid phantom and a filter and rod standard available for these determinations.

Continued on Next Page

Records Retention The following worksheets are used in this program:

- Thyroid Bioassay Worksheet (RSS-50)
- Radioactive Iodine Effluent Monitoring Worksheet (RSS-60)
- Instrument Efficiency Worksheet for I-129 Standards (RSS-120)
- Thyroid Bioassay Instrument Efficiency Worksheet (RSS-121)

These forms must be retained by the facility LRPO for three years. Copies of these forms must be submitted to the RSS for review.

**Using Program
Forms and
Worksheets**

The forms and worksheets included with this document provide the basis for an individual to document the surveys and assessments performed.

All of the worksheets describe the policy that must be met for radiation safety surveys and include the minimum amount of information needed to provide traceability and repeatability of the measurements, if needed.

The procedures section assures that the proper calculations have been performed.

Upon receipt of the forms by the RSS, the calculations are entered into a spreadsheet to verify the calculations.

Questions

If there are any questions regarding the information in this document, contact:

USDA Radiation Safety Staff
5601 Sunnyside Avenue
Unit 5510
Beltsville, MD 20705

Phone: (301) 504-2440

Fax: (301) 504-2450

Approved: 3/11/96 Date	By: /s/ _____ John T. Jensen Director, Radiation Safety Staff
----------------------------------	--