PROCEDURE NUMBER	APPROVED	DATE
*12.10.2	J Martin	06/21/83

VOLUME NAME
12 CHEMISTRY PROCEDURES

SECTION
12.10 POST ACCIDENT SAMPLING AND ANALYSIS

TITLE
*12.10.2 SMALL VOLUME LIQUID ANALYSIS

12.10.2.1 Purpose

This procedure describes the analysis of a small volume liquid sample for gamma energy analysis.

12.10.2.2 Precautions/Prerequisites

A. Lab personnel shall be issued extremity monitoring devices per Health Physics policy.

B. Lead shielding must be setup prior to removing the sample from the cask.

C. Appropriate dose rate meter must be available and in calibration. Use continuously to assure personnel exposure is ALARA.

D. The gamma spectrometer system must be operable.

E. Appropriate remote handling tools must be available and used during handling of highly radioactive sample.

F. Follow PPM 12.10.1 to obtain sample using the Post Accident Sampling System.

12.10.2.3 Equipment

A. Syringes capable of accurately measuring desired aliquiot (100λ ; 200λ ; 500λ)

B. Needles capable of reaching the bottom of the 15 ml vial (2.5" to 3" long)

C. 125 ml Serum - Vials

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UNCONTROLLED

D. 15 ml Serum - Vials

E. Solution of 0.1N HNO_3 for dilution

12.10.2.4 Procedure

A. Prior to removing sample from transfer cask into the shielded handling arrangement, complete the following:

1. Prepare the dilution vials (125 ml) as follows:

a. Add 50 ml of 0.1N HNO_3 to the 125 ml vial.

b. Evacuate vial for approximately 30 seconds being careful not to remove any liquid.

c. Prepare the counting vials (15 ml) as follows:

1) Add 10 ml of 0.1N HNO_3 to 15 ml vial.

2) Evacuate vial for approximately 30 seconds being careful not to remove any liquid.

B. While monitoring radiation exposure raise sample vial up in transfer cask to enable removable and transfer from cask into shield work area. Use remote handling tool only.

C. Monitor radiation exposure while vial is in position to determine dilution and adjust lead to minimize personnel exposure.

D. Using the appropriate syringe withdraw an aliquot of sample and transfer into dilution vial prepared in Step A above. Record dilution on Attachment A.

NOTE: Liquid will be quickly sucked into the vial.

E. Depending on radiation levels of vial more sample dilution(s) may be necessary. If so, repeat Step D by transferring sample from last dilution vial into another prepared 125 ml vial.

F. Final counting vial will be 15 ml with 10 ml final volume in 0.1N HNO_3.

G. Survey counting vial for contamination, radiation and transport to counting room for analysis only when vial is less than 1000 dpm/100cm^2 external contamination and radiation levels are low enough to count on gamma spectrometer.

NOTE: Containing vial in plastic wrap is required prior to placing vial in shielded cave.

H. Count sample just long enough to obtain a spectrum that can be used to identify the following nuclides in microcuries per ml:

1. I-131
2. I-133
3. Cs-134
4. Cs-137

PASS

I. Sample from PASS contains:

10.0 ml of dilution plus (a)

0.1 ml of sample solution (b)

II. Sample dilution #1

_____ ml of dilution (c) (0.1N HNO_3)

_____ ml of sample (d)

III. Sample dilution #2

_____ ml dilution (e) 0.1N HNO_3

_____ ml sample (f)

IV. Sample dilution #3

_____ ml dilution (g) (0.1N HNO_3)

_____ ml sample (h)

Pass dilution ratio:

(a/b) x (c/d) x (e/f) . . . = dilution factor

Isotope	uCi/ml Concentration	Dilution Factor	Final Conc uCi/ml
I-131			
I-133			
Cs-134			
Cs-137			

Attachment A