

NRC INSPECTION MANUAL

DI

MANUAL CHAPTER 1232

COLLECTION, PREPARATION, AND SHIPMENT OF INDEPENDENT MEASUREMENT SAMPLES

1232-01 PURPOSE

To provide requirements and guidance to NRC inspectors and NRC contractors for collecting, processing, packaging, and shipping samples to the Radiological and Environmental Sciences Laboratory (RESL) in Idaho Falls, Idaho.

1232-02 OBJECTIVES

To improve the quality of results, to decrease turnaround time, to tighten management control, and to recover costs from licensees and applicants.

1232-03 DEFINITIONS

Splitting. Dividing a sample into two or more parts.

Urgent Samples. Samples that require immediate attention. These samples will be processed with priority over other samples.

Routine Samples. Samples collected as part of a scheduled inspection in accordance with an inspection procedure.

Nonroutine Samples. Samples collected as part of a reactive inspection.

Inplant Samples. Samples collected inplant including effluent, process streams and reactor coolant samples.

Environmental Samples. Samples collected in the environment, including outfall water samples, vegetation, soils and sediments, and milk.

1232-04 RESPONSIBILITIES AND AUTHORITIES

04.01 Project Manager, IE Headquarters

- a. Approves the types of analyses, scheduling, and number of non-routine samples to be analyzed by RESL.
- b. Resolves problems regarding the above.

04.02 Regional Representative

- a. Coordinates the flow of samples from the region to RESL.
- b. Reviews sample handling, packaging, and paperwork.

1232-05 BASIC REQUIREMENTS

The two main purposes for analyzing samples in or near licensee facilities are (1) to determine the capability of the licensee to make accurate radiometric measurements and (2) to make independent radiological assessments of situations. In the latter case, the obtained information is needed to provide or justify the basis for action.

To obtain accurate measurements on samples and make valid comparisons, it is necessary to have representative samples, samples that are as close as possible with the licensee's samples, and samples that reach RESL in a chemical and physical state to enable the analyst to make meaningful determinations. Provided below are procedures and guidance to achieve this goal.

05.01 Procedures and Materials for Collecting and Processing Samples. Section SP-1, "Collecting, Pretreating, Packing, and Shipping Samples to the Radiological and Environmental Science Laboratory," of RESL's Laboratory Manual entitled, RESL Analytical Chemistry Branch Procedures Manual, IDO-12096, 1982, provides the required methodology.

In special cases, individuals collecting samples for analysis by RESL may deviate from the usual field treatment or request special treatment in the laboratory. However, deviations in sample treatment or special requests should be made clear by noting them on the sample container and Form ID F-5484.1A. When possible, special requests should be discussed with Dale Olson (FTS 583-2532), the RESL contact, before collecting samples.

05.02 Procedure for Filling Out Analytical Record Sheets, Form ID F-5484.1A. An analytical record sheet, Form ID F-5484.1A, must be included in the packages for each sample. No work will be performed without a properly filled out form. A copy of this form is shown in Figure 1. Please note: We are required by law to recover the analytical costs from the licensee. Therefore, the docket number must be provided along with the name of the facility. This should be written in the space listed, "Sample From."

Give all information requested in the form to the left of and including the column headed "Anal. for," except for the first column headed "No." as shown on Figure 1. Fill out those columns of the form as completely as possible. Make sure the sample identification on the form is the same as on the bottle. Include pertinent information, such as sample collection times, sample volumes on air particulate filters and charcoal cartridges, and any specific information that will assist the analyst, such as the presence of higher than usual concentrations of acids, laundry waste, floor drain samples, etc. If all of the usual analyses are not desired,

state specifically those that are desired or those that are to be omitted. Include requests for special sample treatment or analyses such as: do not acidify; filter and analyze filtrate only, etc. Specify a date for the gross beta measurement at least 2 weeks from the date the sample was shipped. This will allow for delays enroute and for reconstitution of the sample after it is received at RESL. If a charcoal cartridge or particulate filter must be returned to the licensee, so state on the analysis sheet. List the analyses to be performed, leaving an appropriate number of lines as suggested on the attached sample sheet to facilitate the recording of results. Do not fill out the blanks for "Samples Received," "Analysis Completed," "Analyzed By," and "Serial No." Do not fill out column "Inst. used" or any columns to the right of "Inst. used."

Note, on the top left side of the sheet, the checkoff to indicate whether the sample is routine, nonroutine, and/or urgent. For budgetary and administrative purposes, it is important to distinguish the types of samples. Check "Urgent" box only if samples are really top priority. Urgent samples will displace and delay routine samples, disrupt regular schedules, and result in substantially increased analytical costs.

In addition, indicate on the form whether the sample was collected in the plant, "Inplant," or in the environment, "Environ." Space has been provided to indicate under which inspection module these samples were collected, "NRC Mod #." We need this information and sometimes it is difficult for RESL to categorize the particular sample.

05.03 Procedure for Accessing RESL's Query Computer Program.
To determine the status and analytical results of submitted samples, a query program has been developed to access RESL's computer system. The project manager will provide each region with a user name and password. Access to the computer will be limited to the time period 5:30 to 17:30 MST Monday through Friday. Any computer terminal and modem capable of 1200 baud transmission rate can be used.

Listed below are detailed instructions for using RESL's query program.

- a. Turn the terminal "on" and allow it to warm up.
- b. Dial the FTS access code and 583-2009. When the call is answered and the carrier signal is heard, hang up the receiver and turn the switch on the modem to data, or do whatever is necessary to make your particular modem operable.
- c. To log onto the computer, press the return on the terminal. You will be asked for your "user name" (each region will be given a name).
- d. Give your user name and the computer will request your password (each region will be given a password).
- e. Respond with your password; if it is correct, you will be welcomed onto the computer and it will conversationally tell you what to do to obtain your data. If the password is

incorrect, you will not be allowed access and you will have to begin "log on" again by returning to step c.

The dialogue that takes place is as follows:

Hello.

Welcome to the RESL data base, courtesy of which here is your fortune cookie for today. (The computer provides a "gem" for your enrichment).

When the program is ready it will display an "*" as a prompt character. If the serial number of the desired sample is known it may be entered after the prompt, terminated by a return. If the serial number is unknown and a listing of the serial numbers, associated comment line and submission date is desired, simply hit the return key. You may halt or continue the listing at any time by using the "control S," "control Q," or the "No scroll" key on your terminal.

Note the serial number(s) of the sample(s) in question.

Once the entire serial number list is displayed, enter the serial number of the desired sample. All of the available results for the specified serial number will then be displayed. The program will then ask if another query is desired. If "yes," it proceeds with the next query. If the answer is "no" the program will terminate.

- f. Turn the switch on the modem from "data" to "voice" or do whatever is necessary to disengage your particular modem.
- g. Turn "off" the terminal.

05.04 Procedures for Packaging and Shipping Samples

- a. General Information. Applicable Department of Transportation (DOT) regulations in 49 CFR 170-178 and U.S. Postal Service (USPS) Regulations in Publication #6, "Radioactive Materials," September 1983, must be followed in the packaging and shipment of samples. The samples must be considered to be "radioactive material" for purposes of transportation if their specific activity exceeds 0.002 $\mu\text{Ci}/\text{gram}$, and the radioactivity is essentially uniformly distributed [see 49 CFR 173.403(y)]. Below this activity, the packages may be shipped as would any other nonradioactive laboratory sample. Liquids below this specific activity may be sent without absorbing material if packaged in 1-quart "Cubitainers." As an added precaution against leakage, the "Cubitainer" lid should be screwed on tightly and black electrical tape should be used to secure the cap and neck of the container. The "Cubitainer" should be placed inside a heavy-gage plastic bag, excess air removed, and the bag sealed. The bagged "Cubitainer" is placed in the cardboard carton and mailed.

Nonliquid samples will be packaged, marked and labeled as required in accordance with applicable requirements for

mailable or non-mailable packages as described below. Particulate filters will be placed inside glassine envelopes and sent in regular mailing envelopes or packages as required by the radioactivity present.

Gas samples are to be shipped in the same package as received, using care to position the polyfoam at the ends of the inner container to protect the fragile arms of the gas bulb. Should the surface activity of the packaged gas sample exceed the permissible limits, the inner container must be packaged within a larger outer container so as to reduce the external radiation.

- b. Mailable Radioactive Sample Packages. If the sample specific activity exceeds or is suspected to exceed the 0.002 $\mu\text{Ci/gm}$ level, the next threshold to consider is whether the package activity exceeds one-tenth of a "small" or "limited" quantity, pursuant to 49 CFR 171.8 and 173.421, 173.421-1, and 173.421-2 or USPS Publication #6, paragraph IIA. For solids this mailable limited quantity is 10^{-4} times its A_2 value in 49 CFR 173.435 or 10^{-5} times its A_2 value for liquids. As such, the packages must be "strong, tight" with the radiation level on the package not to exceed 0.5 mrem/h at any point. The USPS requirements for "limited quantity" are essentially identical to the DOT requirements of 49 CFR 173.421, 173.421-1, and 173.421-2 for a "limited quantity," except that the USPS further requires that liquids must additionally be packaged within a leak resistant and corrosion resistant secondary inner container, surrounded by sufficient suitably positioned absorbent material to absorb at least twice the volume of liquid radioactive contents in the event of leakage from the secondary inner container.

The external surface of the package may not have "significant" removable radioactive surface contamination as prescribed by 49 CFR 173.443(a), and the inner packages must be marked "RADIOACTIVE" or if there is no inner package, the outside of the package itself must be so marked.

Mailable radioactive packages may also be carried by an individual on a passenger-carrying aircraft, since the DOT requirements for air carriage of radioactive packages do not apply to "limited quantities" other than the requirements for reporting of incidents [see 49 CFR 173.421-1(b)(2)] which are applicable. It is important to remember that the certification/notice described by 49 CFR 173.421-1 (a) should be prepared and accompany the package.

- c. Non-mailable Packages. If the limits of USPS Publication #6, paragraph IIA and Table 1 therein are exceeded, the package is non-mailable, but it may be offered for transport to a carrier or transported in private carriage, subject to the applicable DOT regulations for a "limited quantity" (10^{-3} times A_2 for solids and 10^{-4} times A_2 for liquids) or as a Type A package with contents not exceeding A_1 or A_2 (49 CFR 173.403(a) and (b), 173.412, and 173.415).

Limited quantity, non-mailable packages are excepted from specification packaging and labeling requirements. A marking requirement identical to that for mailable packages does apply, but the shipping documentation requirement is much less than that for Type A, non-mailable packages, wherein specification 7A packaging, marking and labeling, and shipping paper documentation is required. It is important to remember that the DOT Specification 7A is a "performance" specification, requiring that each shipper of such a specification maintain on file a supporting documentation which attests to the results of the demonstration testing of the packaging design against the Type A performance tests [see 49 CFR 173.412, 173.415, 178.350, and 173.465]. Additionally, the package is subject to the requirements for liquids as prescribed in 173.412(n), requiring absorbent materials or a double-containment system.

Note: Section 02, IE Procedure No. 86740 may be used as a general guideline for DOT requirements, applicable to package marking, labeling, preparation of shipping papers, etc.

- d. Air Transport of Non-mailable Packages (Labeled Packages). Non-mailable, labeled, radioactive packages may not be carried by an individual passenger on a passenger-carrying aircraft. They may however, be offered to the carrier as air freight, following the established provisions for packaging, marking, labeling, and shipping paper description. Additionally, if the package is to be offered for carriage on a passenger-carrying aircraft, the shipper must certify on the shipping papers that the radioactive material is for use in research [see 49 CFR 175.700(c)] and indicate this accordingly on the shipping papers [see 49 CFR 172.204 (c)(4)]. Independent measurement samples are considered to be for use in research [see memorandum for John Buchanan from Alfred W. Grella, dated September 4, 1986].
- e. Mailability of Samples Based on Nonradiological Hazardous Materials Considerations. In addition to considering the mailability of a sample package based on its radioactive nature, its mailability on the basis of any secondary hazardous material characteristics also must be considered. The general rules for such mailability are contained in USPS Publication #52, "Acceptance of Hazardous, Restricted or Perishable Matter," May 15, 1981.

Generally, the USPS rules allow as a mailable hazardous materials package only those materials that meet the "limited quantity" criteria of 49 CFR for the specific hazard class. In the case of analytical samples, the most likely secondary hazard which might exist would be its corrosivity due to acidic solution. Therefore, a determination should be made of whether the sample is a "corrosive material" even if it is not a "radioactive material."

Pursuant to 49 CFR, a "corrosive material" is a liquid or solid that causes visible destruction or irreversible alterations in skin tissue at the site of contact or, in the

case of leakage from its packaging, a liquid that has a severe corrosion rate on steel. The quantitative test criteria for determination of the above are prescribed in Section 49 CFR 173.240. Informal information has been obtained from DOT to the effect that laboratory testing of nitric and hydrochloric acids in aqueous solution has indicated that greater than 1% by volume of either material would qualify as a "corrosive material" pursuant to the test criteria. A corrosive liquid, however, is excepted from 49 CFR packaging, marking, and labeling requirements and is generally mailable subject to the following:

1. Volume is limited to 16 ounces (approximately 500 ml) in inside closed bottles. (If an air shipment, only one bottle per package.)
2. Bottles must be cushioned by uncombustible, absorbent material, and securely packed in tightly closed metal containers, in an outside metal, wooden, or fiberboard outer container.
3. Bottles and inside containers must have screw caps with a minimum 1½ turns, or soldering clips, or other means to effect secure closure. Friction tape closure is not acceptable.

In general, when a limited quantity radioactive material also meets the definition of another hazard class, the requirements for the other hazard class will prevail. The pertinent requirements are found in 49 CFR 173.421-2.

For shipments that are made to a foreign country, the inspector should check with the USPS Headquarters, Office of Mail Classification, Washington, D.C. (telephone: (202) 245-5756) prior to shipment since the destination country either may have a prohibition on air shipment by mail of such materials or may have a different limit on allowable contents or package surface radiation.

f. Shipping Samples

1. Mailing Address:

Department of Energy
Radiological and Environmental Sciences Laboratory
Analytical Chemistry Branch
CF 601
Scoville, Idaho 83415
Attention: Dale Olson

2. For "Urgent" samples, requiring quick turnaround time, send samples via Federal Express or Emory Air Freight (under 70 lb. Federal Express is preferred). Telephone Dale Olson and inform him of the contents and when the samples were sent.

For your information: There is a local Idaho airline, C&C Airfreight, which flies to Idaho Falls from Salt Lake City each day at 8:00 a.m. Packages addressed to the Scoville address will be delivered to Dale Olson out at the site.

END

Enclosure:
Figure 1

[THIS PAGE INTENTIONALLY LEFT BLANK]