U.S. NUCLEAR REGULATORY COMMISSION

May 1975

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 7.3

PROCEDURES FOR PICKING UP AND RECEIVING PACKAGES OF RADIOACTIVE MATERIAL

A. INTRODUCTION

Amendments* to § 20.205, "Procedures for picking up, receiving, and opening packages," of the Commission's regulations in 10 CFR Part 20, "Standards for Protection Against Radiation," require that a licensee who expects to receive a package containing quantities of radioactive material in excess of Type A limits make arrangements to receive the package when it is offered for delivery at his facility by the carrier or, if the package is routed to be picked up by the consignee at the carrier's facility, that the consignee make arrangements to receive notification from the carrier at the time of arrival of the package. A licensee who picks up a package of radioactive material from a carrier's facility is required to do so soon after being notified. As soon as practicable after receipt of a package and within specified time limits, licensees are further required to monitor the external surfaces of certain packages of radioactive material for radioactive contamination and for external radiation levels, subject to the exceptions contained in Annex I to this guide. If an amount of contamination or radiation level in excess of that specified is detected, the licensee is required to immediately report that fact to the final delivering carrier and to the NRC. These requirements are directed toward control of radiation exposure and spread of radioactive contamination from packages of radioactive material in transport.

Section 20.201 of 10 CFR Part 20 requires each licensee to make or cause to be made such surveys as may be necessary for him to comply with the regulations of 10 CFR Part 20. "Survey" is defined in that section as an evaluation of the radiation hazards incident to the presence of radioactive materials under a specific set of conditions. Finally, § 20.201 states that, when appropriate, such evaluation should include a physical survey of measurements of levels of radiation or concentrations of radioactive material present. External contamination levels and external radiation levels near received packages should be considered unknown until surveyed. If the quantity and form of radioactive material in a package is such that if the material were unpackaged, the licensee should take some action to comply with other provisions of 10 CFR Part 20 (such as those dealing with limits on radiation exposure, restricting or posting of areas, labeling of containers, or providing personnel monitoring equipment to nearby persons), some form of control should be established on receipt of the package. An evaluation of an individual package which is exempt from the more stringent provisions of § 20.205 can be delayed or perhaps even made unnecessary (1) by the use of area monitors and/or restricting access to an incoming package or (2) by other means that ensure safety and compliance with the provisions of 10 CFR Part 20.

This regulatory guide describes a method acceptable to the NRC staff for licensees to comply with the provisions in 10 CFR Part 20, § 20.205, with respect to arrangements for receipt, pickup, and monitoring of packages containing radioactive material and with respect to reporting of packages which, on receipt, show evidence of leakage or excessive radiation levels.

B. DISCUSSION

Since there is no requirement that packages containing radioactive materials be routinely monitored for leaks during transport, it is necessary that packages be picked up expeditiously and that the existence of a leak be detected rapidly (1) to minimize radiation exposure

*Effective date, May 22, 1974.

of transport personnel and licensee personnel, (2) to minimize the spread of contamination, (3) to allow identification of personnel, vehicles, property, and facilities that have been exposed or contaminated during transport, expediting remedial action, (4) to minimize the time a package is in a carrier's facility and thus subject to accidents, and (5) to obtain evidence of a leak in a package other than the package being monitored.

Licensees receiving packages containing radioactive material have the responsibility to expeditiously pick up the packages at carrier's terminals and to monitor the package's external surfaces for radioactive contamination or excessive radiation levels, as well as to notify the delivering carrier and NRC immediately if external radiation or radioactive contamination in excess of that specified is detected.

Annex I to this document contains a discussion* of the requirements of § 20.205 to assist licensees in understanding and complying with the regulatory requirements.

C. REGULATORY POSITION

The guidance contained in the NRC document, "Procedures for Picking Up and Receiving Packages of Radioactive Material," constitutes an adequate basis for complying with the package pickup and monitoring requirements of paragraphs (a), (b), and (c) of § 20.205.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the staff's plans for utilizing this regulatory guide.

Effective on publication of this guide, the method described herein will be considered acceptable by the Commission's staff in assessing licensees' performance with respect to picking up and receiving packages of radioactive material from carrier operations. Alternative methods that satisfy the requirements in the Commission's regulations will also be considered acceptable.

---

*This discussion is also contained in a document entitled "Procedures for Picking Up and Receiving Packages of Radioactive Material," WASH-1313, June 1974. Copies may be obtained from the National Technical Information Service, United States Department of Commerce, 5285 Port Royal Road, Springfield, Va. 22151, at a price of $4.00 for a printed copy and $1.45 for a microfiche copy.

ANNEX I

PROCEDURES FOR PICKING UP AND RECEIVING PACKAGES OF RADIOACTIVE MATERIAL

INTRODUCTION

The regulations of both the NRC and the Department of Transportation (DOT) provide package design standards and provisions for testing packages prior to shipment to reduce to a minimum the chances of leakage during transport. Under the present regulations, however, carriers are not required to have radiation-monitoring capabilities. Therefore, the earliest opportunity for monitoring (i.e., the first time packages in routine transportation channels are in the hands of persons equipped and trained in radiation monitoring) is at the consignee's plant.

The record over the past 25 years in the transportation of radioactive materials shows that procedures to control leakage from packages containing radioactive materials have been highly effective. In the shipment of millions of packages between the 1940's and early 1974, only about 100 or so containers are known to have leaked.

Although in some of these incidents accident conditions caused failure of containers, several failures occurred in the absence of an accident. In a few cases in which there was no apparent evidence of damage or leakage, there was considerable spread of contamination because the leakage went undetected for some time. Also, in several cases, excessive external radiation levels were measured on a package on receipt.

After one such contamination incident, the National Transportation Safety Board report of its investigation noted that delays in pickup, monitoring, and reporting contributed to the spread of contamination. The NTSB report pointed out that DOT authority does not extend to the consignee of a shipment of radioactive materials and recommended that the Commission impose a requirement that licensees promptly pick up and monitor packages of radioactive materials of the type involved in that incident.

Delays in reporting of leaking packages by consignees, either as a result of delays in transporting a package to the consignee or delays in his recognizing that a package is leaking, may contribute to the spread of radioactive contamination and to its economic and radiological consequences. Delays in reporting or failure to report excessive radiation levels may make it impossible or more difficult to assess and deal with any overexposures.

Amendments to § 20.205, "Procedures for picking up, receiving, and opening packages," of the Commission's regulations in 10 CFR Part 20, "Standards for Protection Against Radiation," that have been adopted require a licensee who expects to receive a package containing radioactive material in excess of Type A limits* to arrange to receive the package when it is offered for delivery at his facility by the carrier or, if the package is to be picked up by the consignee at the carrier's facility, to arrange to be notified by the carrier of the arrival of the package at the time of its arrival. A licensee who picks up a package of radioactive material from a carrier's facility is required to do so expeditiously. Licensees are further required to monitor, as soon as practicable after receipt and within specified time limits, the external surfaces of certain packages of radioactive material for radioactive contamination and for external radiation levels. If greater than a specified amount of contamination or allowable radiation levels is detected, the licensee is required to immediately report that fact to the final delivering carrier and to the NRC.

The requirement that packages be monitored on receipt provides a positive means for detecting any significant radiation level or leakage from packages, substantiates the record of no leakage, and provides data that can be a basis for changes in specific designs that would further reduce the chance of high radiation levels

---

*Whether the quantity of a radionuclide exceeds Type A limits may be determined as follows: The Type A quantity limits differ for eight transport groups of radionuclides (Enclosure B), making it necessary to know what transport group(s) one or more radioisotopes is in. Radionuclides are, in general, assigned to transport groups according to their radiotoxicity (see Enclosure A). The most radiotoxic, such as the isotopes of plutonium, are in Group I with a Type A limit of 1 millicurie. Group II, which includes radionuclides with radiotoxicity equivalent to that of strontium-90 and barium-133, has a Type A limit of 50 millicuries. Group III, which includes radionuclides with toxicity equivalent to many commonly used isotopes such as cerium-144, cesium-137, iodine-131, and thallium-204, has a Type A limit of 3 curies. Group IV, which contains commonly used isotopes such as chromium-51, cobalt-58, gold-198, molybdenum-99, and technetium-99, has a Type A limit of 20 curies. Groups V through VII are specialized groups including inert gases such as krypton in uncompressed form and materials in low-hazard form such as tritium (H-3) as a gas or luminous paint.

"Special form" (see Enclosure B) is a specialized group which applies to many materials that are either in solid, nondispersible form or in a capsule that will retain its contents under prescribed conditions; the Type A limit for a radioisotope in special form is 20 Ci, as compared with a variety of Type A limits for radioisotopes not in special form.

If the radionuclide expected to be received is known, its transport group can be found in the list in Enclosure A, and the Type A limit can be found in the table in paragraph 20.205(b) of 10 CFR Part 20 (reproduced here in Enclosure B for convenience). From this, it can be determined whether the expected package contents will be in excess of the Type A limits.

or leakage occurring. These requirements are directed toward the control of (1) radiation exposure and (2) spread of radioactive contamination from packages of radioactive material in transport.

DISCUSSION OF REQUIREMENTS

1. Arrangements for Receipt or Notification of Package Arrival

There has been concern that, in the absence of a requirement for facilitating the transfer between carrier and consignee, a package received after normal working hours on Friday might remain in the carrier's terminal over the weekend because of the carrier's inability to deliver to or even to notify the licensee. Thus, § 20.205(a) of 10 CFR Part 20 is intended to ensure that the transfer of a package with greater than Type A quantity of radioactive material from a carrier to a licensee is not delayed on that account. A primary purpose of this regulation is to minimize the time these packages spend in the carrier's terminal so that packages with a relatively high potential leak hazard may be monitored for external contamination within a reasonably short time after transportation.

2. Expeditious Pickup of Packages

The provisions of the regulations are intended to ensure that a package containing radioactive materials is transferred from the carrier system to the consignee with a minimum of delay. Most packages are delivered directly to the consignee's facility, frequently by a local delivery service or second carrier. These packages must be delivered "without unnecessary delay" (see, for example, 49 CFR Part 177, § 177.853 of the regulations of the Department of Transportation).

When the routing papers for a package of radioactive materials arriving at the carrier's terminal facility designate that the package will be picked up at that facility by the consignee, the carrier has the responsibility of promptly notifying the consignee that the package is available to be picked up. The new paragraph 20.205(a) of 10 CFR Part 20 imposes a requirement on the consignee to pick up such package expeditiously after being notified by the carrier of its arrival.

Expeditious movement of a radioactive material package from a carrier's terminal facility to the consignee reduces the amount of radiation exposure of transport workers. In cases where the packages are held in areas occupied by the carrier's employees, radiation exposure is directly related to the time the package is held at the terminal. Also, delays in pickup may result in extra package handling by carrier personnel and thus additional radiation exposure. Expeditious pickup also reduces the period of exposure of the package to potential accidents in the carrier's facility; i.e., the longer the package remains at the carrier's facility and the more times it is handled, the greater the chance of its involvement in an accident.

Expeditious movement to the consignee, combined with the monitoring required by paragraphs 20.205(b) and 20.205(c) discussed below, provides the means for timely detection of any leaking package or otherwise unsafe package. The sooner detection and reporting occur, the more timely can be the remedial action to reduce the consequences of an unsafe package having been in the transport system.

3. Prompt Monitoring of Packages

Significant contamination on the external surfaces of a package may have been caused by leakage of either that package or another package stowed with it during transportation. Whichever the source, such contamination may have been spread in the carrier's vehicles and facilities to other packages in the same transportation system. Prompt monitoring of packages on receipt by the consignee and immediate reporting of any evidence of significant contamination on the outside of a package will permit the carrier to identify the vehicles, facilities, goods, and property involved which might also be contaminated. If there is evidence that persons may have received significant radiation doses (more than 500 mrem, in most cases, would be considered a significant dose), it is essential that action be initiated at the earliest possible time after exposure so that the exposure conditions can be reconstructed, doses can be estimated, persons with significant exposures can be identified and notified, and appropriate action can be taken to collect biological samples or to provide medical treatment where indicated.

It is important to monitor for high radiation levels and for evidence of contamination on both external and internal surfaces of each package to avoid unnecessary exposure of personnel and spread of contamination in the consignee's facility. If a specified amount of external contamination is found on a package, the situation should be treated as though that package were leaking, even though the contamination may have come from another package. For protection of the personnel and facilities of the consignee, the package should be isolated, and radiologically trained personnel should be asked to assist. Persons who have come in contact with the package should be detained until monitored and released by trained personnel.

Many users of radioactive material follow the procedure of thoroughly monitoring each package before bringing it inside the laboratory, hospital, or plant. Good health physics practice dictates that each package be monitored inside and out while it is being opened and before the packaging or the contents are moved away from the unpacking location.

4. Immediate Notification

If high external radiation dose rates are detected on any package (i.e., either more than 200 mrem per hour on the surface or 10 mrem per hour at 3 ft from the surface of a package) or if there are excessive contamination levels on the external surface (i.e., more than 0.01 μCi per 100 cm^2), the NRC and the carrier who last had contact with the package must be notified immediately.

PROCEDURES

1. Procedures for Receiving Packages or Notification of their Arrival

Implementing the requirement to receive packages or to pick them up expeditiously has two aspects: (a) who should make arrangements and (b) what arrangements should be made.

a. Responsibility for Arrangements. Only licensees who expect to receive quantities of radioactive material in excess of Type A quantities must make arrangements to receive a package or notification of its arrival at the carrier's facility.

b. Arrangements for Receipt or Pickup of Packages. When it is determined that arrangements for receipt or pickup of packages must be made, the arrangements are ordinarily determined by the routing of the expected package, the working hours of the final delivering carrier, and arrangements the consignee has made with the supplier of the radioactive material.

In the simplest case, the licensee-consignee and his supplier agree on a shipment time for the radioactive material that will result in its arriving during normal working hours of the normal workweek. If the supplier determines that this can be accomplished with a reasonable degree of certainty and agrees to it, the consignee need only maintain his ability to receive packages during his normal working hours; if routine shipments arrive on a regular schedule, this can be taken into account in arranging for the capability to receive notification of the availability of packages for pickup or in arranging to receive packages when delivered. If the supplier and consignee arrange that the consignee will pick up a package at the airport or at some other final delivering carrier's terminal, the consignee should maintain, during normal working hours, the ability to be notified by the carrier and to pick up the package.

A more complicated case would be an arrangement between the supplier and the licensee-consignee that allows shipment and arrival at any time or at a specific time not during normal working hours. In this case, the working hours of the carrier at his terminal facilities would influence the required preparations by the consignee. If the carrier terminal is open only from 8:00 a.m. to 5:00 p.m., five days per week, for example the package would not be sent from the originating carrier terminal to arrive at any other time. In this case, the consignee would need to maintain the capability to receive notification or to receive the package (depending on whether pickup is required) only during those hours when pickup or delivery would be feasible. If the carrier terminal is open 24 hours a day, 7 days a week and there are no restrictions on when a particular package may arrive, the consignee capability should be equally open-ended, so that whenever the package arrives at the carrier terminal facility, the consignee is available to either pick it up or receive it.

In summary, the arrangements which the consignee should make to receive a package or a notification that a package has been received at the carrier's facility depend in part on when the package may be or is likely to be received at the terminal carrier's facility. The arrangements should provide reasonable assurance that there will be no undue delays in transferring a package containing more than a Type A quantity of radioactive materials from the carrier to the consignee.

2. Expeditious Pickup of Packages

In § 20.205 of 10 CFR Part 20, the word "expeditiously" relative to picking up packages at the carrier's facility is not defined, permitting flexibility in individual situations. In the following guidelines, an implementation of the requirement for expeditiously picking up packages acceptable to the NRC staff is described.

The pickup of a package containing radioactive material should be accomplished as soon as practicable after receiving notification by the carrier that the package is available.

a. If notice is provided during the normal workday, pickup should be completed the same day – if practicable, within two or three hours.

b. When notification by the carrier occurs after normal working hours and it is not practicable to pick up or to arrange for pickup of a package from a carrier's facility that same day, pickup should be accomplished as early as possible the following morning. Here a distinction can be made between a package of radioactive material of Type A quantity with its smaller potential hazard to people due to the smaller quantity and/or the less hazardous nature of the contained radioactive material and a package with a quantity greater than Type A with its greater potential hazards. If a Type B package is to be delivered, a special effort should be made to take possession of it to the extent that a pickup capability should be provided on weekends, holidays, and other days that are not normal working days. Pickup of a Type A package, with its smaller potential hazard and generally lower external radiation level, can be postponed until the next normal workday. Type A and Type B designations are, or soon will be, marked on the

outside of most packages containing radioactive material.

3. Monitoring of Packages

Monitoring of a package to determine the external radiation levels is a simple procedure involving direct measurement of the radiation level outside the package. For purposes of satisfying the monitoring requirement in paragraph 20.205(c), it is sufficient to make cursory surveys around each package (1) at the surface and (2) at 3 ft from the package with a Geiger-Mueller detector (unless a neutron emitter such as californium-252 or plutonium-beryllium is contained in the package, in which case a neutron detector should also be used). If the cursory survey reveals radiation levels well below 10 mrem per hour at 3 ft and well below 200 mrem per hour at the package surface, it is unnecessary to make a more detailed survey.

If the preliminary survey indicates more than 10 mrem per hour at 3 ft from any package, or more than 200 mrem/hr at the package surface, a more careful measurement of the levels is necessary. For the more accurate measurements, the package being monitored should be separated from other packages. If the packages are in a location where the background level of radiation is reasonably low and relatively constant, it might be preferable to move the other packages away from the package with the high external radiation levels. The levels should be measured (1) at the surface (i.e., by placing the detector as close as is physically possible to the external surface of the packages which would be against a cargo handler—not, for example, between heat radiation fins) and (2) 3 ft from the surface. An appropriate type of survey instrument, properly calibrated, should be used, and the radiation levels at the surface and 3 ft from the surface in all directions from the package should be accurately measured. The radiation levels or a plot of isodose curves and the degree of accuracy of the measurements should be recorded. These results should be provided to the carrier and the NRC as soon as available so that dosage calculations can be made.

Monitoring of a package for external surface contamination normally involves a two-step procedure. First, a wipe test is made of one or more representative sections of the outer surface of the package. The wipe test is made by rubbing a filter paper or other absorbent material over a predetermined area (usually about 100 cm^2 or 16 $in.^2$) of the package surface, using strong finger pressure. Second, the absorbent material is moved to an area where the radiation level is at or near background, and any activity on the absorbent material is measured with appropriately calibrated instruments.

Any removable radioactive contamination found need not be reported immediately if the average* amount of radioactive contamination as measured on the wiping material does not exceed 0.01 μCi (22,000 disintegrations per minute) per 100 cm^2 of package surface area monitored.

The phrase "as soon as practicable" as it relates to monitoring of packages also should be applied with flexibility. The consignee who picks up a package at the carrier's facility may choose to monitor the package while he is at the carrier's facility. That would certainly be "as soon as practicable." However, the application of "as soon as practicable" to monitoring of packages by consignees normally will be determined in relation to the time when the package arrives at the consignee's facility, whether delivered there by a carrier or brought there by the consignee.

a. If the package arrives at the consignee's facility during a normal workday, it should be monitored the same day – if practicable, within an hour or two of receipt. In any case, it is required that the package be monitored within 3 hours. Because of the very low probability that any individual package will be found to be contaminated, it is not considered necessary to detain the carrier who delivers a package until a package is monitored, unless the package is damaged or shows evidence of leaking. The name of the delivering carrier should be kept available until the package has been monitored, however, since this carrier must be notified in the event significant external contamination is found.

b. If a package is received at the consignee's facility after normal working hours and it is not practicable to have the package monitored the day of receipt, the monitoring should be accomplished as early as possible the following morning. In any case, the package must be monitored within 18 hours after receipt.

4. Immediate Notification

If external radiation or radioactive contamination** in excess of that specified is detected on a package, the recipient must immediately notify the delivering carrier, i.e., the last carrier known to have handled the shipment before the consignee took possession of it. This carrier is normally identified on the freight bill. This notification to the carrier should be immediate – that is, as soon as possible, after making sure that high radiation levels do exist or that the package is actually contaminated. This notification normally is by telephone. Because the

*The average refers to the contamination from the specific area wiped by the absorbent material up to 100 cm^2 and does not refer to the average contamination of multiple wipe samples.

**Levels well above those permitted on the surface of packages under the DOT regulations.

carrier would take corrective actions in response to such a notification, the presence of high external radiation levels or contamination should be definitely confirmed before notification – by checking the operation of the measuring instrument, by checking the radiation measurements, by rewiping the package surface, by counting for a longer time period, or by whatever other confirmation seems appropriate for the procedure being used.

DOT regulations require that the carrier isolate any equipment and facilities that have been in contact with the contaminated package and that he notify both the Department of Transportation at 202-426-1830 and the consignor (shipper) of the package. The Department of Transportation will accept this notification at any hour of any day. DOT will then take the initiative and, upon determining whether widespread contamination is likely, will work with the consignor and other carriers involved to take what action is necessary to control the spread of contamination and to properly deal with the contaminated vehicles, facilities, and property.

The appropriate NRC Regional Office (see Enclosure C) should be notified by the licensee to ensure that the end carrier takes the required action to involve the consignor and DOT in the response to the incident, and to provide technical advice and assistance where necessary. This notification, also, will be accepted at any hour of any day.

RECORDS

Any delay in detecting and reporting high external radiation levels or a leaking radioactive material package may be important in (1) assessing the radiation doses to people, (2) controlling the spread of radioactive contamination, and (3) limiting the costs in time, money, and injury of its consequences. It is suggested, but not required by the regulation, that a consignee's records indicate when he was notified of the arrival of a package and when it was picked up and monitored, including notations of reasons for delays if any. In the event a high radiation level or leakage is detected, records should be kept of persons notified and the time of notification.

The monitoring of incoming packages is a necessary survey under the provisions of 10 CFR Part 20, § 20.205, and a record of survey results is required by 10 CFR Part 20, paragraph 20.401(b).

INSTRUMENTATION

If only beta or gamma radiation is involved, the rough check of external radiation levels can be made with a Geiger-Mueller (GM) detector or counter. If significant levels of neutrons are possible, as in the case of a package containing californium-252 or polonium-beryllium or plutonium-beryllium sources, a neutron detector should be used in addition to the GM detector, and the sum of the measured levels should be considered in evaluating the level of radiation.

For more accurate determinations, a GM detector, ion chamber, scintillation chamber, or other accurate calibrated instrument appropriate for the type and levels of radiation to be measured should be used. Consideration should be given energy dependence, geometry, and other factors affecting the accuracy of the readings obtained with whatever instrument is used.

Package surfaces normally are checked for contamination by the wipe test procedures described above. The level of contamination on the wipe is measured with appropriate radiation-detection instruments.

Instrumentation needed to detect the levels of external contamination specified in § 20.205 should be readily available. A thin-window GM detector, either in a portable monitoring instrument or used in conjunction with a shielded counting chamber, should be sufficient in most cases to monitor for the levels of contamination specified. A scintillation well-counter, normally used to measure medical patient samples, would also normally be adequate for this task. When external contamination can be determined at these levels only by the measurement of alpha radiation (e.g., if the contaminant is polonium-210), instrumentation to detect alpha radiation is necessary. Once the instrumentation and procedures for monitoring a package containing specific radionuclide(s) are established, the monitoring can be accomplished by a person with a minimum amount of radiological or monitoring training. There should, of course, be a trained person on call to assist if there is an unusual instrument response.

ENCLOSURE A

Transport Grouping of Radionuclides (from 10 CFR Part 71, Appendix C)

Element*	Radionuclide***	Group
Actinium (89)	Ac 227	I
	Ac 228	I
Americium (95)	Am 241	I
	Am 243	I
Antimony (51)	Sb 122	IV
	Sb 124	III
	Sb 125	III
Argon (18)	Ar-37	VI
	Ar-41	II
	Ar-41 (uncompressed).**	V
Arsenic (33)	As 73	IV
	As 74	IV
	As 76	IV
	As 77	IV
Astatine (85)	At 211	III
Barium (56)	Ba 131	IV
	Ba-133	II
	Ba 140	III
Berkellum (97)	Bk 249	I
Beryllium (4)	Be 7	IV
Bismuth (83)	Bi 206	IV
	Bi 207	III
	Bi 210	II
	Bi 212	III
Bromine (35)	Br 82	IV
Cadmium (48)	Cd 109	IV
	Cd 115 m	III
	Cd 115	IV
Calcium (20)	Ca 45	IV
	Ca 47	IV
Californium (98)	Cf 249	I
	Cf 250	I
	Cf 252	I
Carbon (6)	C 14	IV
Cerium (58)	Ce 141	IV
	Ce 143	IV
	Ce 144	III
Cesium (55)	Cs 131	IV
	Cs 134 m	III
	Cs 134	III
	Cs 135	IV
	Cs 136	IV
	Cs 137	III
Chlorine (17)	Cl 36	III
	Cl 38	IV
Chromium (24)	Cr 51	IV
Cobalt (27)	Co 56	III
	Co 57	IV
	Co 58 m	IV
	Co 58	IV
	Co 60	III
Copper (29)	Cu 64	IV
Curium (96)	Cm 242	I
	Cm 243	I
	Cm 244	I
	Cm 245	I
	Cm 246	I
Dysprosium (66)	Dy 154	III
	Dy 165	IV
	Dy 166	IV
Erbium (68)	Er 169	IV
	Er 171	IV
Europium (63)	Eu 150	III
	Eu 152 m	IV
	Eu 152	III
	Eu 154	II
	Eu 155	IV
Fluorine (9)	F 18	IV
Gadolinium (64)	Gd 153	IV
	Gd 159	IV
Gallium (31)	Ga 67	III
	Ga 72	IV
Germanium (32)	Ge 71	IV
Gold (79)	Au 193	III
	Au 194	III
	Au 195	III
	Au 196	IV
	Au 198	IV
	Au 199	IV
Hafnium (72)	Hf 181	IV
Holmium (67)	Ho 166	IV
Hydrogen (1)	H 3 (see tritium)	
Indium (49)	In 113 m	IV
	In 114 m	III
	In 115 m	IV
	In 115	IV
Iodine (53)	I 124	III
	I 125	III
	I 126	III
	I 129	III
	I 131	III
	I 132	IV
	I 133	III
	I 134	IV
	I 135	IV

Element*	Radionuclide***	Group
Iridium (77)	Ir 190	IV
	Ir 192	III
	Ir 194	IV
Iron (26)	Fe 55	IV
	Fe 59	IV
Krypton (36)	Kr 85 m	III
	Kr 85 m (uncompressed).**	V
	Kr 85	III
	Kr 85 (uncompressed).**	VI
	Kr 87	II
	Kr 87 (uncompressed).**	V
Lanthanum (57)	La 140	IV
Lead (82)	Pb 203	IV
	Pb 210	II
	Pb 212	II
Lutecium (71)	Lu 172	III
	Lu 177	IV
Magnesium (12)	Mg 28	III
Manganese (25)	Mn 52	IV
	Mn 54	IV
	Mn 56	IV
Mercury (80)	Hg 197 m	IV
	Hg 197	IV
	Hg 203	IV
Mixed fission products MFP.		II
Molybdenum (42)	Mo 99	IV
Noodymium (60)	Nd 147	IV
	Nd 149	IV
Neptunium (93)	Np 237	I
	Np 239	I
Nickel (28)	Ni 56	III
	Ni 59	IV
	Ni 63	IV
	Ni 65	IV
Niobium (41)	Nb 93 m	IV
	Nb 95	IV
	Nb 97	IV
Osmium (76)	Os 185	IV
	Os 191 m	IV
	Os 191	IV
	Os 193	IV
Palladium (46)	Pd 103	IV
	Pd 109	IV
Phosphorus (15)	P 32	IV
Platinum (78)	Pt 191	IV
	Pt 193	IV
	Pt 193 m	IV
	Pt 197 m	IV
	Pt 197	IV
Plutonium (94)	Pu 238 (F)	I
	Pu 239 (F)	I
	Pu 240	I
	Pu 241 (F)	I
	Pu 242	I
Polonium (84)	Po 210	I
Potassium (19)	K 42	IV
	K 43	III
Praseodymium (59)	Pr 142	IV
	Pr 143	IV
Promethium (61)	Pm 147	IV
	Pm 149	IV
Protactinium (91)	Pa 230	I
	Pa 231	I
	Pa 233	II
Radium (88)	Ra 223	II
	Ra 224	II
	Ra 226	I
	Ra 228	I
Radon (86)	Rn 220	IV
	Rn 222	II
Rhenium (75)	Re 183	IV
	Re 186	IV
	Re 187	IV
	Re 188	IV
	Re Natural	IV
Rhodium (45)	Rh 103 m	IV
	Rh 105	IV
Rubidium (37)	Rb 86	IV
	Rb 87	IV
	Rb Natural	IV
Ruthenium (44)	Ru 97	IV
	Ru 103	IV
	Ru 105	IV
	Ru 106	III
Samarium (62)	Sm 145	III
	Sm 147	III
	Sm 151	IV
	Sm 153	IV
Scandium (21)	Sc 46	III
	Sc 47	IV
	Sc 48	IV
Selenium (34)	Se 75	IV
Silicon (14)	Si 31	IV
Silver (47)	Ag 105	IV
	Ag 110 m	III
	Ag 111	IV
Sodium (11)	Na 22	III
	Na 24	IV

Element*	Radionuclide***	Group
Strontium (38)	Sr 85 m	IV
	Sr 85	IV
	Sr 89	III
	Sr 90	II
	Sr 91	III
	Sr 92	IV
Sulphur (16)	Sr 35	IV
Tantalum (73)	Ta 182	III
Technetium (43)	Tc 96 m	IV
	Tc 96	IV
	Tc 97 m	IV
	Tc 97	IV
	Tc 99 m	IV
	Tc 99	IV
Tellurium (52)	Te 125 m	IV
	Te 127 m	IV
	Te 127	IV
	Te 129 m	III
	Te 129	IV
	Te 131 m	III
	Te 132	IV
Terbium (65)	Tb 160	III
Thallium (81)	Tl 200	IV
	Tl 201	IV
	Tl 202	IV
	Tl 204	III
Thorium (90)	Th 227	II
	Th 228	I
	Th 230	I
	Th 231	I
	Th 232	III
	Th 234	II
	Th Natural	III
Thullum (69)	Tm 168	III
	Tm 170	III
	Tm 171	IV
Tin (50)	Sn 113	IV
	Sn 117 m	III
	Sn 121	III
	Sn 125	IV
Tritium (1)	H-3	IV
	H 3 (as a gas, as luminous paint, or adsorbed on solid material).	VII
Tungsten (74)	W 181	IV
	W 185	IV
	W 187	IV
Uranium (92)	U 230	II
	U 232	I
	U 233 (F)	II
	U 234	II
	U 235 (F)	III
	U 236	II
	U 238	III
	U Natural	III
	U Enriched (F)	III
	U Depleted	III
Vanadium (23)	V 48	IV
	V 49	III
Xenon (54)	Xe 125	III
	Xe 131 m	III
	Xe 131 m (uncompressed).**	V
	Xe 133	III
	Xe 133 (uncompressed).**	VI
	Xe 135	II
	Xe 135 (uncompressed).**	V
Ytterbium (70)	Yb 175	IV
Yttrium (39)	Y 88	III
	Y 90	IV
	Y 91 m	III
	Y 91	III
	Y 92	IV
	Y 93	IV
Zinc (30)	Zn 65	IV
	Zn 69 m	IV
	Zn 69	IV
Zirconium (40)	Zr 93	IV
	Zr 95	III
	Zr 97	IV

*Atomic number shown in parentheses

**Uncompressed means at a pressure not exceeding one atmosphere.

***Atomic weight shown after the radionuclide symbol.

m – Metastable state

(F) Fissile material

ENCLOSURE B

Exempt and Type A Quantity Limits
(from amended § 20.205, 10 CFR Part 20)

Transport Group[a]	Exempt[b] Quantity Limit (in millicuries)	Type A Quantity Limit (in curies)
I	0.01	0.001
II	0.1	0.050
III	1	3
IV	1	20
V	1	20
VI	1	1000
VII	25,000	1000
Special Form[a]	1	20

[a]The definition of "transport group" is given in § 71.4 of 10 CFR Part 71. "Special form," also defined in § 71.4, means any of the following physical forms of licensed material of any transport group:

(1) The material is in solid form having no dimension less than 0.5 millimeter or at least one dimension greater than five millimeters; does not melt, sublime, or ignite in air at a temperature of 1,000° F; will not shatter or crumble if subjected to the percussion test described below; and is not dissolved or converted into dispersible form to the extent of more than 0.005 percent by weight by immersion for 1 week in water at 68° F or in air at 86° F; or

(2) The material is securely contained in a capsule having no dimension less than 0.5 millimeter or at least one dimension greater than five millimeters, which will retain its contents if subjected to the tests described below and which is constructed of materials which do not melt, sublime or ignite in air at 1,475° F and do not dissolve or convert into dispersible form to the extent of more than 0.005 percent by weight by immersion for 1 week in water at 68° F or in air at 86° F.

(a) Free Drop – a free drop through a distance of 30 feet onto a flat essentially unyielding horizontal surface, striking the surface in such a position as to suffer maximum damage.

(b) Percussion – impact of the flat circular end of a 1-inch-diameter steel rod weighing 3 pounds, dropped through a distance of 40 inches. The capsule or material shall be placed on a sheet of lead, of hardness number 3.5 to 4.5 on the Vickers scale, and not more than 1-inch thick, supported by a smooth, essentially unyielding surface.

(c) Heating – heating in air to a temperature of 1,475° F and remaining at that temperature for a period of 10 minutes.

(d) Immersion – immersion for 24 hours in water at room temperature. The water shall be at pH 6-8, with a maximum conductivity of 10 micromhos per centimeter.

[b]Packages containing a quantity of radioactive material not exceeding the pertinent exempt quantity need not be monitored under the provisions of § 20.205.

ENCLOSURE C

UNITED STATES NUCLEAR REGULATORY COMMISSION REGIONAL OFFICES

Region	Address	Telephone	
		Daytime	Nights and Holidays
I Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont	Region I, Office of Inspection and Enforcement, USNRC, 631 Park Avenue, King of Prussia, Pennsylvania 19406	215-337-1150	215-337-1150
II Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, Panama Canal Zone, Puerto Rico, South Carolina, Tennessee, Virginia, Virgin Islands, and West Virginia	Region II, Office of Inspection and Enforcement, USNRC, Suite 818, 230 Peachtree St. NW., Atlanta, Georgia 30303	404-526-4503	404-526-4503
III Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin	Region III, Office of Inspection and Enforcement, USNRC, 799 Roosevelt Road, Glen Ellyn, Illinois 60137	312-858-2660	312-739-7711
IV Arkansas, Colorado, Idaho, Kansas, Louisiana, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming	Region IV, Office of Inspection and Enforcement, USNRC, 611 Ryan Plaza Drive, Suite 1000, Arlington, Texas 76012	817-334-2841	817-334-2841
V Alaska, Arizona, California, Hawaii, Nevada, Oregon, Washington, and U.S. territories and possessions in the Pacific	Region V, Office of Inspection and Enforcement, USNRC, Suite 202, 1990 N. California Blvd., Walnut Creek Plaza, Walnut Creek, California 94596	415-486-3141	415-273-4237