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MILITARY STANDARDIZATION HANDBOOK

GUIDELINES FOR IDENTIFICATION, MARKING, LABELING, STORAGE, AND TRANSPORTATION OF RADIOACTIVE COMMODITIES

GP 59

DEPARTMENT OF DEFENSE
WASHINGTON, D.C.

MIL-HDBK-600
Guidelines For Identification, Marking, Labeling, Storage, and Transportation of Radioactive Commodities

1. This standardization handbook was developed by the Department of Defense with the assistance of the military departments, federal agencies, and industry.

2. This publication was approved on 1 September 1976 for printing and inclusion in the military standardization handbook series.

3. This document supplements departmental manuals, directives, military standards, etc., and provides basic and fundamental information on radioactive commodities. It contains listings of radioactive commodities, conversion tables and charts, and should provide valuable information and guidance to personnel responsible for the packaging, handling, labeling, and transportation of radioactive commodities.

4. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Electronics Supply Center, ATTN: Director, Directorate of Engineering Standardization, DESC-E, Dayton, OH 45444, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWORD

The use of radioactive materials in the manufacture of certain commodities has introduced a potential hazard within the Department of Defense supply system. Therefore, all personnel should be constantly aware of the potential dangers and of the need for observing extreme caution while handling these commodities. It is important, therefore, that each radioactive commodity be properly packaged, identified, and labeled.

The current status of the private segment of the nuclear industry in the U.S.A. is such that the vast majority of the current shipments of radioactive materials involves small or intermediate quantities of material in relatively small packages. The external radiological hazard resulting from small radioactive commodities is usually insignificant. However, if the commodity is broken or damaged, the hazard is increased by release of the enclosed radioactive material An internal radiation hazard exists when radioactive materials enter the body through eating, drinking, inhalation, or an open wound. Any of these media for internal radiation are made possible when a radioactive commodity is broken.

Since the beginning of the relatively young atomic energy industry, i.e., about three decades, there has been an excellent record of safety in the transportation of millions of packages of radioactive materials. Recent estimates indicate that current shipments involve approximately 800,000 packages of radioactive materials per year in the U.S.A. Thus far, based on best available information, there have been no known deaths or serious injuries to the public or to the transportation industry personnel as a result of the radioactive nature of any radioactive material shipment. This fact can generally be attributed to the close attention which has been given by the shippers to the proper packaging of radioactive materials, and to the effectiveness of the safety standards and regulations applicable to their transportation.

In spite of the excellent past record of safety, the term radioactive unfortunately conveys to the average person an extremely confusing aura of personal concern. The memory of the devastating destruction and violent deaths which were the aftermath of the use of the atomic bomb near the end of World War II is still very vivid in the minds of many. The more recent confusion regarding the effects of nuclear power plants on the environment and the ecology have also added to this aura of concern. This concern, however, has proven to be completely unwarranted as related not only to the safe uses of nuclear energy in industry, but also to the safe transportation of radioactive materials. The record of safety in transportation of these materials clearly exceeds that for any other type of regulated hazardous commodity.

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1. SCOPE

This handbook provides general information for shippers, carriers, and handlers of radioactive commodities for use and storage, and for shipment by any mode of transportation, to insure that such materials are properly packaged, packed, marked, and labeled, when offered for storage or shipment. These instructions, in general, apply to radioactive commodities usually encountered in GP 59.

2. PURPOSE

This handbook does not replace official Federal regulations (CFRs), laws, or military regulation. It implements and provides guidance in determining the requirements of the pertinent regulations, military standards, specifications and manuals which provide the marking and labeling requirements for identification in use, storage and transportation of radioactive commodities, their packages and shipping containers. It is intended to provide, in simple, concise and convenient form, factual data to familiarize personnel and agencies concerned with operational and logistical problems involving radioactive commodities.

2.1 Application. The military departments are presently utilizing radioisotopes in many applications, including those within and without the jurisdiction of the Nuclear Regulatory Commission. Many commodities employ such radioisotopes as Cobalt 60, Cesium 137, Strontium 90, etc., and include electron tubes, spark gaps, switches, light sources, luminous markers, and nuclear batteries.

2.2 Precautions. The amount of radioactive material in many commodities is such that no significant external radiation hazard is present when handled individually or in small numbers. However, extremely large quantities of radioactive commodities may present an external hazard and breakage of one or more will definitely present a potential internal hazard to personnel working in and around the area in which the breakage occurs. Therefore, needless exposure to any radiation, no matter how slight, should be avoided.

Materials that emit alpha and beta particles and gamma rays may be absorbed and deposited within the body. These particles and rays act as damaging agents that injure or destroy blood-forming organs and other tissue. Their removal is limited by the rate of excretion of the elements from the body and the natural radioactive decay of the element. In severe cases, clinical evidence of injury may be apparent in a few weeks; in less severe cases, evidence may not appear for years. Internal radiation effects as a result of broken radioactive tubes are possible in the latter category. It is, therefore, necessary that the instructions, procedures, and precautions contained herein be observed if the hazards involved are to be reduced to a minimum.

3. INCLUSIONS

This handbook provides tables that list the known commodities containing radioactive materials, including the isotopes, the quantity in microcuries, and the manufacturers of these commodities. This handbook has summarized in the tables the marking and labeling (where required) requirements for radioactive commodities for transportation by:

a.	Rail	(Title 49 CFR 174)
b.	Highway carrier	(Title 49 CFR 177)
c.	Water carrier	(Title 49 CFR 176)
d.	Mail	(Title 39 CFR 124)
e.	Aircraft	(Title 49 CFR 175)
f.	Aircraft (military)	(DSAM 4145.3, AFM 71-4, TM38-250, NAVSUPPUB 505, and MCO P 4030.19)

4. ARRANGEMENT

4.1 Composition. This handbook presents general information and technical information in sections pertaining to the technical and operational characteristics of radioactive commodities. The sections are:

Section A	Radioisotopes By Transport Group
Section B	Activity Mass Relationship - Specific Activity Microcuries Per Gram Conversion Factors
Section C and D	Provide listing by part number sequence and NSN sequence of commodities known to contain radioactive material. Some commodities are listed for reference only since the specific activity is less than 0.002 microcurie per gram. This data, including isotopes and quantities, has been provided voluntarily by the manufacturers listed. These commodities have been classified in accordance with the data included in this table and the marking and labeling requirements indexed.

4.2 Appendix. The appendix provides general information and procedures for radiation monitoring, personnel protection, decontamination, and disposition of radiological commodities. DoD personnel should be in a position to determine if shippers and carriers have conformed to the requirements specified in this handbook and other applicable directives.

5. REFERENCED DOCUMENTS

5.1 The following documents form a part of this handbook to the extent specified herein.

STANDARDS AND SPECIFICATIONS

MILITARY

MIL-STD-1458	Radioactive Materials: Marking and Labeling of Items, Packages and Shipping Containers for Identification in Use, Storage and Transportation
MIL-E-75	Electron Tubes, Packaging of, General Specification for
MIL-E-1	Electron Tubes, General Specification for
MIL-HDBK-758	Special Handling Data/Certification for shipment via Military Aircraft

JOINT MILITARY

DSAM 4145.3, AFM 71-4, TM 38-250, NAVSUPPUB 505, MCO P 4030.19
Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft

DSAM 4145.8, AR 700-64, NAVSUPPUB 5012 AFM 67-8, MCO P 4400.105
Radioactive Commodities in the DoD Supply System

DSAR 4145.24, AR 40-14 Control and Recording Procedures for Occupational Exposure to Ionizing Radiation

CODE OF FEDERAL REGULATIONS (See 7.2 and table I)

6. DEFINITIONS

For purposes of this handbook, the following definitions and abbreviations shall apply:

6.1 Activity. The number of nuclear transformations (disintegrations) occurring in a given mass of radioactive material per unit time. (See Curie.)

6.2 Alpha particle. One of the three primary forms of radioactive emissions from radioactive atoms. A charged particle emitted from the nucleus of an atom having a mass and charge equal in magnitude of a helium nucleus (2 protons + 2 neutrons). Alpha particles have very little penetrating ability and therefore are chiefly internal radiation hazards. They travel very short distances in air and are shielded very easily.

6.3 Atom. The smallest (or ultimate) particle of an element which is capable of entering into a chemical reaction. Every atom consists of a positively charged central nucleus, which carries nearly all the mass of the atom, surrounded by a number of negatively charged electrons, so that the whole system is electrically neutral (see nucleus).

6.4 Atomic mass. The mass of a neutral atom of a nuclide, usually expressed in terms of "atomic mass units." The "atomic mass unit" is one-twelfth the mass of one neutral atom of carbon-12; equivalent to 1.6604×10^{-24} gm. (Symbol: u).

6.5 Atomic number. The number of protons in the nucleus of a neutral atom of a nuclide. The "effective atomic number" is calculated from the composition and atomic numbers of a compound or mixture. An element of this atomic number would interact with photons in the same way as the compound or mixture. (Symbol: Z).

6.5.1 Atomic weight. The weighted mean of the masses of the neutral atoms of an element expressed in atomic mass units.

6.6 Beta particles. One of three primary forms of radioactive emissions from radioactive atoms. Beta particles are negatively charged particles emitted from the nucleus of an atom and have a mass and charge equal to that of an electron. They travel greater distances in air than alpha particles, have an intermediate penetrating ability, but still are relatively easily shielded.

6.7 Byproduct material. Any radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing special nuclear material (10 CFR 20).

6.8 CFR. The approved citation of the Code of Federal Regulations. Example: 49 CFR 389 refers to Title 49 Section 389 of the Code of Federal Regulations.

6.9 Curie. The special unit of activity. One curie equals 3.700×10^{10} nuclear transformations per second. (Abbreviated Ci.) Several fractions of the curie are in common usage.

Microcurie: One-millionth of a curie (3.7×10^{4} disintegrations per sec.). Abbreviated μCi.

Millicurie: One-thousandth of a curie (3.7×10^{7} disintegrations per second). Abbreviated mCi.

Picocurie: One-millionth of a microcurie (3.7×10^{-2} disintegrations per second or 2.22 disintegrations per minute). Abbreviated pCi; replaces the term μμc.

6.10 Decay, radioactive. Disintegration of the nucleus of an unstable nuclide, due to the spontaneous emission from the atomic nuclei of either alpha or beta particles, sometimes accompanied by gamma radiation. (See half-life, radioactivity.)

6.11 Dose (10 CFR 20). The quantity of radiation absorbed, per unit of mass, by the body or any portion of the body. Several units of dose are in current use. Definitions of units used in this handbook are specified in 6.11.1 and 6.11.2. (Also, see exposure.)

6.11.1 Rad. A measure of the dose of any ionizing radiation to body tissues in terms of the energy absorbed per unit mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue (10 CFR 20). Also defined as the unit of absorbed dose equal to 0.01 Joules/kg in any medium.

6.11.2 Rem. A measure of the dose of any ionizing radiation to body tissues in terms of its estimated biological effect, relative to a dose of one roentgen (R) of X-rays. (One millirem (mrem) = 0.001 rem.) The relation of the rem to other dose units depends upon the biological effect under consideration and upon the conditions of irradiation. For the purpose of this handbook, any of the following is considered to be equivalent to a dose of one rem (10 CFR 20):

a. A dose of 1 R due to X - or gamma radiation;
b. A dose of 1 rad due to X -, gamma, or beta radiation;
c. A dose of 0.1 rad due to neutrons or high energy protons;
d. A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye.

6.12 Dose rate. As a general rule, the amount of radiation to which an individual would be exposed or which would be absorbed per unit of time. It is usually expressed as roentgens, rads, or rems per hour or in multiples or submultiples of these units, such as a milliroentgens per hour. The dose rate is commonly used to indicate the level of radioactivity in a contaminated area.

6.13 DOT. The Department of Transportation.

6.14 Electron tubes. Electron tubes include spark gap tubes, power tubes, gas tubes, pickup tubes, radiation detection tubes, and any other completely sealed tube that is designed to conduct or control electrical currents (see 10 CFR 30).

6.15 Encapsulation. A term used to denote an additional fabrication technique often used in preparation of radiation sources, wherein the basic material is physically placed within sealed, high physical integrity capsules or envelopes to provide further assurance that in the event a package breaks and the capsule escapes, there would be little possiblity of a spread of particulate contamination (49 CFR 173).

6.16 Exclusive use. Exclusive use (also referred to as sole use or full load as used in IAEA regulations) means any shipment (49 CFR 173):

a. From a single consignor having the exclusive use of a transport vehicle or of an aircraft, or of a hold or compartment of an inland watercraft, or of a hold, compartment, or defined deck area of a seagoing vessel; and
b. For which all initial, intermediate, and final loading and unloading is carried out by or under the direction of the consignor, consignee, or his designated agent.

6.17 Exposure: A measure of the ionization produced in air by X or gamma radiation. It is the sum of the electrical charges on all ions of one sign produced in air when all electrons liberated by photons in a volume element of air are completely stopped in air, divided by the mass of the air in the volume element. The special unit of exposure is the roentgen.

6.18 Fissile. Of a nuclide, capable of undergoing fission by interaction with slow neutrons.

6.18.1 Fission, nuclear. A nuclear transformation characterized by the splitting of a nucleus into at least two other nuclei and the release of a relatively large amount of energy.

6.18.2 Fission products. Elements or compounds resulting from fission.

6.18.3 Fission yield. The percentage of fissions leading to a particular nuclide.

6.18.4 Fissionable. Of a nuclide, capable of undergoing fission by any process.

6.19 Fissile radioactive material. This term refers to plutonium-238, plutonium-239, plutonium-241, uranium-233, or uranium-235, or any material containing any of these materials (see 11.3.7.1 for exclusions), (see 11.3.9):

a. Uranium-235. Exists only in combination with various percentages of uranium-234 and uranium-238. Fissile radioactive material as applied to uranium-235 refers to the amount actually contained in the total quantity of uranium being transported.
b. Radioactive material. May consist of a mixture of fissile and nonfissile radionuclides.
   (1) Fissile radioactive materials refers to the amount of materials (see 2 below) or any combination thereof actually contained in the mixture.
   (2) Radioactivity of the mixture consists of the total activity of both the fissile and nonfissile radionuclides.

6.19.1 Fissile radioactive material classes. Fissile radioactive material package are classified according to the controls needed to provide nuclear criticality safety during transportation as follows (see 11.3.9):

a. Fissile Class I. Packages which may be transported in unlimited numbers and in any arrangement, and which require no nuclear criticality safety controls during transportation. For purposes of nuclear criticality safety control, a transport index is not assigned to Fissile Class I packages. However, the external radiation levels may require a transport index number.
b. Fissile Class II. Packages which may be transported together in any arrangement but in numbers which do not exceed an aggregate transport index of 50. For purposes of nuclear criticality safety control, individual packages may have a transport index of not less than 0.1 and not more than 10. However, the external radiation levels may require a higher transport index number but not to exceed 10. Such shipments require no nuclear ctiticality safety control by the shipper during transportation.
c. Fissile Class III. Shipments of packages which do not meet the requirements of Fissile Class I or II and which are controlled to provide nuclear criticality safety in transportation by special arrangements between the shipper and the carrier.

6.20 Gamma rays. One of the three primary forms of radioactive emissions from radioactive atoms. Gamma rays are not particulate (as opposed to alpha and beta particles) but are short wave length electromagnetic radiations from the nucleus of radioactive atoms. Except for their origin (the nucleus of the atom rather than the outer shell) they are identical in characteristics to X-rays. Gamma rays are the most penetrating form of radiation and travel great distances in air. They require heavy shielding materials such as lead to attenuate the radiation.

6.21 Half-life. The time required for the activity of a given radioactive species to decrease to half of its initial value due to radioactive decay. The half-life is a characteristic property of each radioactive species and is independent of its amount or condition. The biological half-life of a given isotope is the time in which the quantity in the body will decrease to half as a result of both radioactive decay and biological elimination.

6.22 Isotopes. Forms of the same element having identical chemical properties but differing in their atomic masses (due to different numbers of neutrons in their respective nuclei) and in their nuclear properties, e.g., radioactive, fission, etc.

6.23 Large quantity radioactive materials. A quantity of radioactive materials in which the aggregate radioactivity exceeds: (See 11.3.8.3 and 11.3.7.4.)

a. Transport Groups I and II radionuclides: 20 curies.
b. Transport Groups III and IV radionuclides: 200 curies.
c. Transport Group V radionuclides: 5,000 curies.
d. Transport Groups VI and VII radionuclides: 50,000 curies.
e. Special form materials: 5,000 curies.

6.24 Licensed material (10 CFR 20). Source material, special nuclear material, or byproduce material received, possessed, used, or transferred under a general or specific license issued by the NRC.

6.25 License. A license issued under 10 CFR 30, 40, or 70. "Licensee" means the holder of such a license.

6.26 Low specific activity radioactive material. Radioactive material in which the activity is essentially uniformly distributed. This means any of the following: (See 11.3.8.)

a. Uranium or thorium ores and physical or chemical concentration of those ores.
b. Unirradiated natural or depleted uranium or unirradiated natural thorium.
c. Tritium oxide in aqueous solutions, provided the concentration does not exceed 5.0 millicuries per milliliter.
d. Radioactive material in which the activity is uniformly distributed in which the estimated average concentration per gram does not exceed:
   (1) 0.0001 millicuries of Transport Group I radionuclides.
   (2) 0.005 millicuries of Transport Group II radionuclides.
   (3) 0.3 millicuries of Transport Groups III and IV radionuclides.
e. Items externally contaminated with radioactive material provided such radioactive material is not readily dispersible and the surface contamination (when averaged over an area of one square meter) does not exceed:
   (1) 0.0001 millicurie (220,000 disintegrations per minute) per square centimeter of Transport Group I radionuclides.
   (2) 0.001 millicurie (2,200,000 disintegrations per minute) per square centimeter of other radionuclides.

6.27 Mass. A measure of the quantity of matter. The material equivalent of energy. Mass and energy are different forms of the same thing. Different from weight in that it neither increases nor decreases with gravitational force.

6.28 Microcurie (μCi). A one-millionth (10^{-6}) part of a curie. (See curie.)

6.29 Millirem, milliroentgen (mR). A one-thousandth (10^{-3}) part of a rem or roentgen (see dose and roentgen).

6.30 Normal form radioactive materials. Those materials which do not meet the requirements of special form radioactive materials. Normal form radioactive materials are grouped into transport groups (see section A), (49 CFR 389).

6.31 NRC. Nuclear Regulatory Commission (formerly: AEC. Atomic Energy Commission).

6.32 Nucleus (or atomic nucleus). The small, central, positively charged region of an atom which carries essentially all the mass. Except for the nucleus of ordinary (light) hydrogen, which is a single proton, all atomic nuclei contain both protons and neutrons. The number of protons determines the total positive charge, or atomic number; this is the same for all the atomic nuclei of a given chemical element. The total number of neutrons and protons, called the mass number, is closely related to the mass of the atom. The nuclei of isotopes of a given element contain the same number of protons, but different numbers of neutrons. They thus have the same atomic number, and so are the same element, but they have different mass numbers (and masses). The nuclear properties, e.g., radioactivity, fission, neutron capture, etc., of an isotope of a given element are determined by both the number of neutrons and the number of protons (see atom, isotope).

6.33 Nuclide: A species of atom characterized by the constitution of its nucleus. The nuclear constitution is specified by the number of protons (Z), number of neutrons (N), and energy content; or, alternatively, by the atomic number (Z), mass number $A = (N + Z)$, and atomic mass. To be regarded as a distinct nuclide, the atom must be capable of existing for a measurable time. Thus, nuclear isomers are separate nuclides, whereas promptly decaying excited nuclear states and unstable intermediates in nuclear reactions are not so considered.

6.34 NSN. National Stock Number. (Formerly FSN. Federal Stock Number.)

6.35 Person (10 CFR 20, 30). Any individual, corporation, partnership, firm, association, trust, estate, public or private institution, group, Government agency other than the NRC, any State, any foreign government or nation or any political subdivision of any such government or nation, or other entity; and any legal successor, representative, agent, or agency of the foregoing.

6.36 Radiation. The emission and propagation of energy through space or through a medium in the form of waves. This includes the following: Alpha rays, beta rays, gamma rays, X-rays, neutrons, high-speed electrons, high-speed infrared, or ultraviolet light.

6.37 Radioactivity. The spontaneous disintegration of unstable nuclei with the resulting emission of nuclear radiation (see curie for units of measurements).

a. Artificial radioactivity. Man made radioactivity produced by particle bombardment or electromagnetic irradiation, as opposed to natural radioactivity.
b. Induced radioactivity. Radioactivity produced in a substance after bombardment with neutrons or other particles. The resulting activity is "natural radioactivity" if formed by nuclear reactions occurring in nature, and "artificial radioactivity" if the reactions are caused by man.
c. Natural radioactivity. The property of radioactivity exhibited by more then fifty naturally occurring radioisotopes.

6.38 Radioactive material. Radioactive material is any material, or combination of materials, which spontaneously emits ionizing radiation. For the purposes of transportation, materials in which the estimated specific activity is not greater than 0.002 microcuries per gram of material, and in which the radioactivity (see specific activity) is essentially uniformly distributed, are not considered to be radioactive materials (see 49 CFR 173.389).

NOTE: Radioactive materials, as refrenced above, include natural elements such as radium and accelerator-produced radioisotopes whether or not subject to licensing control by the NRC.

6.39 Radioactive (commodity) device. Radioactive (commodity) device (see 11.3.10.2b) means any manufactured article such as an instrument, clock, electronic tube or apparatus, or similar device having radioactive material (other than liquid) in a nondispersible form as a component part.

6.40 Rad. rem. See dose and exposure.

6.41 Radioisotope and radionuclide. For the purpose of transportation, these items are synonymous with radioactive materials.

6.42 Radiotoxicity. A term used to denote the relative hazards of the various radionuclides, that is, their internal radioactive effect within the body.

6.43 Roentgen (R). A unit of radiation exposure. One roentgen is the exposure of X- or gamma radiation such that the associated corpuscular emission per kilogram of air produces in air, ions carry 2.58×10^{-4} coulombs of electrical charge of either sign. (See exposure.)

6.44 Small quantity radioactive materials. A quantity of radioactivity which does not exceed the limits specified in table IX. Small quantities and certain radioactive devices as specified in 11.3.10.2 are exempt from specification packaging, marking and labeling requirements, but still are subject to certain requirements, such as shipping paper requirements.

6.45 Source material (10 CFR 20). Uranium or thorium, or any combination thereof, in any physical or chemical form; or ores which contain by weight one-twentieth of one percent (0.05%) or more of (a) uranium, (b) thorium or (c) any combination thereof. Source material does not include special nuclear material (see 10 CFR 40).

6.46 Special form radioactive materials. Radioactive materials which, if released from a package, present some radiation hazard, but little hazard due to radiotoxicity and possibility of contamination. To qualify as a special form material, the radioactive material must either be in massive solid form or encapsulated (see 11.3.7 for a discussion of radioactive material in special form). Plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235, and any other material which the NRC determines to be special nuclear material, but does not include source material (see 10 CFR 70).

6.47 Specific activity. Specific activity (S.A.) is the rate of decay of the radioactive element or isotope expressed in curies per gram or microcuries per gram of the radioactive element. Specific activity is a natural constant for each radioactive element whether the amount involved in the radio-active material is a microgram or 1,000 grams. For specific activity constants of particular radioisotopes. See section B, table B-1 column VI, to determine whether the isotope of interest exceeds 0.002 μCi/gm and therefore, falls within the classification of radioactive material.

6.48 Transport group. Any one of seven groups into which normal form radionuclides are classified according to their radiotoxicity and their relative potential hazard in transportation (see section A), (49 CFR 173).

6.49 Transport index number (see 11.3.9.1). The number placed on a package to designate the degree of control to be exercised in the transportation cycle. To assign a transport index number, a package of radioactive materials shall be assigned the higher (larger) number, rounded up to the next higher tenth, when determined by one of the following methods:

a. The highest radiation dose rate in millirems per hour, at three feet from any accessible external surface of the package.
b. For Fissile Class II packages only, the transport index number is calculated by dividing the number "50" by the number of similar packages which may be transported together on a single aircraft.

6.50 Type A packaging. Packaging which is designed in accordance with the general packaging requirements of 49 CFR 173.24 and 173.393 and which is adequate to prevent the loss or dispersal of the radioactive contents and to retain the efficiency of its radiation shielding properties if the package is subjected to the test prescribed in 49 CFR 173.398 (b) (Normal conditions of transport) (see 11.3.3).

6.51 Type A quantity radioactive material. That material which may be transported in Type A packaging (see 49 CFR 173.389), (11.3.5).

6.52 Type B packaging. Packaging which meets the standards for Type A packaging, and in addition, meets the standards for the hypothetical accident conditions of transpo t as prescribed in Part 49 CFR 173.398 (c), (see 49 CFR 173.398) (see 11.3.4).

6.53 Type B quantity radioactive material. That material which may be transported in Type B packaging (see 49 CFR 173.398), (11.3.5).

6.54 Unrestricted area. Any area access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

7. REGULATORY ORGANIZATIONS AND REGULATIONS

7.1 ORGANIZATIONS

7.1.1 Department of Transportation (DOT). Under the Department of Transportation Act of 1966, the U.S. Department of Transportation (DOT) has regulatory responsibility for safety in the transportation of radioactive materials by all modes of transport in interstate or foreign commerce (rail, road, air, water), and by all means (truck, bus, auto, ocean vessel, airplane, river barge, railcar, etc.), except postal shipments. Postal shipments come under the jurisdiction of the U.S. Postal Service, formerly known as the Post Office Department. Shipments not in interstate or foreign commerce are subject to control by a state agency in most cases.

7.1.1.1 Materials Transportation Bureau (MTB). The Materials Transportation Bureau was established on July 7, 1975, as a line organization element reporting to the Secretary of Transportation and having responsibility for those hazardous materials and pipeline safety operational functions previously addigned to the Office of the Secretary and certain new responsibilities vested in the Secretary by the Hazardous Materials Transportation Act (Title I of the Transportation Safety Act of 1974., Public Law 93-633). The MTB will be responsible for operational functions relating to regulations and exemptions; functions of an intermodal nature; and, compliance functions pertaining to packaging manufacturers and, in certain instances, shippers. The MTB will consist of the Office of Hazardous Material Operations (OHMO), and the Office of Pipeline Safety Operations.

7.1.2 Interstate Commerce Commission (ICC). The Interstate Commerce Commission (ICC) formerly had the jurisdiction over both the safety and economic aspects of the transport of radioactive materials by land, but the jurisdiction over safety was transferred to the Department of Transportation when DOT was formed in April, 1967. The ICC (for land shipments) and the Civil Aeronautics Board (for air shipments) still exercise jurisdiction over the economic aspects of radioactive materials transport through the issuance of operation authorities to carriers and control of shipping costs (freight rates).

The Bureau of Explosives (B of E) of the Association of American Railroads was for many years the principal technical advisor to the ICC. The B of E no longer is directly involved in the development or administration of the U. S. radioactive materials safety regulatory program.

7.1.3 Nuclear Regulatory Commission (NRC). The Nuclear Regulatory Commission has responsibility for safety in the possession and use, including transport, of byproduct, source and special nuclear materials. Except for certain small quantities and specific products for which the possession and use are exempted, a license is required from the Nuclear Regulatory Commission (NRC) for possession and use of such materials. The NRC has established, in 10 CFR 71, requirements which must be met for licensees to deliver licensed material to a carrier for transport if fissile material or large radioactive sources are involved. (Rule making is pending which will revise these requirements to include Type B quantities of radioactive material as well as large quantities.) The NRC also assists and advises DOT in the establishment of national safety standards and in the review and evaluation of packaging designs.

7.1.3.1 Agreement states. Several states have entered into formal agreements with the NRC whereby the regulatory authority over byproduct, source and less than critical quantities of special nuclear material has been transferred to the states from the NRC. These "agreement states" have adopted uniform regulations pertaining to intrastate transportation of radioactive materials which require the shipper to conform to the packaging, labeling, and marking requirements of the U.S. Department of Transportation to the same extent as if the transportation were subject to the rules and regulations of that agency.

7.1.4 International Atomic Energy Agency (IAEA). The international standards, as promulgated by IAEA are included in the revised edition of "Safety Series No. 6, Regulations for the Safe Transport of Radioactive Materials," and have now been accepted and adopted either wholly or in part by most nations as a standard for both national and international regulations. The Office of Hazardous Materials Operations (OHMO), and the Nuclear Regulatory Commission (NRC) are currently developing proposed changes to the USA regulations in 49 CFR 100-199 and 10 CFR 71 in order to maintain compatibility of domestic and international standards.

7.1.4.1 Application of IAEA Transport Regulations. Concurrently with the issuance of Revised Safety Series No. 6, the IAEA has also issued a companion document entitled "Advisory Material for the Application of the IAEA Transport Regulations, Safety Series No. 37," STI/PUB/324. The intent of the IAEA Regulations is to define in general what has to be achieved in terms of regulatory performance, the new advisory document is intended to assist in determining "how" to achieve such performance. In order that this advisory document would adequately reflect the most current developments in procedures and techniques, the IAEA has stated its intention to review it, if necessary, by a panel of experts at intervals of every two to three years. The first such review was conducted by an IAEA Panel in December 1974. Based on the decisions of the Panel and the current review being carried out, the first revision of Safety Series No. 37 should be available in 1976.

7.1.5 International Air Transport Association (IATA). The regulations of IATA are essentially identical to the IAEA regulations referenced above.

7.2 FEDERAL REGULATIONS

7.2.1 Principal regulations. The principal regulations pertaining to the use and transport of radioactive materials and commodities are summarized in table I. The regulations of the United States of America are published primarily by three agencies--the U.S. Department of Transportation, Nuclear Regulatory and the U.S. Postal Service. This Handbook is concerned primarily with those regulations of the U.S. Department of Transportation, as published in Title 49, Code of Federal Regulations, Parts 100 through 199. Persons involved as actual shippers, package designers, or carriers, are advised to procure a copy of these regulations (all in one bound volume) which are republished each year as of January 1, by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Changes to DOT regulations, in the form of amendments or notices of proposed rule making are published in the daily Federal Register, as issued by the Materials Transportation Bureau (MTB). Another means of keeping abreast of changes would be to request in writing to be placed on the mailing list maintained by the DOT (MTB), Office of Hazardous Materials Operations (OHMO), Washington, D.C. 20590.

7.2.2 Revoked federal regulations. DOT regulations were also published by the Federal Aviation Administration in Title 14, CFR,103, and by the U. S. Coast Guard in Title 46, CFR, 146-149. The U.S. Coast Guard regulations, although using different paragraph and section numbers, were essentially identical with those as published in Title 49, with the exception of some additional specific requirements peculiar to shipments by water. The regulations of the Federal Aviation Administration as codified in Title 14, CFR, Part 103, in addition to specifying certain air carrier requirements, had the principal effect of making reference to the Title 49 standards for the packaging requirements. The hazardous materials regulations of these agencies (14 CFR 103 and 46 CFR 146.01-146.28 and 146.30) were revoked effective July 1, 1976, and consolidated with DOT's hazardous material regulations in 49 CFR.

TABLE I. Sources of federal regulations.

Title 49	Transportation (Department of Transportation's Hazardous Materials Regulations, Parts 100-189 (formerly called the ICC Regulations)). Main Headings 49 CFR 102 - Rulemaking procedures 49 CFR 107 - Exemption procedures 49 CFR 171 - General Information, Regulations and definitions 49 CFR 172 - Hazardous Materials Table and Hazardous Materials Communications Regulations 49 CFR 173 - Shippers General Requirements for Shipment and packagings 49 CFR 174 - Carriage by rail 49 CFR 175 - Carriage by aircraft 49 CFR 176 - Carriage by vessel 49 CFR 177 - Carriage by public highway 49 CFR 178 - Shipping Container Specifications.
Title 46	Shipping 46 CFR 146 - Transportation or Stowage of Explosives or Other Dangerous Articles or Substances and Combustible Liquids Aboard Vessels (Revoked 1 July 1976) See 49 CFR 176

TABLE I. Sources of federal regulations - Continued.

Title 39	United States Postal Service 39 CFR 123 - Nonmailable Matter Publication 6 - Radioactive Matter (Postal Regulations for Transport of Radioactive Matter are published in U.S. Postal Service Publication 6, April 1971 and in the U.S. Postal Manual.)
Title 29	Labor 29 CFR 1910.96 - Occupational Safety and Health Standards (Ionizing Radiation)
Title 14	Aeronautics and Space 14 CFR 103 - Transportation of Dangerous Articles and Magnetized Materials (Revoked 1 July 1976) See 49 CFR 175
Title 10	Energy 10 CFR 20 - Standards for Protection Against Radiation 10 CFR 30 - Rules of General Applicability to Licensing of Byproduct Material 10 CFR 31 - General Licenses for Byproduct Material 10 CFR 32 - Specific Licenses of Broad Scope for certain item containing Byproduct Material 10 CFR 40 - Licensing of Source Material 10 CFR 70 - Special Nuclear Material 10 CFR 71 - Packaging of Radioactive Materials for Transport and Transportation of Radioactive Material Under Certain Conditions

7.3 Other sources of regulations and tariffs*. Other agencies or organizations which publish regulations or tariffs on the transportation of radioactive materials are as follows:

a. "IATA Restricted Articles Regulations," - International Air Transport Association (IATA). Geneva, Switzerland.

b. "Regulations for the Safe Transportation of Radioactive Materials," Revised Safety Series #6 - International Atomic Energy Agency (IAEA). Vienna, Austria.

*c. "Official Air Transport Restricted Articles Tariff" - Airline Publishers, Inc., Washington, D.C.

*d. "R.M. Graziano's Tariff," - Hazardous Materials Regulations of the Department of Transportation, Including Specifications for Shipping Containers," - Bureau of Explosives, Association of American Railroads, Washington, D.C.

*e. "Dangerous Articles Tariff," - Department of Transportation Regulations for Governing Transportation of Hazardous Materials by Motor, Rail, and Water, Including Specifications for Shipping Containers, - American Trucking Associations, Inc.

*f. "R.M. Graziano's Tariff," Department of Transportation Regulations for Governing the Transportation or Storage of Explosives or Other Dangerous Articles or Substances and Combustible Liquids on Board Vessels.

*CAUTION: A tariff should not be construed to be an official regulation per se. A tariff is merely a publication by some originating association, which reprints certain Federal regulations, showing the application and acceptance of those regulations by the carriers who participate in the tariff. As such, tariffs are binding only on the organization's or association member carriers.

8. LICENSING REQUIREMENTS

8.1 The Nuclear Regulatory Commission (NRC). The NRC under the Energy Reorganization Act of 1974 has the responsibility for safety in the possession, use, and transport of byproducts, source and special nuclear materials. A license is required from the NRC for possession and use of such materials, except for certain specific products and small quantities, which are exempt from these requirements. The requirements for licensing have been established in 10 CFR (See table I). The regulations establish standards for protection against radiation hazards arising out of activities under licenses issued by the Nuclear Regulatory Commission and are issued pursuant to the Atomic Energy Act of 1954 and apply to all persons who receive, possess, use or transfer byproduct material, source material, or special nuclear material under a general or specific license issued by the Commission pursuant to the regulations in 10 CFR 30, 40, or 70. (See 7.1.3.1, Agreement States.)

8.1.1 Types of licenses and requirements. The NRC regulations provides for two types of licenses: General and specific. General licenses are effective without the filing of applications with the NRC or the issuance of licensing document to a particular person. A general license provides for the possession of certain limited quantities of radioactive materials. The generally licensed material and quantities are included in 10 CFR 30, 31, 40, and 70. Specific licenses are those for which an application must be submitted to NRC, and are issued to a named person.

8.1.1.1 Specific license and requirements. The general requirements for approval of an application are that the applicant has (1) proposed a use authorized by the NRC Regulations; (2) equipment and facilities adequate to protect health and minimize danger to life or property; and (3) the applicant is qualified by training and experiences to use the material for the proposed use in such a manner as to protect health and minimize danger to life or property; (4) The applicant satisfies any special requirements contained in 10 CFR 32-36. These are rather broad requirements and not specific for any particular type of program.

8.1.1.2 General requirements (10 CFR 30). In accordance with recommendations of the Federal Radiation Council, approved by the President, persons engaged in activities under licenses issued by the Nuclear Regulatory Commission pursuant to the Atomic Energy Act of 1954, as amended, should, in addition to complying with the requirements set forth by NRC, make every reasonable effort to maintain radiation exposures, and releases of radioactive materials in effluents to unrestricted areas as far below the limits specified in 10 CFR 20 as practicable. The term "as far below the limits specified in this part as practicable" means as low as is practicably achievable taking into account the state of technology and the economics of improvements in relation to benefits to the public health and safety and in relation to the utilization of atomic energy in the public interest.

8.1.2 Exemptions to NRC licensing requirements (10 CFR 50). The NRC may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of 10 CFR 31-36 as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest (see 10 CFR 30).

8.1.2.1 Exempt commodities (item) (electron tubes). Any person is exempt from the licensing requirements of 10 CFR 20, 30-36, and 81 to the extent that such person receives, possesses, uses, transfers, owns or acquires electron tubes, and provided that each tube does not contain more than one of the specified quantities of radioactive material (except for persons who apply or incorporate byproduct material to or into, or import for sale or distribution):

a. 150 millicuries of tritium (1H3) per microwave receiver protector tube (TR, ATR, PTR, TRL, etc.) or 10 millicuries of tritium per any other electron tube (see 6.14).

b. 1 microcurie of cobalt 60 (27 Co^{60})

c. 5 microcuries of nickel 63 (28 Ni^{63})

d. 30 microcuries of krypton 85 (36 Kr^{85})

e. 5 microcuries of cesium 137 (55 Cs^{137})

f. 30 microcuries of promethium 147 (61 Pm^{147})

g. And provided further, that the levels of radiation from each electron tube containing byproduct material do not exceed 1 millirad per hour at 1 centimeter from any surface when measured through 7 milligrams per square centimeter of absorber.

8.1.2.2 Exempt carriers and personnel. Common and contract carriers, freight forwarders, warehousemen and the U. S. Postal Service are exempt from the licensing requirements of 10 CFR 30, 31-36, and 81 to the extent they transport or store radioactive (byproduct) material in the regular course of carriage for another or storage incident thereto.

8.1.2.3 Exempt concentrations. Any person is exempt from the licensing requirements of 10 CFR 31-36, and 81 to the extent that such person receives, possesses, uses, transfers, owns or aquires products or materials containing byproduct material in concentrations not in excess of those listed, table A-1, column II and III of this handbook. (Except as otherwise provided in 10 CFR 30).

8.1.2.4 Exempt quantities. Any person is exempt from the licensing requirements of 10 CFR 30-34 and 81 to the extent that such persons receives, possesses, transfers, uses, owns, or aquires byproduct material in individual quantities which does not exceed the limits in Schedule B of 10 CFR 30 (see table A-1, column IV, "Exempt quantities", of this handbook). Certain exceptions to the above exemption are listed in 10 CFR 30).

8.1.2.5 Exempt radiation measuring instruments. Ionizing radiation measuring instruments containing a source or byproduct material for internal calibration or standardization which does not exceed the limits in Schedule B of 10 CFR 30.71 (See table A-1, column IV, "Exempt quantities," of this handbook) are exempt from the licensing requirements of 10 CFR 20, 30-36 and 81.

NOTE: Do not confuse exempt commodities, exempt quantities, and exempt concentrations with radioactive material that does not require a license from the NRC. (See 8.1.3 of this handbook.)

8.1.3 Unlicensed radioactive material (10 CFR 20). The use of radioactive material or other sources of radiation not licensed by the NRC is not subject to the NRC regulations. However, it is the purpose of the NRC regulations to control the possession, use, and transfer of licensed material by any licensee in such manner that exposure to such material and to radiation from such material, when added to exposures to unlicensed radioactive material and to other unlicensed sources of radiation in the possession of the licensee, and to radiation therefrom, does not exceed the standards of radiation protection prescribed in the NRC regulations (also see 8.1.1.2 of this handbook).

8.2 Service licenses and authorizations. Certain radioactive material is not licensed by the NRC and therefore, not subject to the NRC regulations. In such cases, a service license or authorization shall be obtained. Service authorizations or licenses are controlled in much the same manner as Nuclear Reg. Commission licensure, the authorization serving the same purpose as the license, with various DoD agency and single, bi- or tri- Military Service directives being used as regulations (see DSAM 4145.8, AR 700-64, NAVSUP INST 4000.34, AFM 67-8, MCO P4400.105).

8.2.1 Applications for licenses. Applications for licenses or authorizations will be forwarded from the applicant only through the channels prescribed in the following directives:

a. Defense Supply Agency. DSAR 4145.23, Licensing and Control of Radio-Active Materials.
b. Department of the Army. AR 700-52, Licensing and Control of Sources of Ionizing Radiation.
c. Department of the Navy. NAVMED P-5055, Radiation Health Protection Manual.
d. Department of the Air Force. AFR 160-124, Radioisotope Licenses and Permits.
e. Marine Corps. Marine Corps Order P4400.19, Marine Corps Supply Manual, Volume I.

NOTE: Applications for authorization for use of radioisotopes that are not controlled by the Nuclear Regulatory Commission will not be prepared on Commission forms.

9. SPECIAL REQUIREMENTS

9.1 Guidelines for shippers and carriers of radioactive materials. This guide is primarily intended to serve as an aid in reviewing the marking, labeling, packaging, and transportation requirements and procedures of the CFRs shown in table I. The use and storage requirements of 10 CFR will be discussed in the general requirements section, and appendix 1. Shippers and carriers of radioactive materials are legally obligated to comply with the applicable DOT regulations, including those that might not be listed herein. DOT regulations are usually minimum requirements; state and local requirements are frequently more stringent. Therefore, it is important that shipping and carrier personnel be familiar with all applicable regulations. (See general requirements.) A brief resume of some of the more important requirements are listed under 9.1.1 and 9.1.2.

9.1.1 Shippers requirements. Personnel involved with shipping radioactive material should be familiar with DOT radioactive materials definitions, and have available for reference, the marking, labeling, and packaging regulations for these materials. (Also see 11.3.13.)

9.1.1.1 Shippers personnel. The shippers technical, packaging and related shipping personnel shall be capable of performing the following minimum requirements when shipping radioactive material:

a. Shall determine the proper DOT classification, shipping name, class, label, and assure that outside packages are properly labeled and marked (see 10.2 and 11.3.11).
b. Shall determine and assure that the proper authorized DOT containers and closures are being used for the quantities and chemical characteristics of each radioactive material being shipped, and that no leaks are evident (see 11.3.7 and 11.3.8).
c. Shall assure that the shipping documents include the proper DOT shipping name, class, signed certificate, proper count and weight. Do not use abbreviations for required entries (see 10.2.1).
d. Shall assure that the carrier's driver is aware that the shipment contains a radioactive material. Give the driver the proper DOT shipping name, class, quantity, and prepare any specific instructions needed to handle transportation emergencies involving the radioactive material being shipped.
e. Shall apply the same checking procedures used in originating a shipment, when repackaging or breaking-down shipments received from others for further distribution. Do not assume that the original shipments were correct.

f. Shall not tender non-compatible materials in the same shipment. When non-compatible shipments are tendered to the same carrier, assure that the carrier recognizes the situation. Check the loading and storage charts.
g. When radioactive materials are loaded by shipper personnel, assure that a carrier representative has an opportunity to approve the placement, securing and blocking the material before sealing the load, when seals are required.
h. Shall not permit a carrier to transport the shipment unless placards are properly displayed, when placards are required (see 11.3.12).

9.1.2 Carriers requirements. Personnel involved with the transportation of radioactive material should have a broad knowledge of the radioactive material regulations involving proper DOT shipping names, classes, packaging requirements, compatibility, labeling, marking requirements, placarding, and shipping documents. The following requirements shall be implemented by the carrier and carrier personnel (see 11.3.14):

a. Determine and maintain a list of shippers of radioactive materials, including classes, quantities, type of materials, and any special problem associated with the material.
b. The dispatcher or traffic department shall be kept informed relative to radioactive materials to be received or picked-up from the shippers.
c. Work with the shippers concerning shipping requirements, and act as liaison with the shipper when discrepancies are discovered.
d. Ascertain that the drivers have been informed (written or verbal) when they are scheduled to pick-up radioactive materials. The drivers shall have adequate placards and means of securing the radioactive material.
e. The drivers should have specific instructions for use when radioactive material incidents occur and when suspect shipments are encountered.
f. Maintain a current list of sources of help and information to be used when contaminations and other radioactive material emergencies occur.

9.1.2.1 Road, delivery, and pick-up drivers. The following requirements are in addition to those listed under 9.1.2 above:

a. Shall have in his possession, available for immediate use, proper shipping papers covering all radioactive materials loaded on his vehicle.
b. Shall inspect all radioactive material shipments prior to loading, and be able to recognize discrepancies in shipping documents, packaging, labeling, and compatibility.
c. Shall refuse to accept radioactive material shipments from shippers or interline carriers unless in compliance with prescribed regulations. (Shippers must certify that articles are properly packaged and in compliance with the DOT regulations). Do not accept leaking or damaged containers.
d. Shall assure that radioactive material containers will not be damaged by other freight or the vehicle, and that it is properly blocked and secured in the vehicle before movement.
e. Shall understand and execute the proper procedures for decontamination, in case of accident or indicent involving radioactive materials. Report all descrepancies and irregularities observed during the trip (see 10.4).
f. Shall be capable of reporting full details concerning any radioactive material accident or incident including detailed information as to cause, container damage, specific container identification and corrective action taken (see 9.3).
g. Shall understand their responsibilities as to attendance requirements when transporting a hazardous material.

9.1.2.2 Traffic and freight personnel. The following requirements are in addition to those listed under 9.1.2 above.:

a. Shall check all radioactive material against the shipping documents. Flag all improper documents and questionable radioactive material shipments for verification. Do not prepare bills or process suspect shipments until all discrepancies are resolved (see 10.2.1).
b. Shall refuse to accept radioactive material freight from shippers or interline carriers if the shipping documents are improperly prepared, or cannot be reconciled with the freight involved. Do not accept leaking, damaged, or otherwise improper containers.
c. Shall assure that the Special Permit number is included on the freight bill, if the radioactive material is moving under a DOT Special Permit. If the DOT Special Permit includes any carrier conditions, the shipper must give the carrier a copy of that Special Permit.
d. Shall assure that all required information is included on freight bills. Special emergency instructions supplied by the shipper shall also be included on the freight bill. Do not abbreviate.
e. Shall inspect radioactive material freight for leakage or damage each time it is handled. When damaged containers are discovered - isolate and make certain they are not moved until they are in proper condition for further transportation. Make certain that all container information is obtained for use in preparing the required report to the Department of Transportation. (NOTE - In some instances an immediate telephone notification to DOT is also required.)
f. Assure that qualified personnel supervises any decontamination or disposal operation, should they be required (see Appendix 1).
g. Shall assure that radioactive material will not be damaged by other freight or the vehicle and that it is properly blocked and secured before closing the vehicle.
h. Shall not load noncompatible materials in the same vehicle.
i. Shall assure that proper placards are placed on vehicles when required and that placards are removed or covered when not required (see 11.3.14.b).
j. Shall be familiar with, and have available for reference, provisions of 49 CFR Part 177, Subpart B, titled "Loading and Unloading" and Subpart C, titled "Loading and Storage Chart of Hazardous Materials."

9.2 Indicators of hazardous materials shipment violations (see 11.3.15). This partial checklist is intended to be used in checking shipments of radioactive commodities or materials which are shipped by carriers subject to DOT regulations. (NOTE: DOT Special Permits may permit deviations from the normal packaging regulations.) Typical violations involves the following:

9.2.1 Shipping papers.

a. No proper shipping name or classification.
b. Proper shipping name or classification abbreviated.
c. Lack of wording "No Label Required" on shipments exempt from specification packaging, marking, and labeling.
d. No special permit number on shipments moving under DOT special permit.
e. Color of label used in lieu of classification.

9.2.2 Marking of containers.

a. No commodity description on container not of "exempt" size (commodity description per shipping name in Title 49 CFR 172.101).
b. No special permit number on container shipped under DOT special permit.
c. No name and address of consignee on package which exceeds "exempt" size.

9.2.3 Labeling.

a. No label on container of hazardous materials which exceeds "exempt" size.
b. Label on container not compatible with classification on shipping papers.
c. Surface label on containers destined for air shipment.
d. Less than two Radioactive Material Labels on container, other than "small quantities."

9.2.4 Containers.

a. Steel:

(1) Labeled containers with no DOT specification marking, or the markings are illegible.
(2) Labeled containers that are dented, rusted, corroded, or temporary repairs sealed with tape, putty, or screws.
(3) Labeled reused containers marked "NRC" - (Look for old date of manufacture and evidence of reuse such as dents, rust and paint layers).
(4) Labeled reused containers marked "STC" and 17-C, 17-E and 17-H with no reconditioner's marking.

b. Corrugated fiber board:

(1) Labeled box with no DOT specification marking when inside containers are larger than "exempt" size.
(2) Labeled box with DOT specification marking constructed of less than 175 lb. test singlewall fiber board (check boxmaker's certificate).
(3) Labeled box with DOT specification marking which is poorly constructed (i.e., gaps and uneven closures, seams and joints separating).
(4) Water damaged boxes.
(5) Improperly closed boxes (i.e., masking tape, scotch tape, string).

9.3 Hazardous materials incident reporting. Hazardous materials transportation incidents have resulted in injuries, property damage, and highly unfavorable publicity to the transportation industry. Much of this could have been avoided or minimized had the causes of previous incidents been identified and appropriate preventative measures taken. In 1971 a nationwide intermodal system for the reporting of hazardous materials incidents was established to provide the Department of Transportation with the factual data necessary to comply with the Hazardous Materials Transportation Control Act of 1970.

9.3.1 Regulations requiring incident reports. The regulations requiring reporting of hazardous materials incidents during transportation are contained in the Code of Federal Regulations, viz:

a. Title 49, Parts 100 to 199 (Governing the transport of hazardous materials by highway, rail, water, and air).
171.15 Immediate notice of certain hazardous materials incidents
171.16 Detailed hazardous materials incident reports
b. Title 49, Part 175 (Governing the transport of hazardous materials by aircraft)
175.45 Reporting certain dangerous article incidents
c. Title 49, Part 176 (Covering the transport of hazardous materials by water vessel
176.48 Situation requiring report

9.3.2 Reporting system. This system is two-fold in that an immediate telephone notice is required under certain conditions and a detailed written report is required whenever there is any unintentional release of a hazardous material during transportation or temporary storage related to transportation. Any time there is an unintentional release of hazardous materials, the carrier must submit a report on Form DOT F 5800.1 within 15 days from the date of the incident. While carriers are required to report, any interested party may report. In order to include all pertinent information, other reporting parties are encouraged to also utilize this form. Generally, most of this required information is available at the time of the incident, but since leaking and damaged containers are destroyed and spills are cleaned up, some investigation is often necessary in order to obtain all of the facts. Much of this information is also required by carriers for other purposes: insurance records, damage claims, etc. In view of this, carriers may find it to their advantage to incorporate reporting requirements into standard company procedures, thereby making the needed details for the report more readily available and enabling the company to more easily comply with the reporting regulations.

10. GENERAL REQUIREMENTS

10.1 Identification for transportation. For transportation purposes, radioactive material or commodity has been defined as any material emitting ionizing radiation with a specific activity greater than 0.002 microcurie per gram (μCi/gm). This computation involves variables which leads to inconsistent results among individuals making the computations. Therefore, section B has been provided to establish uniform microcurie per gram conversion factors for the isotopes referenced herein.

NOTE: Radioactive material as defined above includes natural elements such as radium and accelerator-produced radioisotopes.

10.2 Marking and labeling. Commodities and their containers containing radioactive materials are divided into groups according to the degree of hazard associated with their handling, storage, and transportation (see section A). These commodities shall be marked and labeled as specified herein and by the applicable referenced documents. The markings shall be placed on the radioactive commodity itself and on each surrounding container so that the presence of the radioactive material can be readily recognized and located. Where it is impractical to mark the radioactive material enclosure itself because of small size, the marking may be placed on an appropriate permanent tag attached to the enclosure, or an alternate method as specified by the applicable commodity specifications (see 11.3.11).

10.2.1 Prohibited labeling. No person shall offer for transportation and no carrier shall transport a package or container bearing any marking or label which by its color, design, or shape could be confused or conflict with a label prescribed by DOT (49 CFR 172.400).

10.2.2 Additional marking requirements. Additional markings on packages containing radioactive materials are required as follows (see 11.3.11 and 49 CFR 172).

a. Each package of radioactive materials in excess of 50 kilograms (110 pounds) must have its gross weight plainly and durably marked on the outside of the package.
b. Each package of radioactive materials which conforms to the requirements for Type A or Type B packaging must be plainly and durably marked on the outside of the package in letters at least 13 millimeters (1/2-inch) high, with the words "TYPE A" or "TYPE B" as appropriate. A packaging which is not in compliance with these requirements must not be so marked. Each package of radioactive materials destined for export shipment must also be marked "USA" in conjunction with the specification marking, special permit, or other package certificate identification (see 173.393).

10.2.3 Shipping papers (49 CFR 172.200). Each shipper offering for transportation a radioactive commodity or material subject to DOT regulations shall describe same on the shipping paper by the proper shipping name (49 CFR 172.101) and by the prescribed classification R.A.M. The total quantity by weight, volume, or as otherwise appropriate shall be shown. When applicable, include the exemption notation "DOT-E" followed by the assigned exemption number. The shipping papers shall also include;

a. The name of each radioisotope in the radioactive material (listed in section A herein). Abbreviations are authorized.
b. A description of the physical and chemical form if the material is not in special form.
c. The activity of the radioactive material in each package in units of curies or submultibles thereof. Abbreviations are authorized.
d. The type of label applied to the package: i.e., radioactive white - I, radioactive yellow - II, radioactive yellow - III.
e. Where the regulations exempt the commodity, package, or container from labeling, the exemption must be indicated by the words "No Label Required" immediately following the description on the shipping paper.
f. The transport index assigned to each package or container bearing the radioactive yellow - II or III labels.
g. For transportation of fissile radioactive materials, the following criteria shall apply:
   (1) If the package or container is "exempt", the words "Fissile Exempt" shall be included (see 11.3.7.1), or
   (2) If not exempt, the fissile class of each package or container shall be included (see definitions), and
   (3) For a Fissile Class III shipment, the following statement shall be added:
      "Warning - Fissile Class III Shipment. Do not Load More Than *** Packages per Vehicle. In Loading and Storage areas, Keep at Least 20 Feet (6 Meters) from Other Packages Bearing Radioactive Labels."
      (Asterisks to be replaced by the appropriate number)
   (4) For Fissile Class III shipment by water, add the following statement to the statement in g.(3) above:
      "For shipment by water, only one Fissile Class III shipment is permitted in a hold."
h. Transportation by air. When a hazardous material is offered for transportation by air and the regulations prohibits its transportation by passenger-carrying aircrate, the description described above. must be followed by the words "Cargo-only aircraft," (see 11.6.6).
   NOTE: When the DOT regulations prohibit a hazardous material aboard a cargo-only aircraft, this material is also prohibited aboard a passenger-carrying aircraft.
j. Transportation by rail. When a hazardous material is offered for transportation by rail, the description described must also include the notation "Placarded" followed by the name of the required placard, and the required placard endorsement (see figure 10 and 49 CFR 174).
k. Package(s) approved by the U. S. Energy Research and Development Administration (ERDA) or the U. S. Nuclear Regulatory Commission (USNRC) requires a notation of the package identification marking (see 11.3.6.2).
l. Export shipments or shipments in foreign made package(s) require a notation of the package identification marking (see 11.3.6.3 c.).

10.2.3.1 Shipper's certification (49 CFR 172). Each shipper offering for transportation a radioactive commodity or material subject to DOT regulations shall include

the following certification on the shipping paper containing the description: (For transportation by air, the alternate statement may be used)

"This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation."

Alternate statement for transportation by air

"I hereby certify that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled, and in proper condition for carriage by air according to the applicable national governmental regulations."

a. For passenger and cargo aircraft, add the following statement to the preceding statement (see 11.6):
"This shipment is within the limitations prescribed for passenger aircraft/cargo-only aircraft." (delete nonapplicable)

b. Shipping papers for air shipments must be made out in duplicate and the shipper's certificate must be executed on both copies.

c. The shipper may also add the words: "*** and to the IATA Restricted Articles Regulations."

d. Shipper certification is not required for shipments to be transported by the shipper except for shipments which are to be reshipped or transferred from one carrier to another, or for bulk shipments in cargo tanks supplied by the carrier.

10.3 Transportation requirements. Radioactive materials or commodities may be offered to carriers for transportation by rail, highway or water, provided the materials or commodities are properly packaged, described and certified as specified herein and in 49 CFR 100-189.

10.3.1 United States Government shipments.

a. Shipments or radioactive materials offered by or consigned to the Departments of the Army, Navy, and Air Force of the United States Government, must be packed, including limitations of weight in accordance with the regulations in 49 CFR 100-189, or in containers of equal or greater strength and efficiency as required by their regulations.

b. Shipments of radioactive materials, made by or under the direction or supervision of the U. S. Nuclear Regulatory Commission or the Department of Defense, and which are escorted by personnel specially designated by or under the authority of those agencies, for the purpose of national security, are exempt from the regulations in 49 CFR 100-189.

10.4 Contamination control (49 CFR 173.397).

a. Removable (non-fixed) radioactive contamination is considered significant if the level of contamination, when averaged over any area of 300 square centimeters of any part of the package surface, exceeds any of the limits specified in table II.

TABLE II. Radioactive material contamination limits.

"SIGNIFICANT" REMOVABLE CONTAMINATION IS DEFINED AS THAT WHICH, AS MEASURED BY WIPE TEST, EXCEEDS
1. For all materials except uranium or thorium: Alpha 10^{-5} μCi/Cm^2 (22 dis/min/Cm^2) Beta-Gamma 10^{-4} μCi/Cm^2 (220 dis/min/Cm^2)
2. For natural or depleted uranium and natural thorium: Alpha 10^{-4} μCi/Cm^2 (220 dis/min/Cm^2) Beta-Gamma 10^{-3} μCi/Cm^2 (2200 dis/min/Cm^2)

In assessing the surface contamination of a package, a sufficient number of measurements must be taken in the most appropriate locations so as to yield a representative assessment of the contamination situation. The average amount of removable (non-fixed) radioactive contamination may be determined by wiping the external surface of the package with an absorbent material, using moderate pressure, and then measuring the activity on the wiping material. If the measured activity per square centimeter does not exceed 10 percent of the levels prescribed above, it may be assumed that those levels have not been exceeded. Other measurement methods of equal or greater efficiency may also be utilized.

b. When radioactive materials packages are consigned as exclusive use, as defined herein, removable (nonfixed) radioactive contamination may not exceed 10 times that as specified in paragraph a. of this section.

c. Each transport vehicle used for transporting radioactive materials as exclusive use, as defined herein, must be surveyed with appropriate radiation detection instruments after each use. A vehicle may not be returned to service until the ratiation dose rate at any accessible surface is 0.5 millirem per hour or less, and there is no significant removable radioactive surface contamination, as defined in paragraph a. of this section.

11. DETAIL REQUIREMENTS

11.1 Arrangement. The requirements for marking, labeling, and packaging of radioactive materials and commodities are enumerated herein according to the requirements of the applicable referenced documents listed below.

a. Use and storage (MIL-STD-1458) (See 11.2)
b. Transportation by rail or highway carrier (49 CFR 174 or 176) (See 11.3)
c. Transportation by water carrier (49 CFR 176) (See 11.4)
d. Transportation by mail (39 CFR) (See 11.5)
e. Transportation by aircraft (49 CFR 175) (See 11.6)
f. Transportation by military aircraft (AFM 71-4, DSAM 4145.3, TM 38-250, NAVSUPPUB 505, MCO P-4030.19) (See 11.7)

11.2 Use and storage label. Any commodity or item containing radioactive material in excess of the values listed in table III shall be marked and labeled as illustrated by figure 6. This requirement (figure 6, and table III), was established by MIL-STD-1458.

NOTE: Commodities requiring radioactive labeling and marking shall be as specified. Where physical size preclude printing all required data on the commodity itself, the standard radiation symbol (see figure 1-4) and the words "accountability", where required may be adopted.

TABLE III. Radioactivity requirements for use and storage label.

Radioisotope	Microcuries
Radioactive materials not listed below	0.1
Americium 241	0.01
Plutonium 239	0.01
Radium 226	0.01
Uranium 233, 234, and 235	0.01
Mixtures of alpha emitters of unknown composition	0.01

11.2.1 Shipping container labels (10 CFR 20). Each shipping container of licensed radioactive material shall bear a durable, clearly visible label identifying the radioactive contents. The required label shall bear the radiation caution symbol and the words "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL" (see figures 6 and 1-4). The label shall also include sufficient information (radiation levels, types of materials, estimates of the activity, date of estimate, etc.) to permit individuals using, handling, or in the vicinity thereof to take proper precautions to minimize exposures (see 11.2.2 for exemptions).

11.2.2 Exempt shipping containers (10 CFR 20). Shipping containers are exempt from the labeling requirements of 11.2.1, provided the following conditions are satisfied:

a. The container does not contain licensed radioactive material in excess of the limits shown in table A-1, column IV, "Exempt quantities."
b. Containers of natural uranium or thorium do not contain more than 10 times the limits shown in table A-1, column IV.
c. Containers of licensed materials in concentrations not greater than the limits shown in column 2, table I, appendix B of 10 CFR 20.
d. Containers are attended by an individual and precautions taken to prevent exposure of any individual to radiation or radioactive material in excess of the limits established by the NRC.
e. Containers are in transport and packaged and labeled in accordance with the regulations of the Department of Transportation (DOT).
f. Containers available or accessible to authorized individuals, provided that the contents are identified to such individuals by a readily available written record.

11.3 Transportation by rail or highway carrier (49 CFR 174 and 176).

11.3.1 Purpose. The purpose of this section is to summarize the basic requirements of the Department of Transportation (DOT) regulations governing the packaging and shipment of radioactive materials and commodities, and to provide guidance toward more easily and correctly applying the regulation in actual practice. The applicable DOT regulations will be stated formally and then paraphrased where practicable.

11.3.1.1 The best approach to using the regulations. Perhaps persons that have made shipments of radioactive materials may feel like the person illustrated in figure 1. The primary consideration for the achievement of safety in the transportation of radioactive materials is the use of proper packaging for the specific radioactive materials to be transported. Listed below are three basic questions that a prospective shipper or package designer must address himself to, in determining his packaging requirements. These questions are as follows:

(a) What radioistope is being shipped? Section A contains a listing of over 250 specific radionuclides plus certain "ground rules" for dealing with unlisted or unknown radionuclides, or with mixtures of radionuclides.

(b) What quantity of the radionuclides is being shipped? The packaging requirements relative to quantity are essentially structured about the aggregate quantity in a package, in terms of curies, millicuries, or microcuries.

(c) What is the form of the radioistope?

(1) Is the material in special form?; or
(2) Is it in normal form?

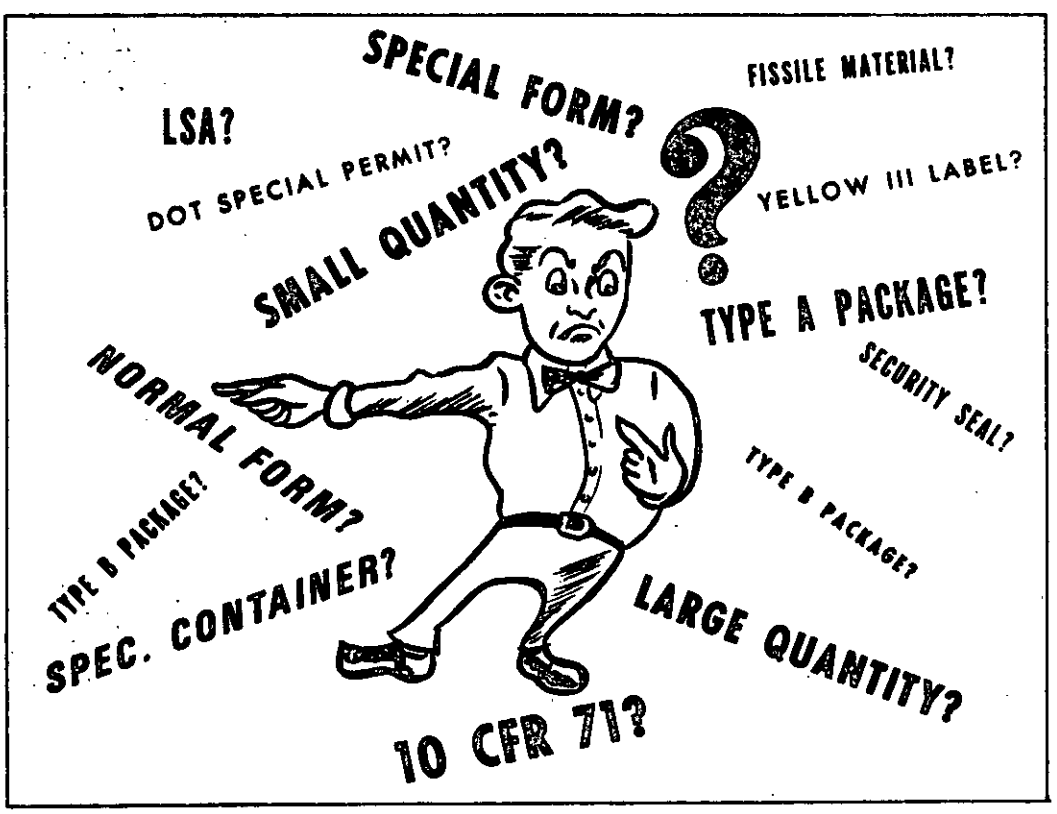


FIGURE 1. What must I do to make a safe and legal shipment of radioactive materials?

11.3.2 Transport groups. Radionuclides are listed in transport groups I through VII according to their radiotoxicity and relative potential hazard in transportation, and are categorized as specified in section A of this handbook.

11.3.3 Type A packaging. Type A packaging shall be designed in accordance with the general packaging requirements specified in 11.3.6 (49 CFR 173.393), and shall be adequate to prevent loss or dispersal of the radioactive contents and to retain the efficiency of its radiation shielding properties if the package is subjected to the defined "normal" conditions of transport specified in 49 CFR 173.398 b.

11.3.3.1 Selection criteria. Figure 2 illustrates typical type A package schemes. Typically, as is seen, type A packaging in 49 CFR 178, including certain specification steel drums, wooden boxes, fiberboard boxes, etc. Also, provided for is a purely performance-based DOT Spec. 7A, type A general package, for which a shipper may make his own assessment of his particular package design against the performance requirements. The regulatory framework therefore provides for the use of all type A packaging without specific regulatory approvals of the package designs, either via the use of the various prescribed specification containers or the DOT Spec. 7A performance specification. Additionally, foreign-made type A packages are acceptable internationally, provided they are so marked as type A, without specific approval by the competent national authority of either country.

11.3.4 Type B packaging. Type B packaging shall meet all requirements for type A packaging, and the standards for hypothetical accident conditions of transportation as prescribed in 49 CFR 173.398 c.

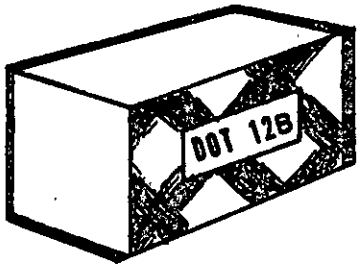
11.3.4.1 Selection criteria. Figure 3 illustrates type B packaging. Except for a limited number of specification type B packagings (i.e., DOT-6M), all type B package designs require prior approval of the DOT. This involves packaging which must be designed to withstand, in addition to the general packaging requirements and the performance standards for normal conditions of transport, certain serious accident damage test conditions with resultant limited loss of shielding capability and essentially no loss of containment. The performance criteria which the package designer must use to assess type B packaging against these empirically established accident damage test conditions of the transport are prescribed in 49 CFR 173.398 c. and include the following:

a. A 30 foot free drop onto an unyielding surface.
b. A puncture test which is a free drop over 40 inches onto a six inch diameter steel pin.
c. Thermal exposure at 1475°F. for 30 minutes.
d. Water immersion for 8 hours (for fissile materials packaging only).

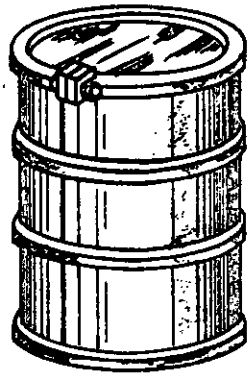
11.3.4.2 Large quantity packaging. "Large quantities" of radioactive material are defined as those quantities which involve greater than type B quantities. The most common materials involved as large quantities are the high-curie irradiator sources and irradiated fuel materials. Packaging requirements for large sources involve all of the type B packaging requirements plus other provisions for such things as decay heat dissipation, potential leakage of contaminated heat transfer medium, heavier shielding and the like, which in some cases, may involve a requirement for certain administrative controls peculiar to the specific package design during shipment. The materials are additionally controlled by the packaging standards as promulgated by the U. S. Nuclear Regulatory Commission in 10 CFR 71.

11.3.4.3 Small quantities, devices, and low-specific activity materials. See "Exemptions" 11.3.10 (49 CFR 173.391 and 173.392).

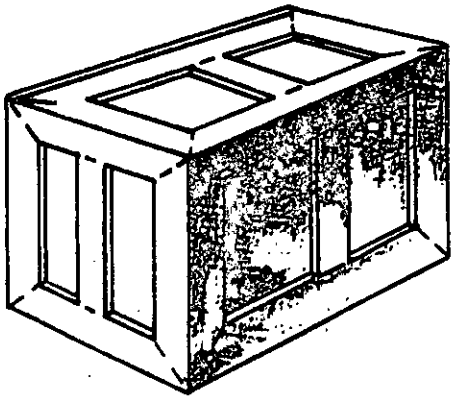
PACKAGE MUST WITHSTAND NORMAL CONDITIONS OF TRANSPORT ONLY WITHOUT LOSS OR DISPERSAL OF THE RADIOACTIVE CONTROL CONTENTS.



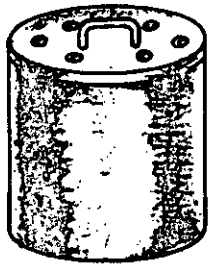
DOT SPECIFICATION
FIBERBOARD BOX



DOT SPECIFICATION
STEEL DRUM



DOT SPECIFICATION
WOODEN BOX



DOT SPECIFICATION 7A
TYPE "A" PACKAGE

FIGURE 2. Typical type "A" packaging.

PACKAGE MUST STAND BOTH NORMAL (49CFR 173.398b) AND ACCIDENT (49CFR 173.398c) TEST CONDITIONS WITHOUT LOSS OF CONTENTS.

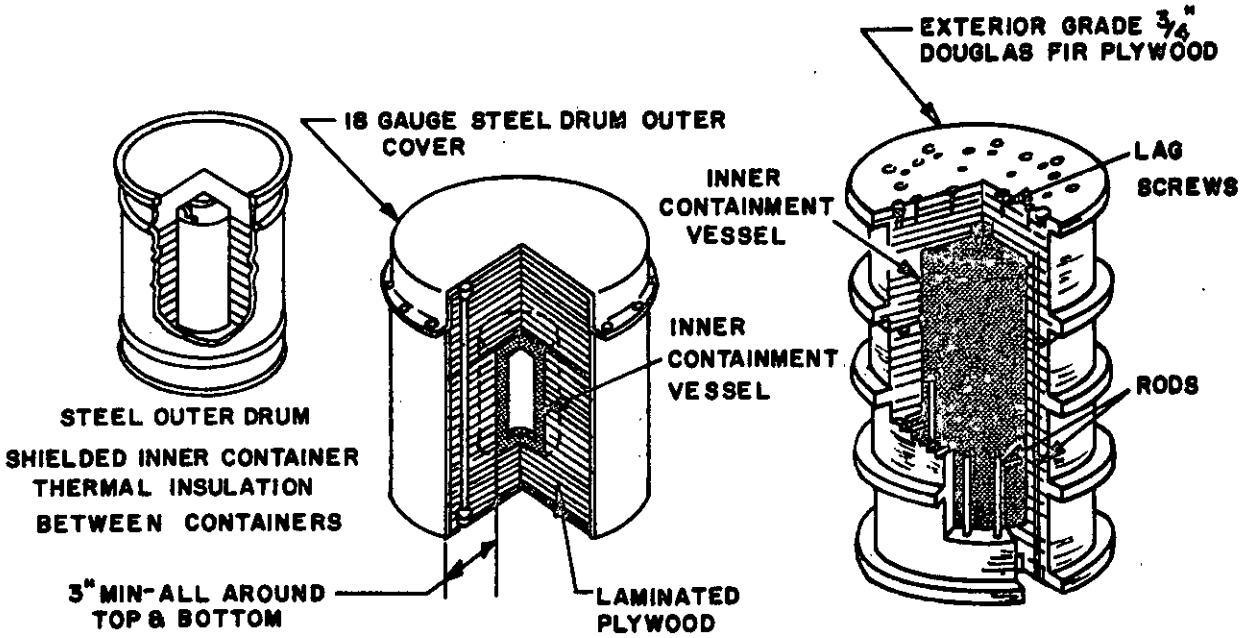


FIGURE 3. Typical type "B" packaging schemes.

11.3.5 Type A and type B quantities. The quantities of radioactive materials which can be shipped in type A or type B packaging are listed in table IV. The aggregate radioactivity for each type shall not exceed the limits specified. Note here the extreme importance of the special form group. For normal form materials, note that the increasing transport group numbers range from group I, which includes the highly radiotoxic alpha emitters, such as plutonium, americium, and radium, to the less radiotoxic, higher transport groups which have a higher allowable aggregate quantity per package. As indicated in a footnote to this table, a large quantity of radioactive material would be any quantity which exceeds the specified type B quantity limit.

TABLE IV. Type A and type B quantities by transport group.

Transport group	Type A quantity (curies)	Type B quantity (curies) 1/
I	0.001	20
II	0.05	20
III	3	200
IV	20	200
V	20	5,000
VI and VII	1,000	50,000
Special form	20 2/	5,000

1/ Quantities exceeding type B are classified as "large quantities" (large radioactive sources).
2/ Except the limit is 2 curies for Californium-252.

11.3.6 General packaging requirements. Unless otherwise specified, all shipments of radioactive materials or commodities shall be packaged as prescribed in 49 CFR 173.391 through 173.396, and shall meet all of the following requirements:

a. The exterior of each package or container must incorporate a feature such as a seal, which is not readily breakable and while intact will be evidence that the package or container has not been opened.
b. The smallest outside dimension of any exterior or container must be four inches or greater.
c. Radioactive material must be packaged in packaging which has been designed to maintain shielding efficiency and leak tightness to assure that there will be no release of radioactive material under normal transportation conditions. If necessary, additional suitable inside packaging must be used. Each package or exterior container must be capable of meeting the standards for type A packaging as specified in 49 CFR 173.398 and 173.24.
d. Internal bracing or cushioning, where used, must be adequate to assure that, under typical transportation conditions, the distance from the inner container or radioactive material to the outside wall of the package remains within the design limits and the radiation dose rate external to the package does not exceed the transport index number shown on the label. Inner shield closures must be positively secured to prevent loss of the contents.
e. The packaging must be designed, constructed, and loaded, so that during transport:
   (1) The heat generated within the package because of the radioactive materials present will not, at any time during transportation affect the efficiency of the package under normal transportation conditions.

(2) The temperature of the accessible surfaces of the package, when fully loaded, will not exceed 122°F in the shade assuming still air at ambient temperature. If the package is transported in a transport vehicle consigned for the sole use of the consignor, the maximum accessible external surface tamperature shall be 180°F.

f. Liquid radioactive material in type A quantities must be packed in (or within) a leak-resistant and corrosion-resistant inner containment vessel. In addition:

(1) The packaging must be adequate to prevent loss or dispersal of the radioactive contents from the inner containment vessel if the package were subjected to the 9 meter (30-foot) drop test prescribed in 49 CFR 173.398 c. (2) i.; and either

(2) Enough absorbent material must be provided to absorb at least twice the volume of radioactive liquid contents. The absorbent material may be located outside the radiation shield only when it can be shown that, if the radioactive liquid contents were taken up by the absorbent material, the resultant dose rate at the surface of the package would not exceed 1,000 millirem per hour; or

(3) A secondary leak-resistant and corrosion-resistant containment vessel must be provided to retain the radioactive contents under the normal conditions of transport as prescribed in 49 CFR 173.398 b., assuming the failure of the inner primary containment vessel.

g. There must be no significant removable radioactive surface contamination on the exterior of the package (see 10.4,49 CFR 173.397).

h. Packages consigned for export are also subject to the regulations of the foreign governments involved in the shipment (see 49 CFR 173.8, 173.9 and 173.393 b).

i. The shipper shall determine, by examination or test, prior to shipment, that the package is proper for the contents, the packaging is unimpared and meets the specified design and construction criteria (see 9.1.1 "shippers requirements").

j. Exeept for shipments described in paragraph k., all radioactive materials must be packaged in suitable packaging (shielded, if necessary) so that at any time during the normal conditions incident to transportation the radiation dose rate does not exceed 200 millirem per hour at any point on the external surface of the package and the transport index does not exceed 10.

k. Packages for which the radiation dose rate exceeds the limits specified in paragraph j. of this section, but does not exceed at any time during transportation any of the limits specified in Table V of this section may be transported in a transport vehicle which has been consigned as exclusive use (except aircraft). Specific instructions for maintenance of the exclusive use (sole use) shipment controls must be provided by the shipper to the carrier. Such instructions must be included with the shipping paper information.

11.3.6.1 Control of radiation during transport (transport index). The regulations prescribe that the maximum permissible dose rate at contact with the accessible exterior surface of any package of radioactive materials offered for transport shall not exceed 200 mR/hr, or 10 mR/hr at 3 feet (this latter value being equal to the maximum "Transport Index"). Higher dose rates are also prescribed, which are allowable provided that "sole use" of the transport vehicle is assured by the shipper. The radiation level limitations are summarized in table V. To control the radiation levels of accumulations of multiple numbers of packages once in the transportation

environment, the regulations require that carriers shall maintain certain prescribed separation distances between radioactive materials packages and other areas which are continuously occupied by persons or photographic film. These separation distances relate the storage time against the "Transport Index" which was defined previously as the dose rate in mrem/hr at three feet from the accessible exterior surface of the package. No package offered for transport (in other than sole-use vehicles) may have a transport index exceeding 10. The establishment of this maximum transport index of 10 is based on considerations for prevention of "fogging" of "fast" photographic film. The total transport index of any aggregate number of packages in any single transport vehicle (other than an exclusive use vehicle) or storage location may not exceed 50. The regulations provide graded tables of stowage distances index. These tables are found in the carrier sections of (49 CFR 174.586 (h) and 177.842 (b), 46 CFR 146.19-35, and 14 CFR 103.23 (a)).

TABLE V. Radioactive materials - maximum radiation level limitations (see 49 CFR 173.393(i) and (j).

Radiation level (dose) rate at any point on external surface of any package of R.A.M. may not exceed:

A. 200 millirem per hour
B. 10 millirem per hour at three feet (transport index may not exceed 10).

Unless the packages are consigned to a "sole use" or "exclusive use" closed transport vehicle (except aircraft) then the maximum radiation levels may be:

A. 1000 millirem per hour at 3 feet from external package surface.
B. 200 millirem per hour at external surface of the vehicle.
C. 10 millirem per hour at 2 meters (6 feet) from the vertical planes projected by the outer lateral surface of the car or vehicle; or if the load is transported in an open transport vehicle, at any point 2 meters (six feet) from the vertical planes projected from the outer edges of the vehicle.
D. 2 millirem per hour in any position of the vehicle which is occupied by a person.

11.3.6.2 U. S. Nuclear Regulatory Commission approved packages; standard requirements and conditions. In addition to the applicable requirements of USNRC approval and 49 CFR 170-189, each shipper of a package containing radioactive material, which has been approved by the USNRC in accordance with 49 CFR 173.394, 173.395, 173.396(b)(2), (c)(2), 173.396(b)(4), or 173.396(c)(3), shall comply with the following:

a. Before the first shipment in a package approved by the Nuclear Regulatory Commission for use by another person, each shipper shall register in writing with the NRC Division of Materials Licensing, his name and address, the name of the person to whom the USNRC approval was issued, and the approval number assigned to the package. Each shipper shall have a copy of the NRC approval and the document referred to in the approval in his possession. Each shipment must be made in compliance with the terms and conditions of the approval;
b. The outside of each package must be durably and legibly marked with the package identification marking indicated in the USNRC approval;

c. Each shipping paper related to the shipment of this package must bear a notation of the package identification marking indicated in the USNRC approval;
d. Before the first export shipment of the package, the shipper shall submit a copy of the applicable competent authority certificate applying to that package design to the competent national authority of each country into or through which the package will be transported, unless a copy has already been furnished to this party by another person. (Detailed requirements for the issuance and content of competent authority certificates are provided in marginal C-6 of the IAEA "Regulations for the Safe Transport of Radioactive Materials, Safety Series No. 6, 1967 edition," hereinafter referred to as the "IAEA Regulations." A list of the national competent authorities of each country is published annually by the IAEA.);
e. Each package of fissile radioactive material must be marked with the numerical value for the transport index if the shipment is fissile class II. Any vehicle limitation indicated in the USNRC approval applies if the shipment is fissile class III; and
f. For a fissile class III shipment the statement prescribed in 49 CFR 173.427(a)(5)(v) must be included with the shipping papers.

11.3.6.3 International shipments and foreign-made packages; standard requirements and conditions. In addition to the other applicable requirements of 49 CFR 170-189, each shipper of a package containing radioactive material, for which a foreign competent authority certificate has been issued and revalidated pursuant to the IAEA regulations and 49 CFR 173.394(b)(4), 173.394(c)(3), 173.395(b)(3), 173.396(c)(3), 173.396(b)(5), or 173.396(c)(4), also shall comply with the following:

a. Before the first shipment of the package, each shipper shall register in writing his identity and type of package with the Office of Hazardous Materials Operations, U. S. Department of Transportation, Washington, DC 20590, furnishing a copy of the foreign certificate or revalidation thereof which is applicable to that package, unless a copy has already been furnished by another person;
b. The outside of each package must be durably and legibly marked with the competent authority identification marking indicated on the certificate of revalidation;
c. Each shipping paper related to the shipment of the package must bear a notation of the package identification marking indicated in the certificate of revalidation;
d. Before the first export shipment of the package, the shipper shall furnish a copy of the applicable competent authority certificate applying to that package design and any required revalidation, to the competent national authority of each country through or into which the package will be transported, unless a copy has already been furnished by another person;
e. The applicable competent authority certificates need not accompany the packages to which they relate. However, the shipper shall supply them to the carrier upon request; and
f. For a fissile class III shipment, the statement prescribed in 49 CFR 173.427(a)(5)(v) must be included with the shipping papers.
g. The designated competent authority in the USA responsible for *administering the requirements (Marginal C-6)* of the International Atomic Energy Agency's (IAEA) "Regulations for the Safe Transport of Radioactive Materials," Safety Series No. 6; Office of Hazardous Materials Operations, Department of Transportation, Washington, DC 20590

h. Any request for a competent authority certificate required by the IAEA regulations must be submitted in writing to the address given in paragraph g. of this section. This request should be in duplicate and must contain all the information required by the applicable subsection of Marginal C-6 of the IAEA regulations. Unless there is good reason for priority treatment, each request will be considered in the order in which it is received. To permit timely consideration, requests should be submitted at least 45 days prior to the requested effective date.

11.3.7 Special form radioactive material. What is meant by "special form" radioactive material? As illustrated in figure 4, we see that "special form" materials are defined as materials, which, if released from a package, might present a hazard due to direct, external radiation, but due to their high physical integrity, would present very little hazard, if any, due to radiotoxicity as a result of spread of contamination. This high physical integrity could be the result of inherent property of the material, such as its being in massive, solid form or an acquired characteristic such as encapsulation as a sealed source. Note a word of caution at this point: The DOT Specification 2R containment is not necessarily synonymous with "special form." In other words, each specific DOT Specification 2R encapsulation must be evaluated against the "special form" performance criteria as prescribed in the regulations (49 CFR 173.398 (a)) in just the same fashion as any other prospective "special form" material. This determination, however, is left to the responsibility of the shipper or package designer, as appropriate, and is not made by the DOT (except where required for export). Recognizing that "special form" materials are not very likely to get "scattered around" in the event of package failure, the regulations allow substantially larger quantities of such materials to be placed in given packagings, than if the materials were in "normal form".

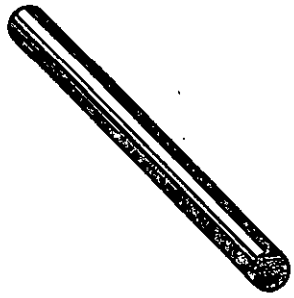
11.3.7.1 Exempted fissile material. The following fissile radioactive materials (exempted from subparagraph e. below) are considered as a special form for packaging purposes: (See 49 CFR 173.396.)

a. Not more than 15 grams of fissile material.
b. Thorium, or uranium containing not more than 0.72 percent by weight of fissile material.
c. Uranium compounds other than metal (for example, UF_4, UF_6, or uranium oxide in bulk form, not pelleted or fabricated into shapes), and aqueous solutions of uranium in which the total amount of uranium -233 and plutonium present does not exceed 1.0 percent by weight of the uranium -235 content, and the total fissile content does not exceed 1.00 percent by weight of the total uranium content.
d. Homogeneous hydrogenous solutions (or mixtures) containing not more than:
   (1) 500 grams of any fissile material, provided the atomic ratio of hydrogen to fissile material is greater than 7,600; or
   (2) 800 grams of uranium -235, if the atomic ratio of hydrogen to fissile material is greater than 5,200, and the content of other fissile material is not more than 1.0 percent by weight of the total uranium -235 content; or
   (3) 500 grams of uranium -233 and uranium -235, if the atomic ratio of hydrogen to fissile material is greater than 5,200, and the content of plutonium is not more than 1.0 percent by weight of the total uranium -233 and uranium -235 content.
e. A package containing less than 350 grams of fissile material, if there is not more than 5 grams of fissile material in any cubic foot within the package.

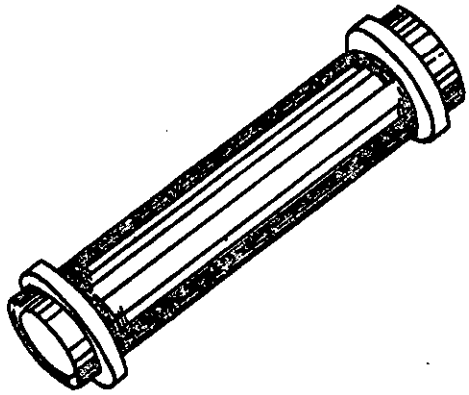
MAY PRESENT A DIRECT RADIATION HAZARD IF RELEASED FROM PACKAGE, BUT LITTLE HAZARD DUE TO CONTAMINATION

"SPECIAL FORM" R.A.M. MAY BE "NATURAL" CHARACTERISTIC, I.E., MASSIVE SOLID METAL, OR "ACQUIRED" THROUGH HIGH INTEGRITY ENCAPSULATION

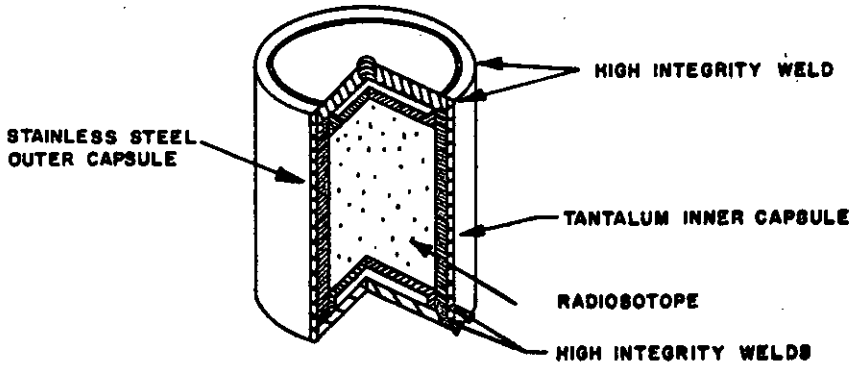
MASSIVE SOLID METAL



DOT SPEC 2R *
(49 CRF 178.34)



HIGH INTEGRITY ENCAPSULATION AS A SEALED SOURCE



* SPEC. 2R CONTAINMENT DOES NOT AUTOMATICALLY QUALIFY AS "SPECIAL FORM" SPECIFIC EVALUATION IS NECESSARY AGAINST 173.398(A)

FIGURE 4. Special form radioactive material.

11.3.7.2 Type A quantities. In addition to the general packaging requirements (see 11.3.6), Type A quantities must be packaged as follows:

a. Specification 7A, Type A general packaging (49 CFR 178.350). Each shipper of Specification 7A packaging must maintain on file for at least one year after the latest shipment, and be prepared to provide the DOT a complete certification and supporting safety analysis demonstrating that the construction methods, packaging design, and materials of construction are in compliance with the DOT specification.
b. Specification 55, metal encased shielded container (49 CFR 178.250). Use of existing containers authorized. Construction not authorized after March 31, 1975.
c. Any Type B packaging authorized by DOT.
d. Foreign-made packaging which bear the marking "TYPE A."

11.3.7.3 Type B quantities. Must be packed as follows (also see 11.3.4):

a. Metal packaging (drum), DOT Specification 6M. Authorized only for solid or gaseous materials which will not decompose at temperatures up to 250°F.
b. Metal-encased shielded container, DOT specification 55. Authorized for not more than 300 curies per container (domestics shipments only). Use of existing containers authorized. Construction not authorized after March 31, 1975.
c. DOT SP 4888.
d. DOT SP 5426.
e. DOT SP 5447.
f. DOT SP 5637.
g. DOT SP 5758.
h. DOT SP 5800.
i. DOT SP 5890.

11.3.7.4 Large quantities of radioactive material in special form. Must be packed in metal packaging (drum), DOT Specification 6M. Radioactive thermal decay energy must not exceed 10 watts. Any other type B packaging which meet the pertinent requirements for large quantities of radioactive materials in the U. S. Nuclear Regulatory Commission (10 CFR 71).

11.3.8 Radioactive materials in normal form and low specific activity (see table IX). Figure 5 illustrates "normal form" radioactive materials which do not qualify as special form, as specified in 11.3.7. Normal form radioactive materials are classified into one of the seven transport groups specified in Section A of this handbook.

11.3.8.1 Type A quantities. Must be packed in specification containers as specified in 11.3.7.2 (also see 11.3.3):

11.3.8.2 Type B quantities. Shall be packaged as follows (also see 11.3.4):

a. Specification 55 (See 11.3.7.3 b.)
b. Metal packaging (drum), DOT Specification 6M. Authorized only for solid or gaseous materials which will not decompose at temperatures up to 250°F.
c. Any other type B packaging for which DOT has issued a certificate of compliance.

11.3.8.3 Large quantities of radioactive materials in normal form. Must be packed as follows:

a. Metal packaging (drum), DOT Specification 6M. Authorized only for solid or gaseous materials which will not decompose at temperatures up to 250°F. Radioactive thermal decay energy must not exceed 10 watts.

"NORMAL FORM" R.A.M. (RADIOACTIVE MATERIAL-N.O.S.)

INCLUDES ANY MATERIAL WHICH DOES NOT QUALIFY AS "SPECIAL FORM".

NORMAL FORM MATERIALS ARE CLASSIFIED INTO EITHER OF SEVEN TRANSPORT GROUPS.

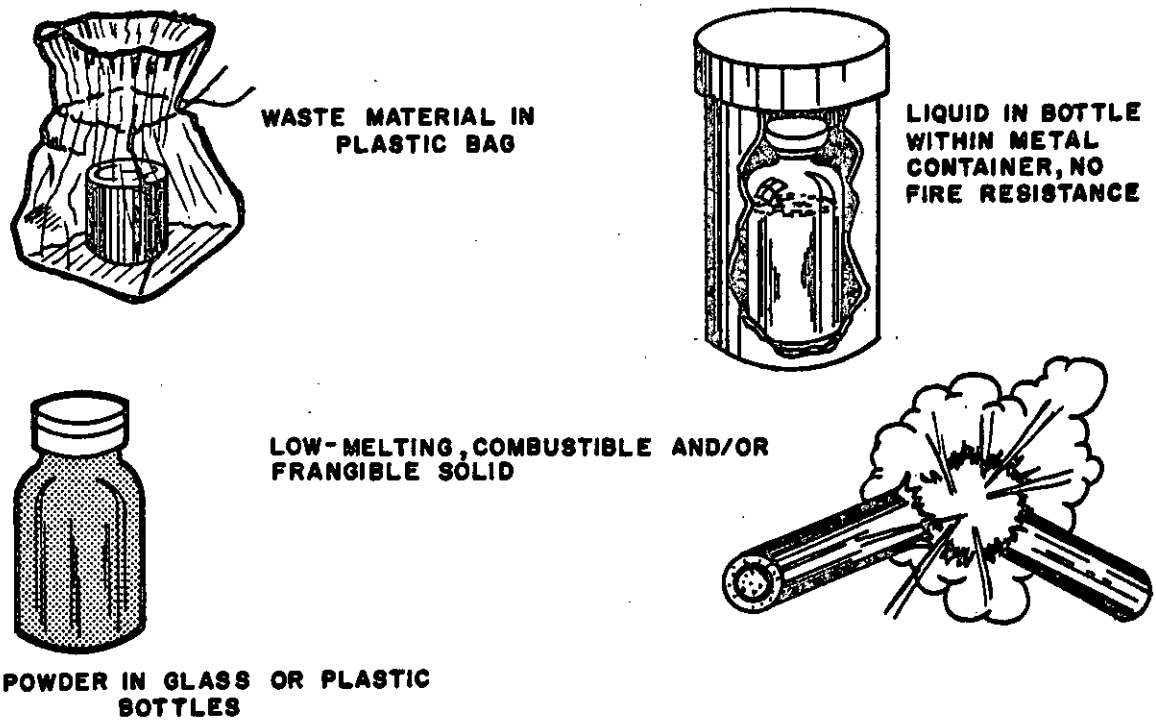


FIGURE 5. Normal form radioactive material.

b. Any other type B packaging which meets the pertinent requirements for large quantities of radioactive materials in the regulations of the U. S. Nuclear Regulatory Commission (10 CFR 71).

11.3.9 Fissile radioactive materials. See 11.3.7.1 for exempted fissile material. In addition to considerations for the radioactive content, shippers of fissile radioactive material must also take into account certain other packaging and shipment requirements to ensure against nuclear criticality due to the fissile (fissionable) nature of the materials. The design of the packaging for fissile radioactive material, the transport index to be assigned (if Fissile Class II), and any special procedures for packaging are prescribed in 49 CFR 173.396 (see 11.3.6) and in 10 CFR 71. Each fissile radioactive materials package design (except for the DOT Spec. 6L and 6M) must be reviewed and approved by the USNRC prior to its first use. The packaging must be such to ensure against nuclear criticality (an unplanned nuclear chain reaction) under both normal and accident damage test conditions, and to prevent loss of contents of transport. For purposes of control in transportation, fissile radioactive material packages are classified with one of three groups, according to the degree of control which must be exercised to assure nuclear criticality safety, as shown in table VI. (See 6.18 and 6.19.)

TABLE VI. Fissile radioactive material classes.

SHIPMENT CONTROLS FOR FISSILE RADIOACTIVE MATERIALS PACKAGES
1. Fissile Class I - Packages may be transported in unlimited numbers (Transport Index is based only on external radiation levels).
2. Fissile Class II - Number of packages limited by aggregate maximum of Transport Index of 50 (50 unit rule). No single package may exceed a Transport Index of 10. Transport Index will have been calculated either on criticality or external radiation level basis.
3. Fissile Class III - Packages which do not meet the requirements of Fissile Classes I or II. Controlled by special arrangements between the shipper and carrier. (See 49 CFR 173.396 (g).)

11.3.9.1 Transport index system. The transport index (TI) system with the separation tables controls the exposure of personnel handling, transporting, or casually exposed to radiation from radioactive material packages. The TI system has also been adapted for limiting aggregations of packages containing fissile radioactive materials to avoid assembling in one location an amount of fissile material which, under credible conditions, would support a chain reaction, i.e., "go critical." As for radiation levels, the shipper determines in accordance with the regulations of the NRC (10 CFR 71), a TI (49 CFR 173.389 (i) (2)) which is to be assigned to the fissile material package (see 6.45). The shipper assigns to each package of fissile material the nuclear safety TI as calculated or the radiation level TI (as described earlier), whichever is greater. The transport worker adds these radiation level TI's and by complying with the TI limitation in any one vehicle or location, limits the amount of fissile material in fissile material packages.

TABLE VII. Clarification of classification terminology.

CAUTION - - - DO NOT CONFUSE THE FOLLOWING:
Transport Groups I through VII (6.47 and Section A)
with:
Radioactive materials package labels (11.3.11)
RADIOACTIVE WHITE - I RADIOACTIVE YELLOW - II RADIOACTIVE YELLOW - III
or with:
Fissile Classes I, II, or III (6.17 and 11.3.9)

11.3.9.2 Type A quantities. Fissile radioactive materials containing not more than type A quantities of radionuclides, in either normal form or special form, must be packed as follows:

a. Metal container (drum), DOT Specification 6L. Authorized contents shall be as specified in 11.3.9.3 (a).
b. Metal package (drum), DOT Specification 6M. Authorized only for solid radioactive material as provided for in 11.3.9.3 (b).
c. Any container provided for in 11.3.8, provided the following conditions are met:

   (1) Not more than 500 grams of uranium -235 as Fissile Class III, or not more than 40 grams of uranium -235 as Fissile Class II shipment, the transport index to be assigned to each package shall be 0.4 for each gram of uranium -235 above 15 grams, up to a maximum of 40 grams (transport index of 10).
   (2) Not more than 320 grams of plutonium -239 as plutonium-beryllium neutron sources in special form. Total radioactivity content must not exceed 20 curies. The transport index to be assigned to each package shall be 0.5 for each 20 grams, or fraction thereof, of fissile plutonium.

d. Any other type A or B packaging which meets the standards for packaging for fissile radioactive material in the NRC regulations (10 CFR 71), and for which DOT has issued a certificate of compliance.

11.3.9.3 Type B quantities. Fissile radioactive materials containing type B quantities of radionuclides, in either normal form or special form, must be packaged as follows:

a. Metal container (drum), DOT Specification 6L. Authorized only for uranium-235, plutonium-239 or 241, as metal, oxide, or compounds which will not decompose at temperatures up to 149°C (300°F.) Radioactive thermal decay energy output shall not exceed 5 watts. Large quantity radioactive materials in normal form must be packaged in one or more sealed and leak tight metal cans or

polyethylene bottles within the Specification 2R containment vessel. The following quantities of fissile radioactive materials are authorized under the Fissile Class II and III conditions listed:

TABLE VIIIA. Maximum authorized contents. 1/

Uranium-235 2/		Plutonium 2/4/		Fissile class II transport index	Fissile class III maximum number of packages per transport vehicle
H/X≤3	3<H/X≤20	H/X≤10	10≤H/X≤20		
14	3.6 3/	---	---	1.3	80
---	---	2.5	2.4	1.8	55

1/ Quantity in kilograms.
2/ All sources of hydrogen within the inner containment vessel must be considered in determining the H/X ratio of inner containment vessel.
3/ Volume not to exceed 3.6.1.
4/ Plutonium solutions are not authorized.

b. Metal package (drum), DOT Specification 6M. Authorized only for solid radioactive materials which will not decompose at temperatures up to 250°F. Radioactive thermal decay energy output shall not exceed 10 watts. Large quantity radioactive materials in normal form must be packaged in one or more sealed and leak-tight metal cans or polyethylene bottles within the Specification 2R containment vessel.

11.3.9.4 Fissile classes to containers. Classification of Fissile Class I, II, or III to containers (see table VI):

a. Fissile Class I packages. The following quantities of fissile radioactive material are authorized for Fissile Class I packages: 1.6 kilograms uranium -235; 0.9 kilograms of plutonium (because of the 10-watt thermal decay heat limitation, the limit for plutonium -238 is only 0.02 kilograms); and 0.5 kilograms of uranium -233. The maximum ratio of hydrogen to fissile material must not exceed three, all sources of hydrogen within the Specification 2R containment vessel being considered.

b. Fissile Class II and III packages. Quantities of fissile radioactive material as shown in table VIIIB are authorized for Fissile Class II and III packages. When the table specifies a maximum ratio of hydrogen to fissile material, this refers only to the hydrogen interspersed with the fissile material.

(1) For Fissile Class II packages, the minimum Transport Index Number to be assigned is also shown in table VIIIB.

(2) For Fissile Class III packages, the maximum number of similar packages per transport vehicle is shown. Fissile Class III shipments are also subject to the restrictions outlined in 11.3.9.4 (c). For a uranium-233 shipment, the maximum inside diameter of the inner containment vessel must not exceed 12 centimeters (4.75 inches). Where necessary, a tight fitting steel insert must be used to reduce a larger diameter inner containment vessel specified in (49 CFR 178.104-3(b) to the 12 centimeters (4.75 inches) limit.

TABLE VIIIB. Maximum authorized contents (in kilograms).

Uranium-233 4/			Uranium-235 3/6/			Plutonium 1/2/3/			Fissile class II transport index	Fissile class III maximum number of packages per transport vehicle
Metal or alloy H/X=0	Compounds		Metal or alloy H/X=0	Compounds		Metal or alloy H/X=0	Compounds			
	H/X=0	H/X=3		H/X=0	H/X≤3		H/X=0	H/X≤3		
3.6	4.4	2.9	7.2	7.6	5.3	3.1	4.1	3.4	0.1	1,250
4.2 5/	5.2	3.5	8.7	9.6	6.4	3.4	4.5	4.1	.2	625
5.2	6.8	4.5	11.2	13.9	8.3	4.2	---	4.5	.5	250
---	---	---	13.5	16.0	10.1	4.5	---	---	1.0	125
---	---	---	---	26.0	16.1	---	---	---	5.0	25
---	---	---	---	32.0	19.5	---	---	---	10.0	12

1/ Minimum percentage of plutonium-240 is 5 weight percent.
2/ 4.5 kg limitation of plutonium due to 10 w decay heat limitation.
3/ For a mixture of uranium-235 and plutonium an equal amount of uranium-235 may be substituted for any portion of plutonium authorized.
4/ Maximum inside diameter not to exceed 12 cm (4.75 in.) (see 11.3.9.4(c)(2)(ii)).
5/ Granulated or powdered metal with any particle less than 8 mm (0.25-in) in the smallest dimension is not authorized.
6/ Maximum uranium-235 enrichment is 93 percent.

c. Fissile Class II packages shipped under the exclusive use provisions (49 CFR 173.393(j)) shall provide for packages with high radiation dose rates. The transport index number which is calculated for nuclear criticality control purposes must not exceed 10 for any single package or a total of 50 for the full load, unless specifically authorized by the DOT for Fissile Class III shipments.

(1) Fissile Class II packages may be shipped with a transport index greater than 10, and combined with other packages of the same or different designs in a Fissile Class III shipment, under the conditions prescribed in paragraph d. of this section, Provided:

(a) The transport index which has been assigned in the package approval for nuclear criticality control purposes does not exceed 10 for any single package;
(b) The total transport index for nuclear criticality control purposes for all packages in the shipment does not exceed 100;
(c) The shipment satisfies the provisions of (49 CFR 173.393(j)) if any package has radiation dose rates exceeding 10 millirem per hour at 1 meter (three feet) from any accessible external surface of the package; and
(d) The shipment will not be transported by water.

(2) Fissile Class III packages, which have been assigned a transport index for nuclear criticality control purposes in accordance with Fissile Class II criteria, may be combined with Class II criteria, may be combined with other Fissile Class III packages of the same or different design for which a transport index has been so assigned for nuclear criticality control purposes, and may be combined with Fissile Class II packages in a Fissile Class III shipment under the conditions prescribed in paragraph d. of this section, provided:

(a) The transport index which has been assigned in the package approval for nuclear criticality control purposes does not exceed 50 for any single package;
(b) The total transport index for nuclear criticality control purposes for all packages in the shipment does not exceed 100;
(c) The shipment satisfies the provisions of (49 CFR 173.393(j)) if any package has radiation dose rates exceeding 10 millirem per hour at 1 meter (three feet) from any accessible external surface of the package; and
(d) The shipment will not be transported by water.

d. Fissile Class III shipments may be made only in accordance with subparagraph (1) or (2) of this paragraph, or in accordance with other procedures authorized by the Department. The transport controls must provide nuclear criticality safety and shall be carried out by the shipper or carrier, as appropriate, to protect against loading, transporting, or storing of that shipment together with other fissile material.

(1) Transportation in a transport vehicle assigned for the sole use of that consignor, with a specific restriction for such sole use to be provided in the special arrangements, and with instructions to that effect issued with the shipping papers; or

(2) Transportation under escort by a person in a separate vehicle, with the escort having the capability, equipment, authority, and instructions to provide administrative control adequate to assure compliance with this paragraph.

11.3.10 Small quantities of radioactive materials, commodities, and low specific activity materials (49 CFR 391 and 392). The transport group and special form package limits are also used as a basis for defining the package quantity limits for small or "exempt" specific activity materials, as illustrated in table IX. As a matter of in-interest, the "small" or exempt quantities and "radioactive device" categories are those which are allowable for shipment by U. S. Mail provided that certain other limitations are fulfilled (see 11.5). Note in table IX that the limitations for low specific activity materials are based on concentration, i.e., specific activity, rather than on the aggregate quantity per package.

a. Exemption from all labeling. No labeling, marking or specified packaging is required where the radioactive material (RAM) used has an activity level within the limits defined in 11.3.10.1.

b. Exemption from DOT labeling.

(1) No Department of Transportation (DOT) labeling, marking or specified packing is required where the radioactivity of devices and their packaging is within the limits defined in 11.3.10.2.

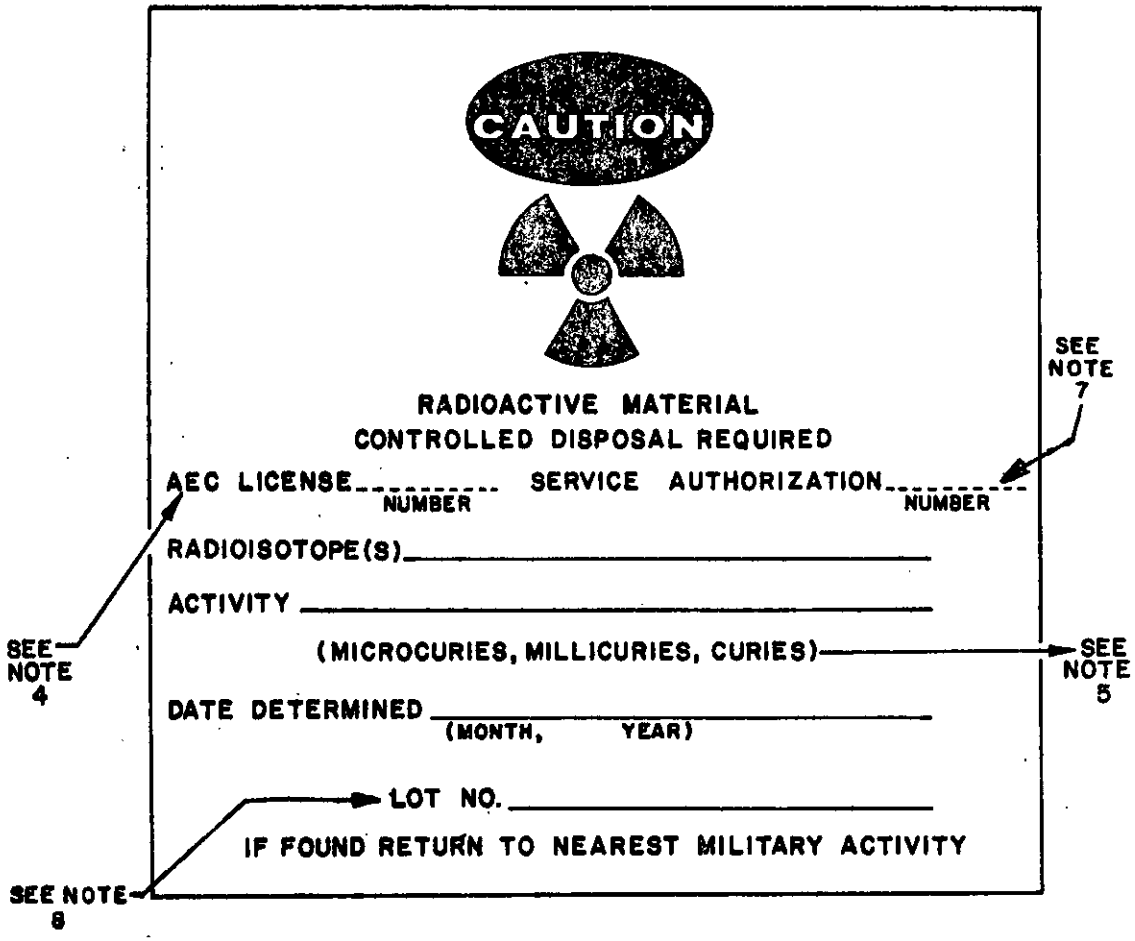
(2) The "Use and Storage" labels, figure 6, are required for DOT exempt shipments when the RAM material used exceeds the limits defined in 11.3.10.1. The information required is indicated on the figure 6 label and is as follows:

(a) AEC license number and service organization if required by section 8. (See 8.1.2 for exemption for electronic tubes.)
(b) Name of radioactive material (RAM)
(c) Activity of RAM. See section B, table B-1.
(d) Manufacturing lot number. See MIL-STD-1458.

(3) Shipping papers for DOT exempt shipments require the following information where the RAM material used exceeds the limits defined in 11.3.10.1:

(a) The statement "No Label Required" (see 10.2.2 g.).
(b) Statement of certification (see 10.2.2 h.).
(c) Name of radioisotope (see 10.2.2 b.).
(d) Activity of radioisotope (see 10.2.2 c.).
(e) Proper name of RAM (see 11.3.13).
(f) Transport group (see 10.2.2 a.).

11.3.10.1 Non-radioactive material (minimum requirements). Materials and commodities in which the calculated specific activity is not greater than 0.002 microcuries per gram of material (see section B), and in which the radioactivity is essentially uniformly distributed, are not considered to be radioactive materials and marking and labeling requirements are not applicable (49 CFR 173.389(e)).



NOTES:

1. Modification of the figure above is authorized as provided for in the applicable commodity specification and technical data package.
2. Symbol, words, and background for "caution" to be magenta or purple.
3. Background and "caution" to be yellow.
4. Cross out the one that is not applicable.
5. Cross out the two terms that are not applicable.
6. AEC license number is that issued to agency having logistical responsibility by Atomic Energy Commission.
7. For an explanation of this requirement, see 8.2.
8. For an explanation of this requirement, see MIL-STD-1458.

FIGURE 6. Use and storage label.

11.3.10.2 Exemptions. The following radioactive materials and commodities shown in table IX are exempt from specification packaging, marking, and labeling and are exempt from 11.3.6 (49 CFR 173.393), except for the name of contents as required by paragraph 11.3.13, and provided the following conditions are met:

a. Radioactive materials in normal form.

(1) The limits in table IX for small or exempt quantities are not exceeded:

(2) The materials are packaged in strong, tight shipping containers such that there will be no leakage of radioactive materials under conditions normally incident to transportation.

(3) The shipping container shall be such that the radiation dose rate at any point on the external surface of the shipping container does not exceed 0.5 millirem per hour.

(4) There shall be no significant removable radioactive surface contamination on the exterior of the shipping container. (See 10.4.)

(5) The outside of each inner container must be marked "Radioactive." or "Radioactive - LSA" as appropriate.

TABLE IX. Activity limits for small quantities, devices, and low specific activity materials.

Transport group	Small or exempt quantities	Radioactive Commodities (Devices) maximum quantities		Low specific activity materials
		Per device	Per package	
I	0.01 mCi	0.0001 Ci	0 0.001 Ci	0.0001 mCi/gm
II	0.1 mCi	0.001 Ci	0.05 Ci	0.005 mCi/gm
III	1 mCi	0.01 Ci	3 Ci	0.3 mCi/gm
IV	1 mCi	0.05 Ci	3 Ci	0.3 mCi/gm
V, VI	1 mCi	1 Ci	1 Ci	---
VII	25 Ci	25 Ci	200 Ci	---
Special form	1 mCi	0.05 Ci	20 Ci	---
Tritium oxide (in aqueous solution)	0.5 mCi/ml (3 Ci/package limit)	---	---	---
Fissile Material	15 grams (U-235)	---	15 grams	---

b. Radioactive commodities (devices): This includes manufactured articles such as instruments, clocks, electronic tubes or apparatus, or similar devices having radioactive materials (other than liquids) in a nondispersible form as a component part, are exempt from specification packaging, marking, and labeling, provided the following conditions are met. (49 CFR 173.391b).

NOTE: For radioactive gases, the requirement for the radioactive material to be in a nondispersible form does not apply.

(1) The limits in table IX for Radioactive Commodities (devices) are not exceeded.

(2) Radioactive materials are securely contained within the devices, or are securely packaged in strong, tight shipping containers, so that there will be no leakage of radioactive materials under conditions normally incident to transportation.
(3) The radiation dose rate at four inches from any unpackaged device does not exceed 10 millirem per hour.
(4) The radiation dose rate at any point on the external surface of the package may not exceed 0.5 millirem per hour. However, for exclusive use shipments only, the radiation at the external surface of the package or the item may exceed 0.5 millirem per hour, but must not exceed 2 millirem per hour.
(5) There must be no significant removable radioactive surface contamination on the exterior of the shipping container. (See 10.4. and 49 CFR 173.397).
(6) The outside of the inner container must bear the marking "Radioactive."

c. Radioactive commodities containing uranium. A manufactured article, other than reactor fuel elements, in which the only radioactive material is metallic natural or depleted uranium or natural thorium or alloys thereof, is exempt from DOT specification packaging, marking, and labeling, and is exempt from 11.3.6 (49 CFR 173.393) if the following conditions are met:

(1) The radiation dose rate at any point on the external surface of the shipping container does not exceed 0.5 millirem per hour.
(2) There shall be no significant radioactive surface contamination of the exterior of the package (see 10.4 or 49 CFR 173.397).
(3) The total radioactivity content of each article must not exceed 3 curies.
(4) The outer surface of the uranium or thorium is enclosed in a non-radioactive, sealed, metallic sheet.

11.3.11 Radioactive material label requirement. Each package or shipping container of radioactive material, unless exempted under paragraph 11.3.10.2 (49 CFR 173.391 - 49 CFR 173.392) of this handbook, shall be labeled with distinctive warning labels affixed to opposite sides of the package. The labels are described below and shown in figures 6 and 7. The labels alert persons handling packages that the package may require special handling. If the background color of the label is all white, the radiation is minimal and nothing special is required for that package. If, however, the background of the upper half of the label is yellow, a radiation label requiring consideration may exist at the outside of the package and an indication of what controls must be exercised for that package is related to the transport index concept. If the package bears a yellow label, with three stripes, the rail or highway vehicle in which it is carried must be placarded. Placarding is discussed in more detail in paragraph 11.3.12. The requirements for the use and storage label (figure 6) are specified under paragraph 11.2. The requirements for the three DOT radioactive material labels (figure 7) shall be determined by the transport index or other considerations as follows (summarized in table X). See 8.1.2.6 for NRC requirements.

11.3.11.1 Radioactive white-I label (figure 7). Each shipping container or package not exceeding 0.5 millirem per hour at any point on the external surface of the shipping container and provided it does not contain a large quantity of radioactive material (see definitions), shall bear a radioactive white-I label. This label is not authorized for Fissile Classes II and III shipping containers.

11.3.11.2 Radioactive yellow-II label (figure 7). Radioactive yellow-II labels shall be affixed to:

a. Each shipping container or package measuring more than 0.5 but not exceeding 50 millirem per hour at each point on the external surface of the shipping container and not exceeding 1.0 millirem per hour at 3 feet from each point on the external surface of the shipping container; or

b. Each fissile class II package or shipping container for which the transport index does not exceed 1.0 at any time during transportation.

11.3.11.3 Radioactive yellow-III label (figure 7). Radioactive yellow-III labels shall be used when either of the limits in 11.3.11.2 is exceeded. In addition, the following types of packages or shipping containers shall also bear this label:

a. Each Fissile Class III shipping container.
b. Each package or shipping container containing a large quantity of radioactive material as defined herein.
c. Each package or shipping container being transported under a permit.

TABLE X. Radioactive material label requirements.

Label	Exposure rate limits: At any point on accessible surface of package (millirem/hour)	Exposure rate limits: At 3 feet from external surface of package (millirem/hour)
"RADIOACTIVE-WHITE I"	0.5	0
"RADIOACTIVE-YELLOW II"	0.5-50	1.0
"RADIOACTIVE-YELLOW III"*	>50	>1.0

*Requires vehicle placarding
(This label mandatory for any fissile Class III or large quantity package regardless of dose rate levels.)

11.3.11.4 Mixed hazardous materials. Radioactive materials having other hazardous characteristics must also be labeled with other labels as required according to the hazards of the commodity. For example:

a. Packages containing the solid nitrates of uranium or thorium must bear both a "radioactive" label and a "yellow" oxidizing materials label.
b. Packages containing nitric acid solutions of radioactive materials must bear both a "radioactive" label and a "white" corrosive acid label.

11.3.11.5 Empty container label. The "empty label" as illustrated in figure 8 shall be applied to shipping containers which have been emptied and on which the old labels have not been removed, obliterated, or destroyed. They shall be so placed on the shipping container as to completely cover the old labels. Labels for empty containers must be not less than 6 inches on each side, white in color, and printed in letters not less than 1 inch high in black ink.

11.3.11.6 Placarding. The shipper or carrier must apply the appropriate placard to the transport vehicle (rail or highway) if a radioactive material package or container on board bears a "Radioactive Yellow-III" label (figure 7). The format for these placards is illustrated in figures 9 and 10. (See 9.1 and 49 CFR 172.500,)

11.3.12 Shipper's labeling requirements. The following shipper's requirements pertaining to labels are in addition to special requirements listed under 9.1.1 herein:

a. Shippers must furnish and attach the labels prescribed for their packages. Labels should be applied to that part of the package bearing consignee's name and address.

b. Labels must not be applied to packages containing articles which are not subject to 49 CFR 170-189 or are exempted therefrom. (See 11.3.10.2.). However, this paragraph does not prohibit the use of labels required on packages destined for transportation by air (11.6.4).

c. Shippers must not use labels which by their size, shape, and color, may readily be confused with the standard caution labels prescribed in this part.

d. Labels must conform to standards as to size, printing, and color, and samples will be furnished, on request, by the Bureau of Explosives.

e. A combination diamond-shaped label-tag of proper size and color, bearing on one side the shipping information and on the reverse side the wording prescribed in this part, will be permitted.

f. The carrier's name and stationery form number, or the shipper's name and address, may be printed on the labels, in type not larger than 10 point, if placed within the blackline border and in the upper or lower corner of the diamond.

g. Each package of radioactive material (except when exempted) requiring a radioactive (white I, yellow II, or yellow III) label shall be labeled with two such labels, affixed to opposite sides of the package. The method of determining which label to use is discussed in 11.3.11.

h. Labels which conform to the model prescribed in the regulations of the International Atomic Energy Agency, and which are similar in appearance to the labels prescribed herein (although the inscriptions on the labels may be in a foreign language) are authorized in place of the labels prescribed herein for import or export shipments only.

i. A person who offers for transportation a package containing hazardous material shall conspicuously label it in compliance with the requirements of 49 CFR 172. The applicable information as required in any blank spaces on the label must be inserted by legible printing, using a durable, waterproof means of marking. Labels should be applied to that part of the package bearing the consignee's name and address.

j. The following requirements apply to completion of the items of information in the blank spaces of the labels specified in this section:

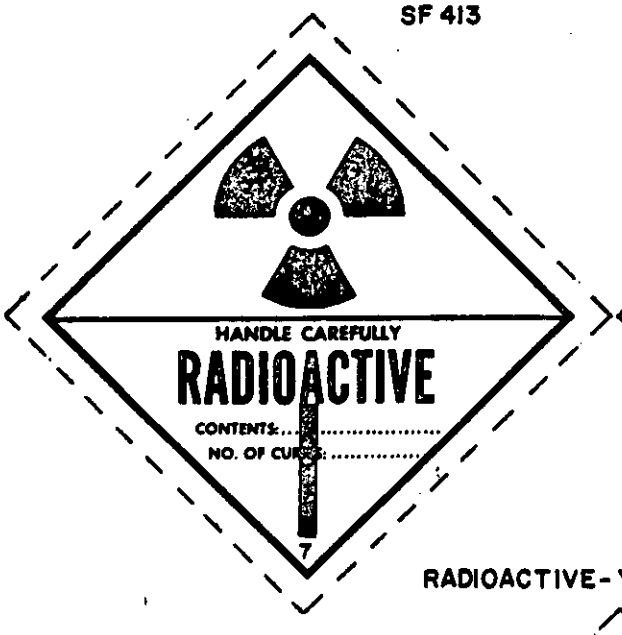
(1) "Contents". The name of the radionuclide, as taken from the listing of radionuclides in Section A (symbols which conform to established radiation protection terminology are authorized, i.e., Mo. Co, etc.). For mixtures of radionuclides, the most restrictive radionuclides on the basis of radiotoxicity must be listed as space on the label allows.

(2) "Number of curies". Units shall be expressed in appropriate curie units, i.e., curies (Ci), millicuries (mCi) or microcuries (μCi) (abbreviations are authorized). For a fissile material, the weight in grams or kilograms of the fissile radioisotope may also be inserted.

(3) "Transport index". (See definitions and Section A.)

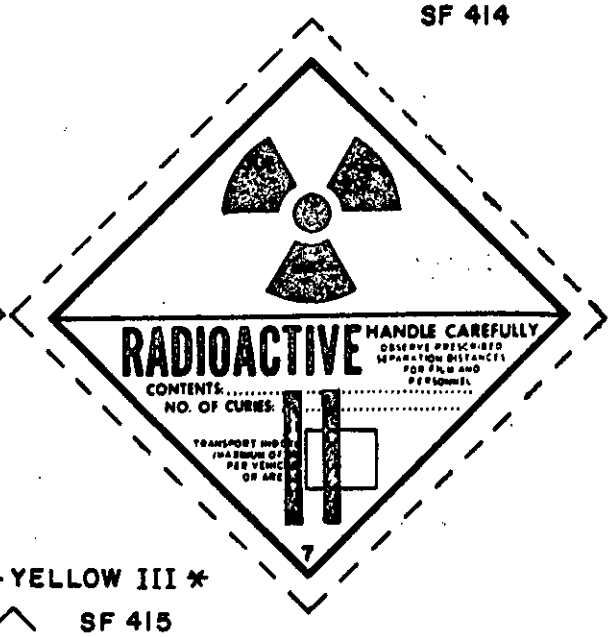
RADIOACTIVE-WHITE I

SF 413



RADIOACTIVE-YELLOW II

SF 414

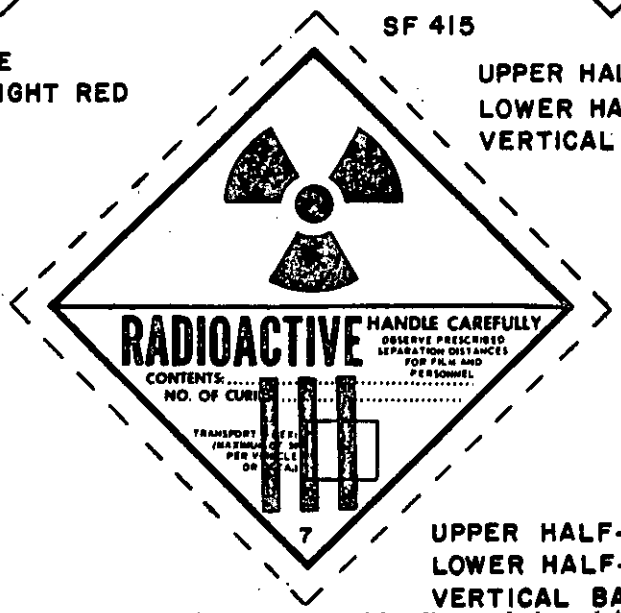


RADIOACTIVE-YELLOW III *

SF 415

BACKGROUND--WHITE
VERTICAL BAR--BRIGHT RED

UPPER HALF--BRIGHT YELLOW
LOWER HALF--WHITE
VERTICAL BARS--BRIGHT RED



UPPER HALF--BRIGHT YELLOW
LOWER HALF--WHITE
VERTICAL BARS--BRIGHT RED

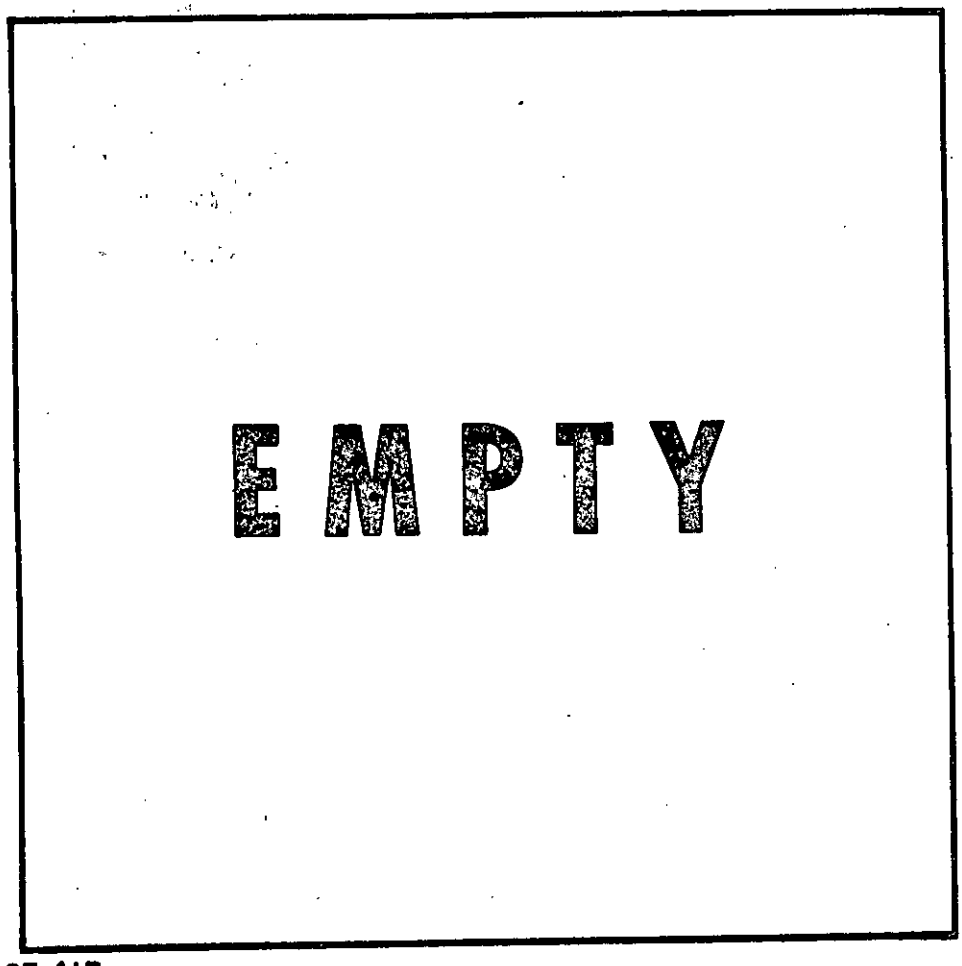
LABEL REQUIREMENTS: All labels must be diamond shaped 4.00 inches (101.6 mm) long on each side with black printing inside a black border at least 3.50 inches (88.9 mm) on each side.

* Vehicle placarding (rail or highway) requirement is keyed to this label.

NOTES:

1. The bottom half of the above labels may be printed in the language of the country of origin.
2. The United Nations hazard class number "7" must be black, approximated .25 inch (6.4 mm) high.
3. The above described labels are mandatory for use after January 1, 1975.

FIGURE 7. Radioactive material labels (UN class 7).



SF 417

Labels for empty containers must be not less than 6.00 inches (152.4 mm) on each side, white in color, and printed in letters not less than 1.00 inch (25.4 mm) high in black ink.

FIGURE 8. Empty container label.

MIL-HDB

Pg: 49

50

Pg. 50

11.3.13 Additional shipper's requirements. These requirements summarize the shipper's requirements specified herein (see 9.1.1 and 11.3.11.6). After selecting the proper packaging for the specific contents, and having considered the radiation level limits, contamination limits, and the label requirements, the shipper must also check for compliance with the following:

a. Other package markings - The outside of the package must also be marked with the appropriate specification number (see 49 CFR 173.24 (c)(i)) or special permit number, if applicable, and also with the proper shipping name as shown in the commodity list (see 49 CFR 172.101. The most commonly used proper shipping names for radioactive materials are listed in table XI:

TABLE XI. Principal commodity descriptions (proper shipping names) for radioactive materials (R.A.M.) (from 49 CFR 172.100).

Radioactive materials, small quantities	(see 49 CFR 173.391(a))
Radioactive devices	(see 49 CFR 173.391(b))
Fissile radioactive materials	(see 49 CFR 173.396)
Radioactive materials, low specific activity (L.S.A.)	(see 49 CFR 173.392)
Radioactive materials, special form	(see 49 CFR 173.394)
Radioactive materials, N.O.S.	(see 49 CFR 173.395)

b. Shipping papers - Certain essential elements of information must also be included on the shipping paper description (see 10.2.3). These requirements also apply to packages containing small quantities and radioactive commodities (11.3.10.2) except that the notation "No Label Required" must be entered in lieu of the type of label applied.

c. Shipper's certification - The shipping papers must include a certificate signed by the shipper, which reads as specified in paragraph 10.2.3.1.

d. Security seal - The outside of each radioactive materials package must incorporate a feature such as a seal, which is not readily breakable and which, while intact, will be evidence that the package has not been illicitly opened (49 CFR 173.393 (b)). For this requirement, some ingeniuty may be called for on the part of the package designer, especially on such packages as fiberboard cartons and wooden boxes. The regulations also require that "inner shield closures must be positively closed to prevent loss of contents." In connection with these requirements, the sorry experience of the past has proven that too often an attempt has been made by shippers to utilize a padlock as both a security seal and a closure mechanism. Most padlocks, however, are not even a good security seal, let alone a closure device, because it is usually not possible with most types of padlocks to ascertain if they have been illicitly opened. Such combinations as serially numbered lead wire seals, in combination with such closure mechanisms as slotted screw-in plugs, bolted flanges, and positive-action shutter mechanisms are usually the best approach toward meeting the dual requirements.

e. Smallest dimension - The smallest outside dimension of any radioactive materials package must be four inches or greater (49 CFR 173.393 (c)).

f. Liquid packaging provisions (49 CFR 173.393 (g)) - Liquid radioactive material must be packaged in or within a leak-resistant and corrosion-resistant inner container. In addition, (1) the packaging must be adequate to prevent loss or dispersal of the radioactive contents from the inner container, if the package were subjected to the 30-foot drop test prescribed in 49 CFR 173.398(c)(2)(i); or (2) enough absorbent material must be provided to absorb at least twice the volume of the radioactive liquid contents. The absorbent material may be located outside the radiation shield only if it can be shown that if the radioactive liquid contents were taken up by the absorbent material the resultant dose rate at the surface of the package would not exceed 1,000 millirem per hour. Care should be exercised by the package designer to assure that the positioning of the absorbent material about the liquid-containing vessel is such that the "absorber will absorb" in the event of leakage from the vessel.

g. Surface temperature of package - Maximum surface temperature limits on packages, resulting from radioactive thermal decay energy of the contents are prescribed in 49 CFR 173.393 (e). The limit is either 122°F. or in the case of full load or sole-use shipments, 180°F.

h. Quality assurance requirements (49 CFR 173.393(m) and (n)) - The regulations also prescribe certain quality assurance requirements before the first shipment of a radioactive materials package and before each shipment of a package. With regard to packages of liquids containing in excess of type A quantity, destined for shipment by air, an additional requirement (49 CFR 173.393(n)(7)) is imposed such that the containment system of each package offered for shipment must be tested to assure that it will remain leak-free in a specified ambient reduced atmosphere (0.5 atmosphere).

11.3.14 Carrier requirements in handling of radioactive materials packages. Up to this point, this handbook has been concerned principally with the regulatory requirements applicable to the shipper, or in some cases indirectly to the package designer. The reason for this is simple. Most of the regulatory requirements for the assurance of safety are through proper packaging. It follows, therefore, that the majority of these requirements will be ones which must be met by the shipper. The principal carrier responsibilities in transport of radioactive materials are as follows: (See 9.1.2 herein.)

a. Certification by shipper - CArriers may not accept for transport any packages of radioactive materials which have not been properly certified by the shipper pursuant to 49 CFR 173.204. This certificate is relied upon by the carrier, as evidence that the packaging is in accordance with the regulatory requirements. In the case of air shipments, one signed copy of the shipper's certificate must accompany the shipment, with the originating air carrier retaining a second copy.

b. Placarding - The carrier must apply the appropriate placard to the transport vehicle (rail or highway) if any RAM package on board bears a "Radioactive Yellow - III" label. The format for these placards is specified under paragraph 11.3.11.6.

c. Stowage control by maximum transport index (see 11.3.6.1) - The carrier must assure that the total transport index does not exceed 50 for any group of "Yellow-labeled" packages in a single transport vehicle or storage location, and further he must assure that such groups of yellow-labeled packages are kept separated from undeveloped film shipments and areas continuously occupied by

persons, in accordance with a table of storage time vs. the graded total transport index.

d. Reporting of incidents (see 9.3) - The carrier must assure that the shipper and the DOT are notified in the event of fire, accident, breakage, or suspected radioactive contamination involving shipment of RAM and also that vehicles, areas, or equipment in which RAM may have spilled, are not placed in service again until they have been surveyed and decontaminated.

The reporting requirement cited above is not necessarily a means of receiving technical assistance in radiological monitoring in the event of a transportation incident. To obtain such assistance any person may call upon the services of the IRAP (Interagency Radiological Assistance Plan). The map of regional coordinating offices and telephone numbers for radiological assistance and geographical areas of responsibility is available from the DOT. Since its inception, over 10 years ago, the IRAP has served to assist many persons in obtaining technical guidance in coping with radiation emergencies. The IRAP organization works closely with other state, Federal, Military, and regional groups in integrating the technical capabilities of those groups.

e. Shipping papers (10.2.3) - Carriers must prepare and carry with the shipments the appropriate shipping papers based on the information derived from the shipper's shipping papers. For water shipments, a Dangerous Cargo Manifest and storage plan is also required.

f. Notification to pilot (for aircraft shipments) see 11.6.3 - The aircraft operator must notify the pilot in command of the aircraft of the name, type of label, quantity, and location of any "hazardous material," such as radioactive materials packages. The cargo load manifest must be conspicuously marked to indicate the presence of such packages (49 CFR 175.33).

11.3.15 Discussion of more frequently noted discrepancies in radioactive materials shipments. This discussion is intended to serve as an aid to both shippers and carriers by making them more aware of the nature of the more frequently observed items of noncompliance in radioactive materials shipments. Such items are generally either of a safety related nature, i.e., improper packaging, excessive radiation or contamination, or an administrative nature, i.e., improper shipping paper description, illegible labels, etc.

a. By shippers.

(1) Excessive radiation levels (49 CFR 173.389(i)) - Fortunately, this item is not noted frequently. It does, however, rank along with improper packaging, as the most serious type of shipper violation of the safety requirements for transportation of radioactive materials. Excessive radiation levels on packages of radioactive materials are generally the result of either of two causes:

a. An excessive quantity of material in the package relative to the shielding capability of the package design; or
b. A failure to properly secure a shielded closure mechanism, a faulty closure mechanism, etc.

For "special form" radioactive sources the hazard then becomes one of excessive radiation levels. For dispersible, non-"special form" radioactive materials, the

hazard may then be due to both excessive radiation and possible dispersal of loose contamination. In some cases, it has been noted that suppliers of radioisotopes of very short half-life will place into their packages at the time of loading more than the total quantity allowed for shipment with the view that at the time of actual shipment, the radiation levels will be within the limits, due to radioactive decay. Such a practice can, of course, result in a violation if the package is offered for shipment too soon, with the radiation level not having decayed to the point of being within the limits.

(2) Improper packaging - This, of course, is also a most serious safety item and is closely related to the excessive radiation level in that an improper package may be one which does not incorporate sufficient thickness of shielding for the quantity of material involved. Improper packaging also may result from not using a container as authorized in the regulations or under a DOT Special Permit.

Even when an approved package is utilized, however, if it is not in its proper condition as required by its design, safety may be affected. Good quality control practices by shippers of radioactive materials are paramount. A relevant requirement of 49 CFR 173.22 reads as follows:

> "... the shipper shall be responsible to determine that shipments of hazardous materials are made in containers which..., have been made, assembled with all their parts or fittings in their proper place, and marked in accordance with applicable specifications..."

On some types of packages, i.e., steel drums, hinged lid boxes, etc., provision for a security seal is fairly simple. On many other types, i.e., wooden boxes, fiberboard cartons, much more thought and ingenuity in designing of a seal to meet the requirements will be necessary. The use of padlocks as a security seal may not, in all cases, be appropriate since many types of padlocks may be illicitly opened and closed again without knowledge of the consignee.

(3) Improper labels - Incorrect labeling of radioactive materials packages is a common deficiency. The most frequent error is "overlabeling," i.e., the use of a yellow-III label where a white-I or yellow-II label would have been adequate. When done too often, such "overlabeling" can cause a loss in the distinction which is intended to be implied by the graded series of the three labels which are used to indicate the degree of control the package requires.

(4) Illegible/incorrect label notations - This item should speak for itself. Needless to say, shippers should exercise care to insert legible, durable entries on the labels. These entries call for noting the "contents," "number of curies," and "transport index." In future rule making, more precise guidance is planned on this aspect. In the meantime, the entry of "n.o.s." for "not otherwise specified" under "contents" is totally inappropriate. The name of the isotope must be entered, as taken from the list of radionuclides in 49 CFR 172.101. Also, care should be taken to clearly indicate in the "number of curies" entry whether the quantity is in terms of curies, millicuries or microcuries. Finally, the "transport index must be rounded up to the next highest tenth as prescribed in 49 CFR 173.389(i).

(5) Improper or incomplete shipping paper description - The basic requirements for the shipping paper description are prescribed in 49 CFR 172.200 (see 10.2.2). The first entry on the shipper's bill of lading should always be the applicable "proper shipping name" as taken from the commodity list in 49 CFR 172.101. Any other description or information not inconsistent therewith may follow. However, there are at present only eight different proper shipping names for radioactive materials in the commodity list. The six most commonly used are listed in table XI. The appropriate one of these must be used. Care should be exercised to properly enter the other information as required by 49 CFR 172.200). In the shipper's certification, care should further be exercised to add the notation that the shipment meets the requirements for passenger-carrying aircraft, when applicable.

(6) Inadequate provision for liquid contents - The regulations prescribe certain additional packaging requirements for liquid radioactive materials. As required by 49 CFR 173.393(g), these are basically either of two options, i.e., a "performance" requirement wherein the package must withstand a 30-foot drop test without loss of liquid contents, or absorbent material must be used to absorb the liquid contents in event of breakage of the primary liquid container.

In meeting the overall provision, if the liquid absorbent option is not utilized, the shipper is then responsible to properly evaluate the liquid "contaminant system" of his specific packaging against the "performance" requirement option. Such shipper should be prepared to demonstrate the method in which he has determined that his packaging complies with this requirement.

b. By carriers:

(1) Acceptance of consignments without shipper's certification - Each of the carrier regulations (49 CFR 172.204, 176.27) prescribe a requirement that shipments of regulated hazardous materials may not be accepted by a carrier unless accompanied by the appropriate certification by the shipper that the packages have been packaged, marked, and labeled in accordance with the regulations. This certification must be signed by the shipper and it is his legal representation to the carrier that the safety requirements of the shipment are in order. Needless to say, carriers must refuse acceptance of hazardous materials shipments which are tendered to them without this certification.

(2) Failure to prepare proper shipping paper description - Each of the carrier regulations (49 CFR 172.200, 176.24) require that carrier's manifests, waybills, etc., carry the appropriate proper shipping name and an indication of the type of label applied or the notation "no label applied," when applicable. In many cases, carriers in preparing their shipping papers, do not properly transpose these essential items of information from the shipper's papers.

(3) Acceptance of radioactive materials consignments exceeding the 50 transport index maximum per vehicle - In many cases carriers either do not appear to be aware of this limitation or fail to follow it. Concurrent with this requirement, each of the carrier regulations contain a table which prescribes certain stowage distances and in certain cases stowage times for accumulations of radioactive materials packages, based on the total transport index. These stowage controls are intended to provide the necessary segregation distance of packages from areas occupied by persons or photographic film. An increased effort is needed by carriers to more completely train and educate their personnel in this requirement.

(4) Failure to placard transport vehicles - For any rail or highway vehicle transporting any quantity of radioactive materials packages bearing the radioactive yellow-III label, the carrier is required to display the appropriate placard (49 CFR 172.203 (49 CFR 172.203(j). Intentional failure to placard vehicles so as to avoid certain bridge, turnpike, tunnel or other travel restrictions is a very serious offense.

11.4 Transportation by water carrier (49 CFR 176). The regulations and requirements for transportation of radioactive materials and commodities by water carrier are in general identical to the requirements specified herein, with the following additions or exceptions: (These were formerly included in 46 CFR 146.19, but were revoked effective July 1, 1976.)

11.4.1 Shipping papers. Shipping paper requirements for shipments by water are almost identical to the requirements for shipments by rail or highway (see 10.2.3). The regulations are divided into requirements for domestic shipments, export shipments, and import shipments. The two significant differences are as follows: First, for other than domestic shipments, when the proper shipping name of a hazardous material is an "N.O.S." (Not Otherwise Specified) entry in the list of hazardous materials (49 CFR 172.10), this description must be qualified by the "chemical name of the commodity" in parenthesis, e.g. "Corrosive liquid, n.o.s." (caprylyl chloride). Secondly, in connection with the entry (on the shipping documents) of each hazardous material, the description is required to include the kind and color of label applied to the package when the label is required.

11.4.2 General stowage requirements aboard vessels. The following requirements for water carriers are in addition to those listed under 11.3 for rail or highway carriers (49 CFR 176.700):

a. Packages or containers bearing the radioactive white or radioactive yellow labels shall be kept separated from living accommodations and from spaces that may be continually occupied by persons, except those exclusively reserved for couriers specially authorized to accompany such shipments. Packages bearing the radioactive yellow label shall be separated from persons and undeveloped photographic and radiographic films in accordance with table XII. (Mail bags shall be assumed to contain undeveloped film and separated from radioactive materials as for film.) The sum of the transport indexes for the shipment is the arithmetic total of the transport indexes of of each package as stated on the label.

b. The number of packages bearing the radioactive-yellow label shall be so limited that the sum of the transport indexes does not exceed 200 in any one ship unless authorized by the Commandant. In addition to complying with the segregation distance in paragraph (a) of this section, no single group of packages shall have a total Transport Index of more than 50 and each such group shall be handled and stowed not closer to any other group than 20 feet. The requirements of this paragraph do not apply to low specific activity materials as defined in a compact stack nor need they apply in case of a full load where the consignor has the exclusive use of the whole vessel, providing that the transport indexes of Fissile Class II packages aboard the vessel do not exceed 50.

c. Packages of radioactive materials which are significant heat sources shall not be overstowed with any other cargo. If stowed below decks, the hold or compartment in which stowed must be ventilated.

d. For radioactive materials shipments requiring supplementary operational procedures, the package shall be stowed in an accessible location and the necessary operational instructions furnished to the vessel's master.

e. Fissile Class III shipments shall be separated by at least 20 feet from other packages bearing radioactive-yellow labels during handling and stowage.

f. All containers of radioactive materials shall be carried by the handles when handles are provided.

g. When "On Deck in open" stowage is permitted for any substances by DOT regulations, it shall apply only to the substances when packaged in authorized, waterproof packagings.

h. No person shall remain unnecessarily in a hold or compartment or in the immediate vicinity of a deck cargo space containing radioactive materials. The shipper shall furnish the carrier with such information and equipment as is necessary for the protection of the carrier's employees, stevedores, or other persons engaged in the handling of such cargo. In no instance shall any person who must necessarily remain in a hold, compartment, or deck cargo space containing radioactive material be exposed to a total of more than 100 millirem in any 7-day period. Provided further, that a maximum whole body dose of 500 millirem per year is not exceeded. The radiation level in any space or area on board continuously occupied by passengers, crew, or shipments of animals shall not exceed 0.5 millirem per hour at any time during transportation.

11.4.3 Segregation from other cargoes.

a. Radioactive materials shall not be stowed in the same hold or compartment with Class A, Class B, or Class C explosives, flammable gases, flammable liquids, oxidizion materials, flammable solids, corrosive liquids, or cotton.

b. Radioactive materials shall be stowed away from (i.e., with intervening cargo or ship's structure) nonflammable gases and foodstuff.

c. Radioactive materials shall be separated from mail and undeveloped films in accordance with 11.4.2.a.

11.4.4 Care following leakage or shifting of radioactive materials.

a. In case of fire, collision, or breakage involving shipments of radioactive materials, other than the materials of low specific activity, the package or material shall be segregated from unnecessary contact

TABLE XII. Safe distance for persons and undeveloped films.

Sum of transport indexes of the packages	Minimum distance in feet from living accommodation or regularly occupied working space				Minimum distance 1/ in feet from undeveloped films or plates									
					Less than 24-hour voyage	24 up to 48-hour voyage	Over 2 up to 4-day voyage				Over 4 up to 9-day voyage			
	A	B	C	D	A	A	A	B	C	D	A	B	C	D
0 through 0.5	10	10	10	10	3	5	10	10	10	10	15	10	10	10
Over 0.5 through 1.0	10	10	10	10	5	7	15	10	10	10	20	10	10	10
Over 1.0 through 2.0	10	10	10	10	7	12	20	10	10	10	25	15	10	10
Over 2.0 through 5.0	10	10	10	10	12	16	35	10	10	10	40	15	10	10
Over 5.0 through 10.0	15	10	10	10	16	25	40	15	10	10	55	20	10	10
Over 10.0 through 25.0	25	10	10	10	25	35	65	20	10	10	100	30	10	10
Over 25.0 through 50.0	40	15	10	10	35	50	90	30	10	10	145	45	10	10
Over 50.0 through 100	60	20	10	10	50	70	140	45	10	10	210	65	10	10
Over 100 through 200	80	25	10	10	70	100	190	55	10	10	285	85	15	10
Over 200 through 300 2/	110	30	10	10	90	125	230	70	10	10	320	105	15	10
Over 300 through 400 2/	130	35	10	10	100	145	260	80	15	10	360	120	20	10

Sum of transport indexes of the packages	Minimum distance 1/ in feet from undeveloped films or plated - Con.															
	Over 9 up to 16-day voyage				Over 16 up to 25-day voyage				Over 25 up to 36-day voyage				Over 36 up to 49-day voyage			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
0 through 0.5	20	10	10	10	20	10	10	10	25	15	10	10	30	15	10	10
Over 0.5 through 1.0	25	15	10	10	30	15	10	10	35	20	10	10	45	20	10	10
Over 1.0 through 2.0	35	15	10	10	45	20	10	10	55	25	10	10	65	30	10	10
Over 2.0 through 5.0	60	20	10	10	70	25	10	10	90	30	10	10	100	35	10	10
Over 5.0 through 10.0	85	30	10	10	110	35	10	10	135	40	10	10	155	45	10	10
Over 10.0 through 25.0	140	45	10	10	170	50	10	10	200	60	10	10	230	70	10	10
Over 25.0 through 50.0	195	60	10	10	240	70	10	10	275	85	15	10	315	105	15	10
Over 50.0 through 100	270	85	15	10	320	95	15	10	360	115	20	10	400	145	20	10
Over 100 through 200	325	110	20	10	400	145	20	10	450	180	25	10	500	170	30	10
Over 200 through 300 2/	400	145	25	10	460	175	25	10	500	220	30	10	(3/)	240	35	10
Over 300 through 400 2/	450	165	30	10	500	200	30	10	(3/)	235	35	10	(3/)	270	40	10

See notes on following page.

1/ Column A applies when no intervening cargo or bulkheads screen the radioactive material from the living accommodation or undeveloped photographic film or plate. Column B applies when the radioactive material is to be surounded by at least 2 feet of cargo of unit density and at least 1 steel bulkhead between the radioactive material and the living accommodation or undeveloped photographic film or plate.

Column C applies when radioactive material is to be surrounded by at least 6 feet of cargo of unit density and at least 2 steel bulkheads between the radioactive material and the living accommodation or undeveloped photographic film or plate.

Column D applies when the radioactive material is to be surrounded by at least 14 feet of cargo of unit density and at least 2 steel bulkheads between the radioactive material and the living accommodation or undeveloped photographic film or plate.

"Cargo of unit density" means cargo stowed at a density of 1 ton per 36 cubic feet (1 ton metric per cubic meter). Where the density of the cargo is less than this, the depth of the cargo specified in this note for columns B, C, and D (i.e., 2 feet, 6 feet, and 14 feet) must be increased in proportion.

"Minimum distance" means the least distance in any direction, whether vertical or horizontal.

2/ The total consignment on board at any time must not exceed transport indexes totaling 200 without prior authorization by the Commandant (see 46 CFR 146.19-35(b)).

3/ Not to be carried unless screening by other cargo and bulkheads can be arranged in accordance with columns B, C, or D.

with personnel. In case of obvious leakage, or if the inside container appears to have been damaged, the section (hold, deck area, or compartment) containing this cargo must be isolated as much as possible, and care should be taken to prevent radioactive material from entering the body through contact, inhalation, or ingestion. No person shall be allowed to handle the material or to remain in the vicinity until qualified personnel are present to supervise. In any incident in which radioactive materials are involved in fires or are damaged, the shipper and the District Commander of the U.S. Coast Guard, or his authorized representative as prescribed by(see 9.3.1) 49 CFR 171.15 of this chapter, having supervision over the port or place where the vessel is located or bound, shall be notified immediately.

(b) Holds and compartments used for the transport of low activity materials as full loads or in which leakage of radioactive materials has occurred because of fire, collision or breakage, shall not be used for other goods until decontaminated as specified in 10.4 and Appendix 1 of this handbook.

11.5 Transportation by the United States Postal Service (39 CFR 124.2e and Publication 6). The regulations and requirements for transportation of radioactive materials and commodities by parcel post or mail carrier are in general identical to and conform to the requirements 49 CFR and 11.3 herein, under the conditions of 11.5.1 and 11.5.2.

11.5.1 Nonmailable matter. Any package of radioactive matter bearing any of the Department of Transportation's Radioactive white-I, Radioactive yellow-II, or Radioactive yellow-III labels (see 11.3.11) or which contains quantities of radioactive material in excess of those authorized under 11.3.10 is nonmailable. These labels are illustrated in figure 7.

11.5.2 Mailable matter. Authorized mailable radioactive materials include only those which are classified as "small quantities" of radioactive materials or radioactive devices, as prescribed in 49 CFR 173.391. These authorized materials, the maximum quantities mailable, and the conditions under which they may be mailed are described in table IX and 11.3.10.2 herein.

NOTE: Radioactive Commodities shall not be entered into the U. S. Postal System except when approved by the cognizant transportation officer of the specifiec shipping activity.

11.6 Transportation by aircraft (49 CFR 175). The regulations and requirement for transportation of radioactive materials and commodities by aircraft are, in general identical to and conform to the requirements specified herein for highway or rail carrier, with the following additions or exceptions:

11.6.1 Exceptions. These regulations do not apply to the following:

a. Shipments of radioactive materials via cargo-only aircraft, made by or under the direction or supervision of the U. S. Atomic Energy Commission or the Department of Defense, which are escorted by personnel especially designated by or under the authority of that Commission of Department for the purpose of national security.
b. Shipments of radioactive materials that meet those requirements in 49 CFR 173.391 (see 11.3.10) that exempt them from packaging, marking, and labeling requirements for shipment by rail. (Note: This exception is not valid after May 3, 1977.)
c. Human beings and animals implanted with medical devices (heart pacemaker, etc) that contain radioactive material.

11.6.2 Certification and shipping paper requirements.

a. No shipper may offer, and no person operating an aircraft may knowingly accept, any hazardous material for shipment in an aircraft unless there is accompanying the shipment a clear and visible statement that the shipment complies with the requirements of 49 CFR 172 (see 10.2.3) and (11.3.14). In the case of shipments in passenger-carrying aircraft, the shipper shall also state that the shipment complies with the requirements 49 CFR 172 for carrying hazardous materials (see 11.6.6) in passenger-carrying aircraft. The shipper or his authorized agent shall sign the statement or stamp it with a facimile of his signature. The person operating an aircraft may rely on the shipper's statement as prima facie evidence that the shipment complies with the requirements of DOT.
b. The shipper shall execute the required certificates in duplicate. One signed copy accompanies the shipment and the originating air carrier retains the other signed copy.
c. For the purposes of this Handbook, a passenger-carrying aircraft is an aircraft that carries any person other than a crewmember, company employee, an authorized representative of the United States, or a person accompanying the shipment.

11.6.3 Notification of pilot in command. Whenever articles subject to the provisions of 49 CFR 175 are carried in an aircraft, the operator of the aircraft shall inform the pilot in command, before takeoff, in writing, of the shipping name and the classification of each hazardous material as prescribed in 49 CFR 172.11, the quantity in terms of weight, volume or as otherwise appropriate, and the location of the hazardous materials in the aircraft. The person marking the cargo-load manifest shall mark it conspicuously to indicate the hazardous materials (see 11.3.14), and the results of the inspections required by 49 CFR 175(b), 175.700.

11.6.4 Labeling requirements. Except as otherwise provided the shipper shall label each hazardous material that is acceptable for transportation in air commerce, with the appropriate label required by 11.3.11 herein, even though that article is exempt from from those labeling requirements because of quantity and packing limitations (see 11.3.10.2). Label with "Cargo-aircraft only" label where required.

11.6.5 Quantity limitations. No person may carry aboard an aircraft a number of packages of radioactive materials that make the total transport index number (determined by adding together the transport index numbers shown on the labels of the individual packages) more than 50.

11.6.6 Passenger-carrying aircraft. No person shall carry (or offer for transportation) any radioactive item in a passenger-carrying aircraft (see 11.6.2.c) unless there is a signed printed certificate stating that the radioactive materials involved are intended for use in, or incident to, research, or medical diagnosis or treatment, so long as such materials as prepared for and during transportation do not pose an unreasonable hazard to health and safety and meets the requirements of 49 CFR 175.

11.6.7 Cargo-only aircraft. No person shall carry any radioactive item in a cargo-only aircraft except those items permitted on passenger-carrying aircraft under 11.6.6 above and except items that:

a. Are specified in 49 CFR 172 (see 11.3) as acceptable for shipment by rail express.
b. Do not exceed the maximum quantity for each outside container specified in 49 CFR 172 for rail.
c. Are packaged, marked, and labeled as specified in 49 CFR 173 (11.3) herein for shipment by rail.
d. For the purposes of this part, a cargo-only aircraft is any aircraft that is not a passenger-aircraft.

11.6.8 Special requirements for radioactive materials and commodities. No person may place any package of radioactive materials bearing "radioactive yellow-II" or "radioactive yellow-III" labels in aircraft closer than the distances shown in table XIII to a space (or dividing partition between spaces) which may be continuously occupied by people, or shipments of animals, or closer than the distances shown in table XIII to any package containing undeveloped film (if so marked). If more than one of these packages is present, the distance shall be computed from table XIII on the basis of the total transport index numbers shown on the labels of the individual packages in the aircraft.

TABLE XIII. Radioactive cargo items - Temporary storage requirements.

Total transport index	Minimum separation distances in feet to nearest undeveloped film for various times of transit					Minimum distance in feet to area of persons, or minimum distance in feet from dividing partition of cargo compartment
	Up to 2 hours	2-4 hours	4-8 hours	8-12 hours	Over 12 hours	
None - - - - - -	0	0	0	0	0	0
0.1 to 1.0 - - -	1	2	3	4	5	1
1.1 to 5.0 - - -	3	4	6	8	11	2
5.1 to 10.0 - -	4	6	9	11	15	3
10.1 to 20.0 - -	5	8	12	16	22	4
20.1 to 30.0 - -	7	10	15	20	29	5
30.1 to 40.0 - -	8	11	17	22	33	6
40.1 to 50.0 - -	9	12	19	24	36	7

11.6.9 Special requirements for fissile class III radioactive materials. No person may carry aboard any aircraft any package of fissile class III radioactive material (as defined herein), except as follows:

a. On a cargo-only aircraft which has been assigned for the sole use of the consignor for the specific shipment of fissile radioactive material. Instructions for such sole use must be provided for in special arrangements between the consignor and carrier, with instructions to that effect issued with shipping papers; or
b. On any aircraft on which there are no other packages of radioactive material required to bear one of the "radioactive" labels described in 11.3.11 herein. Specific arrangements must be effected between the shipper and carrier, with instructions to that effect issued with the shipping papers; or
c. In accordance with any other procedure specifically approved by the DOT.

11.7 Requirements for transportation of radioactive commodities by military aircraft (DSAM 4145.3, AFM 71-4, TM38-250, NAVSUP PUB 505, MCO P 4030.19). The regulations and requirements for marking and labeling of radioactive materials and commodities for transportation by military aircraft shall, in general, conform to the requirements of 49 CFR 175 (see 11.6), with the following additional requirements.

11.7.1 Transport index number. (See definitions and 11.3.9.1.) Unless otherwise exempted by 11.3.10.2 herein, the total transport index number of radioactive packages shipped in a single shipment must be noted on all copies of the shipping document. DD Form 1348-1, "DoD Single Line Item Release/Receipt Document", and signed copies of DD Form 1387-2, "Special Handling Data/Certification".

11.7.2 Special handling-data certification form. Unless otherwise exempted by 11.3.10.2 herein, DD Form 1387-2 shall be prepared as shown below for each exempt radioactive item listed herein (see MIL-HDBK-758).

SPECIAL HANDLING DATA/CERTIFICATION PARA 13-4 PAGE 13-5

TRANSPORTATION CONTROL NUMBER	NOMENCLATURE OF ITEM	NET EXPLOSIVE WEIGHT	GROSS WEIGHT
*	RADIOACTIVE DEVICES DOT CLASS – RAM DOT LABEL – EXEMPT	N/A	*
DESTINATION *			

HANDLING INSTRUCTIONS

PROPERTIES: CONTAINS RAM IN NON-DISPERSIBLE FORM.

S/H: HANDLE CAREFULLY TO AVOID BREAKAGE. IF DAMAGE IS SUSPECTED CHECK FOR RADIATION AND HANDLE ACCORDINGLY.

L/S GP 18 NOTE 5

SHIPPER CERTIFICATION: This is to CERTIFY that the contents of the packages in this shipment are properly described by name and are packed, marked, and in proper condition for transportation in accordance with:

☒ SUBPARAGRAPH 13-4d ARM 71-4; TM 38-250, NAVWEPS 16-03-500 AND MCO P4030.19

☐ OFFICIAL AIR TRANSPORT RESTRICTED ARTICLES TARIFF 6, CAB NO. 83

☐ OTHER (Specify)

☒ SHIPMENT WITHIN PASSENGER/CARGO AIRCRAFT LIMITATIONS

SIGNATURE	DATE
*	*

DD FORM 1387-2, 1 APR 66 GPO 891-342 REPLACES EDITION OF 1 APR 63, WHICH MAY BE USED.

*SHIPPER MUST ENTER APPROPRIATE DATA IN BLOCKS INDICATED WITH ASTERISK. This label is applicable when shipping manufactured articles such as instruments, Clocks, Electronic Tubes or Apparatus, or other similar devices, having RADIOACTIVE materials (other than liquid) in a nondispersible form as a component part. The outside of each inner and exterior container must be marked "RADIOACTIVE".

FIGURE 11. Special handling data/certification form.

Custodians:
Army - EL
Navy - YD
Air Force - 85

Review activities:
Army - AV, EA
Navy - AS, MC, EC, SA
Air Force - 03

User activities:
Army - ME, SM
Navy - CG, MC, OS
Air Force - 80

Preparing activity:
DSA - ES

(Project MISC OA05)

SECTION A

RADIOISOTOPE DATA

TRANSPORT GROUPS - EXEMPT QUANTITIES AND CONCENTRATIONS

Section A. This section contains radioisotope (radionuclide) data for marking and labeling radioactive materials or commodities for transportation, use, and storage in accordance with the requirements of the DOT (49 CFR 173.390) and the NRC (10 CFR 20 and 10 CFR 30).

A-1 Transport group requirements. Radioactive materials or commodities that are not exempt from specification packaging, marking, and labeling requirements under the conditions of 11.3.10.2, shall include the appropriate transport group when presented for transportation.

A-1.1 Applicability. The transport groups shown in table A-1 are applicable to the following modes of transportation:

(1)	Rail carrier	(Title 49 CFR 174) (See 11.3)
(2)	Highway carrier	(Title 49 CFR 177) (See 11.3)
(3)	Water carrier	(Title 49 CFR 176) (See 11.4)
(4)	Mail carrier	(Title 39 CFR and Pub. No. 6) (See 11.5)
(5)	Air carrier	(Title 49 CFR 195) (See 11.6)
(6)	Air carrier (military)	(DSAM 4145.3, AFM 71-4, TM38-250, NAVSUPPUB 505, and MCO P 4030.19) (See 11.7)

A-2 Classification by transport groups of radioisotopes. Radioisotopes are listed in transport groups I through VII according to their radiotoxicity and relative potential hazard in transportation.

A-2.1 Transport group I. This group is the most hazardous. Any radioisotope not listed in the table A-1, and which has an atomic number of 82 or over, shall be assigned this group, provided the radioactive half-life is 10 years or less.

A-2.2 Transport group II. Any radioisotope not listed in the table A-1, and which has an atomic number from 1 to 81, shall be assigned this group, provided the radioactive half-life is between 1,000 days and 10 years.

A-2.3 Transport group III. Any radioisotope not listed in the table A-1 and which has:

(1) An atomic number from 1 to 81, shall be assigned this group provided the radioactive half-life is 0 to 1,000 days or over 10 years; or

(2) An atomic number of 82 or over, shall be assigned this group provided the radioactive half-life is over 10 years.

A-2.4 Transport groups IV, V, and VI. No unlisted radioisotope shall be assigned to these groups.

A-2.5 Transport group VII. This group is the least hazardous. No unlisted radioisotope shall be assigned this group.

A-2.6 Transport group for a mixture of radioisotopes. To determine the transport group for a mixture of radioisotopes the following shall apply:

(1) If the identity and respective activity of each radioisotope is known, the permissible activity of each radioisotope shall be such that the sum, for all groups present, of the ratio between the total activity for each group to the permissible activity for each group will not be greater than unity.

(2) If the groups of the radioisotopes are known but the amount in each group cannot be reasonably determined, the mixture shall be assigned to the most restrictive group present.

(3) If the identity of all or some of the radioisotopes cannot be reasonably determined, each of those unidentified radioisotopes shall be considered as belonging to the most restrictive group which cannot be positively excluded.

(4) Mixtures consisting of a single radioactive decay chain where the radioisotopes are in the naturally occurring proportions shall be considered as consisting of a single radioisotope. The group and activity shall be that of the first member present in the chain, except if a radioisotope "x" has a half-life longer than that of the first member and an activity greater than that of any other member including the first at any time during transportation; in that case, the transport group of the isotope "x" and the activity of the mixture shall be the maximum activity of that isotope "x" during transportation.

A-3 Unlisted radioisotopes or byproduct material (concentrations). For beta and/or gamma emitting byproduct material not listed in table A-1 with half-lives less than 3 years---The column II value shall be 1×10^{-10}, and the column III value shall be 1×10^{-6}. (Also see 8.1.2.3 herein.)

A-4 Unlisted radioisotopes (exempt quantities). Any radioisotopes not listed in column IV of table A-1 shall be assigned the following values. (Also see 8.1.2 herein.)

(1) Any alpha emitting radioisotope or mixtures of alpha emitters of unknown composition, the column IV value is-----0.01.

(2) Any radioisotope other than alpha emitting radioisotopes or mixtures of beta emitters of unknown composition, the column IV value shall be----------0.1.

NOTE: Radioisotopes without entries or dashes in columns II, III, and IV of table A-1 were not listed in 10 CFR 20 and 10 CFR 30.

TABLE A-1. RADIOISOTOPE DATA

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration μCi/ml 3/	Column III Liquid and Solid Concentration μCi/ml 3/	Column IV Exempt Quantities μCi 4/
Actinium (89)	Ac 227	I			
	Ac 228	I			
Americium (95)	Am 241	I			(.01)
	Am 243	I			
Antimony (51)	Sb 122	IV	---	3×10^{-4}	100
	Sb 124	III	---	2×10^{-4}	10
	Sb 125	III	---	1×10^{-3}	10
Argon (18)	A 37	VI	1×10^{-3}	---	
	A 41	II	4×10^{-7}	---	
	A 41 5/ (uncompressed)	V	---	---	
Arsenic (33)	Ar 73	IV	---	5×10^{-3}	100
	Ar 74	IV	---	5×10^{-4}	10
	Ar 76	IV	---	2×10^{-4}	10
	Ar 77	IV	---	8×10^{-4}	100
Astatine (85)	At 211	III			
Barium (56)	Ba 131	IV	---	2×10^{-3}	10
	Ba 133	II			10
	Ba 140	III	---	3×10^{-4}	10
Berkelium (97)	Bk 249	I			
Beryllium (4)	Be 7	IV	---	2×10^{-2}	
Bismuth (83)	Bi 206	IV	---	4×10^{-6}	
	Bi 207	III	---	---	
	Bi 210	II	---	---	1.0
	Bi 212	III	---	---	
Bromine (35)	Br 82	IV	4×10^{-7}	3×10^{-3}	10
Cadmium (48)	Cd 109	IV	---	2×10^{-4}	10
	Cd 115m	III	---	3×10^{-4}	10
	Cd 115	IV	---	3×10^{-4}	100
Calcium (20)	Ca 45	IV	---	9×10^{-5}	10
	Ca 47	IV	---	5×10^{-4}	10
Californium (98)	Cf 249	I			
	Cf 250	I			
	Cf 252	I			
Carbon (6)	C 14	IV	1×10^{-6}	8×10^{-3}	100
Cerium (58)	Ce 141	IV	---	9×10^{-4}	100
	Ce 143	IV	---	4×10^{-4}	100
	Ce 144	III	---	1×10^{-4}	1.0

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration µCi/ml 3/	Column III Liquid and Solid Concentration µCi/ml 3/	Column IV Exempt Quantities µCi 4/
Cesium (55)	Cs 131	IV	---	2×10^{-2}	1,000
	Cs 134m	III	---	6×10^{-2}	100
	Cs 134	III	---	9×10^{-5}	1.0
	Cs 135	IV			10
	Cs 136	IV			10
	Cs 137	III			10
Chlorine (17)	Cl 36	III			10
	Cl 38	IV	9×10^{-7}	4×10^{-3}	10
Chromium (24)	Cr 51	IV	---	2×10^{-2}	1,000
Cobalt (27)	Co 56	III			
	Co 57	IV	---	5×10^{-3}	
	Co 58m	IV			10
	Co 58	IV	---	1×10^{-5}	10
	Co 60	III	---	5×10^{-4}	1.0
Copper (29)	Cu 64	IV	---	3×10^{-3}	100
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	---	4×10^{-3}	10
	Dy 166	IV	---	4×10^{-4}	100
Erbium (68)	Er 169	IV	---	9×10^{-4}	100
	Er 171	IV	---	1×10^{-3}	100
Europium (63)	Eu 150	III			
	Eu 152m	IV			100

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration µCi/ml 3/	Column III Liquid and Solid Concentration µCi/ml 3/	Column IV Exempt Quantities µCi 4/
	Eu 152	III	---	6×10^{-4}	1.0
	Eu 154	II			1.0
	Eu 155	IV	---	2×10^{-3}	10
Fluorine (9)	F 18	IV	2×10^{-6}	8×10^{-3}	1,000
Gadolinium (64)	Gd 153	IV	---	2×10^{-3}	10
	Gd 159	IV	---	8 x 10-4	100
Gallium (31)	Ga 67	III			
	Ga 72	IV	---	4×10^{-4}	10
Germanium (32)	Ge 71	IV	---	2×10^{-2}	100
Gold (79)	Au 193	III			
	Au 194	III			
	Au 195	III			
	Au 196	IV	---	2×10^{-3}	
	Au 198	IV	---	5×10^{-4}	100
	Au 199	IV	---	2×10^{-3}	100
Hafnium (72)	Hf 181	IV	---	7×10^{-4}	10
Holmium (66)	Ho 166	IV			100
Hydrogen (1)	H3	(see tritium)	5×10^{-6}	3×10^{-2}	1,000
Indium (49)	In 113m	IV	---	1×10^{-2}	100
	In 114m	III	---	2×10^{-4}	10
	In 115m	IV			100
	In 115	IV			10
Iodine (53)	I 124	III			
	I 125	III			1.0
	I 126	III	3×10^{-9}	2×10^{-5}	1.0
	I 129	III			0.1

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration μCi/ml 3/	Column III Liquid and Solid Concentration μCi/ml 3/	Column IV Exempt Quantities μCi 4/
	I 131	III	3×10^{-9}	2×10^{-5}	1.0
	I 132	IV	8×10^{-8}	6×10^{-4}	10
	I 133	III	1×10^{-8}	7×10^{-5}	1.0
	I 134	IV	2×10^{-7}	1×10^{-3}	10
	I 135	IV			10
Iridium (77)	Ir 190	IV	---	2×10^{-3}	
	Ir 192	III	---	4×10^{-4}	10
	Ir 194	IV	---	3×10^{-4}	100
Iron (26)	Fe 55	IV	---	8×10^{-3}	100
	Fe 59	IV	---	6×10^{-4}	10
Krypton (36)	Kr 85m	III	1×10^{-6}	---	
	Kr 85m 5/ (uncompressed)	V			
	Kr 85 Kr 85 5/ (uncompressed)	III VI	3×10^{-6}	---	100
	Kr 87 Kr 87 5/ (uncompressed)	II V			10
Lanthanum (57)	La 140	IV	---	2×10^{-4}	10
Lead (82)	Pb 203	IV	---	4 x 10-3	
	Pb 210	II			
	Pb 212	II			
Lutetium (71)	Lu 172	III			
	Lu 177	IV	---	1×10^{-3}	100
Magnesium (12)	Mg 28	III			
Manganese (25)	Mn 52	IV	---	3×10^{-4}	10
	Mn 54	IV	---	1×10^{-3}	10
	Mn 56	IV	---	1×10^{-3}	10

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration µCi/ml 3/	Column III Liquid and Solid Concentration µCi/ml 3/	Column IV Exempt Quantities µCi 4/
Mercury (80)	Hg 197m	IV	---	2×10^{-3}	100
	Hg 197	IV	---	2×10^{-3}	100
	Hg 203	IV	---	2×10^{-4}	10
Mixed Fission Products	MF-P	II			
Molybdenum (42)	Mo 99	IV	---	2×10^{-3}	100
Neodymium (60)	Nd 147	IV	---	6×10^{-4}	100
	Nd 149	IV	---	3×10^{-3}	100
Neptunium (93)	Np 237	I			
	Np 239	I			
Nickel (28)	Ni 56	III			
	Ni 59	IV			100
	Ni 63	IV			10
	Ni 65	IV	---	1×10^{-3}	100
Niobium (Columbium) (41)	Nb 93m	IV			10
	Nb 95	IV	---	1×10^{-3}	10
	Nb 97	IV	---	9×10^{-3}	10
Osmium (76)	Os 185	IV	---	7×10^{-4}	10
	Os 191m	IV	---	3×10^{-2}	100
	Os 191	IV	---	2×10^{-3}	100
	Os 193	IV	---	6×10^{-4}	100
Palladium (46)	Pd 103	IV	---	3×10^{-3}	100
	Pd 109	IV	---	9×10^{-4}	100
Phosphorus (15)	P 32	IV	---	2×10^{-4}	10
Platinum (78)	Pt 191	IV	---	1×10^{-3}	100
	Pt 193	IV			100
	Pt 193m	IV	---	1×10^{-2}	100

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration µCi/ml 3/	Column III Liquid and Solid Concentration µCi/ml 3/	Column IV Exempt Quantities µCi 4/
	Pt 197m	IV	---	1×10^{-2}	100
	Pt 197	IV	---	1×10^{-3}	100
Plutonium (94)	Pu 238 6/	I			
	Pu 239 6/	I			(0.01)
	Pu 240	I			
	Pu 241 6/	I			
	Pu 242	I			
Polonium (84)	Po 210	I			0.1
Potassium (19)	K 42	IV	---	3×10^{-3}	10
	K 43	III			
Praseodymium (59)	Pr 142	IV	---	3×10^{-4}	100
	Pr 143	IV	---	5×10^{-4}	100
Promethium (61)	Pm 147	IV	---	2×10^{-4}	10
	Pm 149	IV	---	4×10^{-3}	10
Protactinium (91)	Pa 230	I			
	Pa 231	I			
	Pa 233	II			
Radium (88)	Ra 223	II			
	Ra 224	II			
	Ra 226	I			(0.01)
	Ra 228	I			
Radon (86)	Rn 220	IV			
	Rn 222	II			
Rhenium (75)	Re 183	IV	---	6×10^{-4}	
	Re 186	IV	---	9×10^{-3}	100
	Re 187	IV			
	Re 188	IV	---	6×10^{-4}	100

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration µCi/ml 3/	Column III Liquid and Solid Concentration µCi/ml 3/	Column IV Exempt Quantities µCi 4/
	Re Natural	IV			
Rhodium (45)	Rh 103m	IV	---	1×10^{-4}	100
	Rh 105	IV	---	1×10^{-1}	100
Rubidium (37)	Rb 86	IV	---	7×10^{-4}	10
	Rb 87	IV			10
	Rb Natural	IV			
Ruthenium (44)	Ru 97	IV	---	4×10^{-4}	100
	Ru 103	IV	---	8×10^{-4}	10
	Ru 105	IV	---	1×10^{-4}	10
	Ru 106	III	---	1×10^{-3}	1
Samarium (62)	Sm 145	III			
	Sm 147	III			
	Sm 151	IV			10
	Sm 153	IV	---	8×10^{-3}	100
Scandium (21)	Sc 46	III	---	4×10^{-3}	10
	Sc 47	IV	---	9×10^{-4}	100
	Sc 48	IV	---	3×10^{-4}	10
Selenium (34)	Se 75	IV	---	3×10^{-3}	10
Silicone (14)	Si 31	IV	---	9×10^{-3}	100
Silver (47)	Ag 105	IV	---	1×10^{-3}	10
	Ag 110m	III	---	3×10^{-3}	1
	Ag 111	IV	---	4×10^{-3}	100
Sodium (11)	Na 22	III			
	Na 24	IV	---	2×10^{-4}	10
Strontium (38)	Sr 85m	IV			
	Sr 85	IV	---	1×10^{-4}	10
	Sr 89	III	---	1×10^{-4}	1

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration µCi/ml 3/	Column III Liquid and Solid Concentration µCi/ml 3/	Column IV Exempt Quantities µCi 4/
	Sr 90	II			0.1
	Sr 91	III	---	7×10^{-4}	10
	Sr 92	IV	---	7×10^{-4}	10
Sulphur (16)	S 35	IV	9×10^{-8}	6×10^{-4}	100
Tantalum (73)	Ta 182	III	---	4×10^{-4}	10
Technetium (43)	Tc 96m	IV	---	1×10^{-1}	
	Tc 96	IV	---	1×10^{-3}	10
	Tc 97m	IV			100
	Tc 97	IV			100
	Tc 99m	IV			100
	Tc 99	IV			10
Tellurium (52)	Te 125m	IV	---	2×10^{-3}	10
	Te 127m	IV	---	6×10^{-4}	10
	Te 127	IV	---	3×10^{-3}	100
	Te 129m	III	---	3×10^{-4}	10
	Te 129	IV			100
	Te 131m	III	---	6×10^{-4}	10
	Te 132	IV	---	3×10^{-4}	10
Terbium (65)	Tb 160	III	---	4×10^{-4}	10
Thallium (81)	Tl 200	IV	---	4×10^{-3}	100
	Tl 201	IV	---	3×10^{-3}	100
	Tl 202	IV	---	1×10^{-3}	100
	Tl 204	III	---	1×10^{-3}	10
Thorium (90)	Th 227	II			
	Th 228	I			
	Th 230	I			
	Th 231	I			

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration μCi/ml 3/	Column III Liquid and Solid Concentration μCi/ml 3/	Column IV Exempt Quantities μCi 4/
	Th 232	III			
	Th 234	II			
	Th Natural	III			(100)
Thulium (69)	Tm 168	III			
	Tm 170	III	---	5×10^{-4}	10
	Tm 171	IV	---	5×10^{-3}	10
Tin (50)	Sn 113	IV	---	9×10^{-4}	10
	Sn 117m	III			
	Sn 121	III			
	Sn 125	IV	---	2×10^{-4}	10
Tritium (1)	H 3	IV	5×10^{-6}	3×10^{-2}	1,000
	H 3 (as a gas, as luminous paint, or absorbed on solid material)	VII			
Tungsten (74)	W 181	IV	---	4×10^{-3}	10
	W 185	IV			10
	W 187	IV	---	7×10^{-4}	100
Uranium (92)	U 230	II			
	U 232	I			
	U 233 6/	II			(0.01)
	U 234	II			(0.01)
	U 235 6/	III			(0.01)
	U 236	II			
	U 238	III			
	U Natural	III			(100)
	U Enriched 6/	III			

TABLE A-1. RADIOISOTOPE DATA - Continued

Element (Atomic No.)	Radio-isotope 1/	Column I Transport Group 2/	Column II Gas Concentration µCi/ml 3/	Column III Liquid and Solid Concentration µCi/ml 3/	Column IV Exempt Quantities µCi 4/
	U Depleted	III			
Vanadium (23)	V 48	IV	---	3×10^{-4}	10
	V 49	III			
Xenon	Xe 125	III			
	Xe 131m	III	4×10^{-6}	---	1,000
	Xe 131m 5/ (uncompressed)	V			
	Xe 133	III	3×10^{-6}	---	100
	Xe 133 5/ (uncompressed)	VI			
	Xe 135	II	1×10^{-6}	---	100
	Xe 135 5/ (uncompressed)	V			
Ytterbium (70)	Yb 175	IV	---	1×10^{-3}	100
Ytterium (39)	Y 88	III			
	Y 90	IV	---	2×10^{-4}	10
	Y 91m	III	---	3×10^{-2}	
	Y 91	III	---	3×10^{-4}	10
	Y 92	IV	---	6×10^{-4}	100
	Y 93	IV	---	3×10^{-4}	100
Zinc (30)	Zn 65	IV	---	1×10^{-3}	10
	Zn 69m	IV	---	7×10^{-4}	100
	Zn 69	IV	---	2×10^{-2}	1,000
Zirconium (40)	Zr 93	IV			10
	Zr 95	III		6×10^{-4}	10
	Zr 97	IV		2×10^{-4}	10
	Radioisotopes not listed above	See para A-2	See para A-3	See para A-3	See para A-4

Footnotes:

1/ Atomic weight shown after the radioisotope symbol.
2/ Transport groups are based upon 49 CFR 173.390 (See paragraph A-2 herein).
NOTE: Radioisotopes without entries or dashes in columns II, III, and IV were not listed in 10 CFR 20 or 10 CFR 30.

Footnotes: (Continued)

3/ Concentrations are based upon 10 CFR 30, schedule A. Column II values are given for those materials normally used as gasses. The column III unit is μCi/gm for solids. (See 8.1.2 herein.)

4/ Exempt quantities are based upon appendix C of 10 CFR 20 and schedule B of 10 CFR 30. Values in parenthesis apply to 10 CFR 20 only. (See 8.1.2 herein.)

5/ Uncompressed means at a pressure not exceeding 14.7 psi (absolute).

6/ Fissile radioactive material.

SECTION B

ACTIVITY MASS RELATIONSHIP - SPECIFIC ACTIVITY

MICROCURIE PER GRAM CONVERSION FACTORS

TABLE B-1. TECHNICAL DATA FOR SELECTED RADIOISOTOPES

Element (Atomic No.)	I Radio-isotope 1/	II Type Radiation 2/	III Half-Life (years) 2/	IV Transport Group 3/	V Exempt Quantities (μCi) 4/	VI Specific Activity (μCi/gm) 5/
Americium (95)	Am 241	Alpha and Gamma	458	I	(0.01)	3.24×10^{6}
Carbon (6)	C 14	Beta (-)	5,730	IV	100	4.46×10^{6}
Cesium (55)	Cs 137	Beta, Gamma	30	III	10	8.71×10^{7}
Cobalt (27)	Co 57	Gamma	0.739	III		8.48×10^{9}
	Co 60	Beta (-), Gamma	5.27	III	1.0	1.13×10^{9}
Krypton (36)	Kr 85	Beta (-), Gamma	10.76	III	100	3.91×10^{8}
Nickel (28)	Ni 63	Beta (-)	92	IV	10	6.17×10^{7}
Promethium (61)	Pm 147	Beta (-)	2.62	III	10	9.29×10^{6}
Radium (88)	Ra 226	Alpha, Gamma	1,602	I	(0.01)	9.88×10^{5}
Rhenium (75)	Re 187	Beta (-)	4.3×10^{10}	IV		4.45×10^{-2}
Strontium (38)	Sr 90	Beta (-)	28.1	II	0.1	1.41×10^{8}
Thorium (90)	Th 228	Alpha, Gamma	1.91	I		8.22×10^{8}
	Th 232	Alpha, Gamma	1.41×10^{10}	III		1.09×10^{-1}
	Th (natural)	Alpha, Gamma	1.41×10^{10}	III	(100)	1.09×10^{-1}
Tritium (1)	H 3	Beta (-)	12.3	IV	1,000	9.64×10^{9}
Uranium (92)	U 234	Alpha, Gamma	2.47×10^{5}	II	(0.01)	6.19×10^{3}
	U 235	Alpha, Gamma	7.1×10^{8}	III	(0.01)	2.14
	U 238	Alpha, Gamma	4.51×10^{9}	III	(0.01)	3.33×10^{-1}
	U (natural)	Alpha, Gamma	4.51×10^{9}	III	(100)	3.33×10^{-1}
	U (enriched)	Alpha, Gamma	99% U238+ <1% U235	III		$>3.33 \times 10^{-1}$
	U (depleted)	Alpha, Gamma	U238 - U235	III		$\approx 1.67 \times 10^{-1}$ (assuming one half-life decay)

1/ Atomic weight shown after the radioisotope symbol.
2/ Data obtained from Radiological Health Handbook, U. S. Department of Health, Education, and Welfare, Public Service Publication N. 2016, January 1970.
3/ Transport groups are based upon 49CFR173.390 (See section A herein for details in determining transport groups.
4/ Exempt quantities are based upon appendix C of 10 CFR 20, and Schedule B of 10 CFR 30. Values in parenthesis apply to 10 CFR 20 only (see 8.1.2 and table A-1 herein).
5/ For details in determining specific activity (S.A.) constants, see section B herein.

SECTION B - ACTIVITY MASS RELATIONSHIP - SPECIFIC ACTIVITY

B-1 Introduction. This section contains instructions, information, general data, and a table of pertinent data based on the radioisotopes used in the commodities included herein under section C. The mathematical formulas and derivations of the specific activity (S.A.) in microcurie per gram constants are also included.

B-2 Requirements. Pursuant to the law, Title 49, Code of Federal Regulations, Part 173.389, has defined radioactive (for transportation) material to be any material in which the specific activity is 0.002 (or greater) microcuries per gram (see 6.38, 6.39 and B-3). Therefore, manufacturers of radioactive commodities must comply with these requirements and the additional requirements of MIL-STD-1458. This means then, that for each radioactive commodity, the radioisotope used and the quantity in microcuries shall be identified, unless otherwise exempted (see 11.3.10.2 and 8.1.2.6).

NOTE: Do not confuse specific activity (µCi/gm) with radioactivity (µCi). See definitions, B-3 and B-4.

B-3 Specific activity (µCi/gm). Specific activity (S.A.) is the rate of decay of the radioactive element or isotope expressed in curies per gram or microcuries per gram of the radioactive element. Specific activity is a natural constant for each radioactive element whether the amount involved in the radioactive material is a microgram or 1,000 grams. For specific activity constants of particular radioisotopes see table B-1 specific activity data column VI to determine whether the isotope of interest exceeds 0.002 µCi/gm and therefore, falls within the classification of radioactive material.

B-4 Radioactivity of small radioactive commodities (µCi). In the case of electron tubes, it is usually impractical to measure the radioactivity with any degree of precision for two reasons. The radioisotope is often surrounded by electrodes, spacers, and an envelope such that the geometric considerations preclude a realistic calibration of a measuring device; and the amount of radioisotope intentionally added in the tube is often so extremely small that the amount of radiation is difficult to discern from the normal background radiation that exists in the atmosphere. Therefore, the radioactivity for electron tubes and other small commodities shall be determined by a calculation technique in terms of the known radioisotopes which have been intentionally added to the electron tube to either increase tube life or to improve the overall tube performance.

Radioactivity (µCi/tube) = Specific activity (µCi/gm) times the actual mass in grams of the radioactive element used in the tube.

If the radioactive element or isotope is part of a mixture or a chemical compound, the specific-activity expression may be reduced by an amount corresponding to the fraction of the material which is radioactive since specific activity (S.A.) is expressed per gram of radioactive element rather than the compound.

Several examples of the calculation of specific activity and ultimately the radioactivity in Ci/tube are included

B-5 Computations of specific activity. The specific activity (S.A.) of a radioisotope (disintegrations per unit time)/(unit mass), is calculated from the base equation:

$$S.A. = \lambda N = \frac{(\ln 2)\ N}{T_{1/2}}$$

WHERE: N = number of radioactive atoms per unit mass, and $T_{1/2}$ = half-life.

This basic equation can be transformed as follows:

by definition: $N = 6.0225 \times 10^{23}$/atomic mass (Avogadro's principal)

$Ci = 3.7 \times 10^{10}$ disintegrations/second.

Substituting:

$$S.A. = \frac{0.69315\ N}{T_{1/2}(\text{secs})} = \frac{0.69315}{T_{1/2}} \times \frac{6.0225 \times 10^{23}}{\text{atomic mass}} \times \frac{1}{3.7 \times 10^{10}} \times 10^{6} = \mu Ci/gm$$

This equation is satisfactory when the half-life of the isotope is expressed in seconds. If, however, the half-life is expressed in other units (such as minutes, hours, days, or years), a separate time conversion is required for each. By substituting the appropriate time conversion factors the following five equations can be obtained:

$$\text{microcuries/gram or S.A. } (T_{\frac{1}{2}} \text{ in secs}) = \frac{1.128 \times 10^{19}}{(T_{\frac{1}{2}})(\text{atomic mass})} \quad (1)$$

$$\text{microcuries/gram or S.A. } (T_{\frac{1}{2}} \text{ in mins}) = \frac{1.880 \times 10^{17}}{(T_{\frac{1}{2}})(\text{atomic mass})} \quad (2)$$

$$\text{microcuries/gram or S.A. } (T_{\frac{1}{2}} \text{ in hrs}) = \frac{3.134 \times 10^{15}}{(T_{\frac{1}{2}})(\text{atomic mass})} \quad (3)$$

$$\text{microcuries/gram or S.A. } (T_{\frac{1}{2}} \text{ in days}) = \frac{1.306 \times 10^{14}}{(T_{\frac{1}{2}})(\text{atomic mass})} \quad (4)$$

$$\text{microcuries/gram or S.A. } (T_{\frac{1}{2}} \text{ in yrs}) = \frac{3.578 \times 10^{11}}{(T_{\frac{1}{2}})(\text{atomic mass})} \quad (5)$$

NOTE: For a detailed analysis of the above conversion factors, see section B-6. To obtain radioactivity, see B-6 (23).

B-5.1 Applicability. The specific activities for the isotopes shown in table B-1 are based on the above conversion factors, using the half-lives shown. Integer mass numbers were used rather than actual masses. Also, these specific activities are for pure forms of the isotopes only.

B-6 Basic theory. The number of atoms (dN) in any one radioactive element that will disintegrate in a small interval dt is proportional to the number of atoms (N) present at the beginning of the time period dt.

(1) $-dN = \lambda N dt$

The fundamental law of nature which describes the rate of disintegration or decay of a radioactive element is therefore as follows:

(2) $$-\frac{dN}{dt} = \lambda N dt$$

where λ = a proportionality constant for the particular radioactive element; often called the decay or disintegration constant.

N = number of radioactive atoms of the element at any time t

$-\frac{dn}{dt}$ = rate of disintegration (the rate change of N is negative because N is decreasing with time)

Rearranging equation (1) gives:

(3) $$\frac{dN}{N} = -\lambda dt$$

Integrating equation (3) gives:

$$\int \frac{dN}{N} = -\int \lambda dt$$

(4) $$\ln N = -\lambda t + C$$

at t = 0; N = No

Therefore, equation (4) can be rewritten:

$$\ln No = \lambda (0) + C$$

or $C = \ln No$

Referring to equation (4) again and replacing C:

$$\ln N = -\lambda t + \ln No$$

and $\ln N - \ln No = -\lambda t$

(5) $$\ln \frac{N}{No} = -\lambda t$$ natural logarithmic form to base ε

Rewriting equation (5):

$$\varepsilon^{-\lambda t} = \frac{N}{No}$$

(6) or, $N = No\, \varepsilon^{-\lambda t}$ exponential form

(7) or, $Nt = No\ \varepsilon^{-\lambda t}$ exponential form

Definitions: where No = original number of radioactive atoms of the element at time t = 0

N = Nt = number of radioactive atoms after a given decay time t

λ = a proportionality constant (decay constant) for a given radioactive element

t = decay time

Equations 5, 6, and 7 are written in terms of the natural logarithm to the base ε(ε= 2.7183), a fundamental constant which derives from other natural phenomena as well as radioactive decay.

The time T required for 1/2 the number of atoms to disintegrate is defined as the half-life of the radioactive element or isotope.

A simplified expression for the half-life time T can thus be derived from equation (7) as follows:

$$Nt = No\ \varepsilon^{-\lambda t}$$

since Nt = 1/2 No in half-life time where t = T

$$1/2\ No = No\ \varepsilon^{-\lambda T}$$

$$0.5 = \varepsilon^{-\lambda t}$$

$$\ln 0.5 = -\lambda T \ln \varepsilon$$

$$-.693 = -\lambda T$$

$$\lambda T = .693$$

(8) $T = \frac{.693}{\lambda}$ Half-life time of the particular radioactive element.

Equivalent expressions based on common logarithms to the base 10 are shown for general information. However, the use of natural logarithms results in a simpler and more useable expression for Nt (equation (7) compared to equation (10)).

Repeating equation (7) and taking the common logarithm (base 10):

$$Nt = No\ \varepsilon^{-\lambda t}$$

$$\log Nt = \log No + \log \varepsilon^{-\lambda t}$$

$$\log Nt - \log No = \log (\varepsilon^{-\lambda t})$$

$$\log \frac{Nt}{No} = -\lambda t \log \varepsilon$$

Since: $\log \varepsilon = .4343$

(9) $\log \frac{Nt}{No} = -.4343\lambda t$ common logarithmic form (base 10)

(10) or $Nt = No\ (10^{-.4343\lambda t})$ common logarithmic form (base 10)

At the half-life time: $N_T = 1/2$ No due to half the atoms disintegrating

and $t = T$

Substituting in equation (9):

$$\log \frac{No}{2\ No} = -.4343\lambda T$$

$$\log 1/2 = -.4343\lambda T$$

$$\log 1 - \log 2 = -.4343\lambda T$$

$$0 - .3010 = -.4343\lambda T$$

$$\lambda T = \frac{.3010}{.4343} = .693$$

(11) $T = \frac{.693}{\lambda}$ This expression for T (equation (11)) is the same result that was derived from the exponential form (equation (8)) using natural logarithms.

For radioactive decay calculations the half-life is a more convenient parameter to use than the decay constant. The rate of disintegration from equation (2) can now be expressed in terms of the half-life T.

$$-\frac{dN}{dt} = \lambda N$$

Substituting for λ from equation (8):

(12) $-\frac{dN}{dt} = \frac{.693}{T} N$ rate of disintegration

The decay rate for any radioactive substance is referenced to he decay rate of radium. One curie of a radioactive substance is that amount having an activity of 3.7×10^{10} disintegrations/second, the disintegration rate of radium.

Therefore,

(13) 1.0 curie $= 3.7 \times 10^{10}$ disintegrations/second

(14) 1.0 μCi $= 3.7 \times 10^{4}$ disintegration/second

According to Avogadro's principle there are 6.02×10^{23} atoms in a gram-atom or in a mass equivalent to the atomic weight expressed in grams. Therefore the number of atoms in one gram is:

(15) $$N = \frac{6.02 \times 10^{23}}{A} \qquad \frac{\text{atoms/gram atom}}{\text{grams/gram-atom}} = \frac{\text{atoms}}{\text{gram}}$$

where A = atomic weight of the radioactive element

Now the specific activity (S.A) is the rate of decay of one gram of the radioactive element or isotope expressed in curies or microcuries.

Therefore,

(16) $$\text{S.A.} = \frac{0.693}{T} \times \frac{6.02 \times 10^{23}}{A} \times \frac{1}{3.7 \times 10^{10}}$$

(Specific Activity = 1/sec x atoms/gram x $\frac{\text{curies}}{\text{atom/sec}}$ = curies/gram of radioactive element

(17) $$\text{S.A.} = \frac{0.693}{T} \times \frac{6.02 \times 10^{23}}{A} \times \frac{1}{3.7 \times 10^{10}} \times 10^{6}$$ = μcuries/gram of radioactive element

(Specific Activity)

Reducing the specific activity equation (17) gives:

(18) $$\text{S.A.} = \frac{1.13 \times 10^{19}}{T\ A}$$ μCi/gram of radioactive element — for T = half-life in seconds

(19) $$\text{S.A.} = \frac{1.88 \times 10^{17}}{T\ A}$$ μCi/gram of radioactive element — T = half-life in minutes

(20) $$\text{S.A.} = \frac{3.14 \times 10^{15}}{T\ A}$$ μCi/gram of radioactive element — T = half-life in hours

(21) $$\text{S.A.} = \frac{1.31 \times 10^{14}}{T\ A}$$ μCi/gram of radioactive element — T - half-life in days

(22) $$\text{S.A.} = \frac{3.58 \times 10^{11}}{T\ A}$$ μCi/gram of radioactive element — T = half-life in years

To obtain the radioactivity in μCi/tube:

(23) Radioactivity (μCi/tube) = S.A. above in μCi/gm of radioactive element x actual mass in grams of the radioactive element used in the tube

If the radioactive element or isotope is part of a mixture or a chemical compound, the specific-activity expression may be reduced by an amount corresponding to the fraction of the material which is radioactive since specific activity (S.A.) is expressed per gram of radioactive element rather than the compound.

Several examples of the calculation of specific activity and ultimately the radioactivity in μCi/tube are included as follows:

EXAMPLES: RADIOACTIVE CALCULATIONS*

A. For pure radioactive element

* See table B-1 - Half-life values of radioactive elements.

1. Re187

Known factors	Reference symbol
$T = 4.3 \times 10^{10}$ years	T = half-life
A = 187	A = atomic weight of radioactive element
gms of Re^{187} in tube = 0.1	S.A. = specific activity = rate of decay of 1 gram of pure radioactive element expressed in μCi/gm of the pure radioactive element

Using equation (22):

$$\underset{(\mu Ci/gm)}{S.A.} = \frac{3.58 \times 10^{11}}{T\ A};\ T \text{ in years}$$

$$S.A. = \frac{3.58 \times 10^{11}}{4.3 \times 10^{10} \times 187}$$

$$S.A. = 0.0445\ \mu Ci/gm \text{ of } Re^{187}$$

From equation (23):

Radioactivity (μCi/tube) = S.A. (μCi/gm) of radioactive element x gm of radioactive element actually used per tube

Radioactivity = 0.0445 x 0.1 gram of Re^{187} used in tube

Radioactivity = 0.00445 μCi/tube of Re^{187}

2. Ni^{63}

From vendor information of	Known factors
.002 μCi/mm² /plated side compute μCi level/Tab:	T = 92 years
	A = 63
μCi/Tab = .002 μCi/mm² x 3mm² x 2 plated sides/Tab	1 Tab of Ni^{63} material used/tube
= .012	Area of each side of Ni^{63} tab = 3 mm
	Ni^{63} is plated on both sides of each tab
	Vendor information: .002 μCi/mm²/plated side

Since 1 Tab is used/tube, then:

(24) Radioactivity = .012 μCi/tube of Ni^{63}

Now using equation (22):

$$\text{S.A.}_{\mu Ci/gm \text{ of } Ni^{63}} = \frac{3.58 \times 10^{11}}{T\ A};\ T \text{ in years}$$

$$\text{S.A.} = \frac{3.58 \times 10^{11}}{92 \times 63}$$

(25) $\text{S.A.}_{c/gm \text{ of } Ni^{63}}$ = 61,770,000 μCi/gm of Ni^{63} or 61.77 μCi/gm of Ni^{63}

Divide equation (24) = .012 μCi/tube of Ni^{63} by equation (25) where the specific activity = 61,770,000 μCi/gm of Ni^{63} to calculate the grams of Ni^{63} in the tube:

$$\text{gms of } Ni^{63}/\text{tube} = \frac{.012\ \mu Ci/\text{tube}}{61{,}770{,}000\ \mu Ci/\text{gm } Ni^{63}}$$

Therefore,

(26) gms of Ni^{63} /tube = 1.94×10^{-10}

Repeating equation (23):

Radioactivity (μCi/tube) = Specific activity (μCi/gm) x gm of radioactive element used/tube

= 61,770,000 μCi/gm of Ni^{63} x 1.94×10^{-10} gm of Ni^{63} /tube

(27) Radioactivity μc/tube = .012 μCi/tube of Ni^{63}

This result not only shows the μCi level/tube but also verifies the μc/tube value obtained in equation (24) above. It also certifies that the calculated gm weight of Ni^{63} determined in equation (26) as 1.94×10^{-10}gm of Ni^{63}/tube is likewise correct.

The small amount of Ni^{63} used/tube (1.94×10^{-10} gms) is nearly infinitesimal and when multiplied by the large specific activity value for Ni^{63}(61,770,000 μCi/gm of Ni^{63}) gives an end product having an extremely low radioactivity level of .012 (μCi/tube)

3. Co^{60}

Known factors

T = 5.26 years

A = 60

gms of Co^{60} in tube = 2.64×10^{-10}

Using equation (22):

$$S.A. = \frac{3.58 \times 10^{11}}{T\ A} = \mu Ci/gm \text{ of } Co^{60}$$

$$= \frac{3.58 \times 10^{11}}{5.26\ (60)}$$

$$S.A. = 1.137 \times 10^{9}\ \mu Ci/gm \text{ of } Co^{60}$$

Radioactivity = 1.137×10^{9} µCi/gm of Co^{60} x 2.64×10^{-10} gms of Co^{60}/tube

Then:

(28) Radioactivity = 0.30 µCi/tube of Co^{60}
µCi/tube

4. For several pure radioactive elements or isotopes

When more than one radioactive element or isotope is present in an electron tube, then the radioactivity of each specie is determined (per A1 or A2 or A3 method above) and the radioactivity results can then be added to give the total radioactivity for the electron tube.

B. For radioactive compounds

1. Thorium tungsten wire (ThW)

Using equation (22):

$$S.A. \ \mu Ci/gm = \frac{3.58 \times 10^{11}}{T\ A};\ T \text{ in years}$$

$$S.A. = \frac{3.58 \times 10^{11}}{1.41 \times 10^{10}} \times 232$$

$$S.A. = 0.1094\ \mu Ci/gm \text{ thorium}$$

Known factors

Th^{232} (radioactive thorium is the only radioactive compound)

T = 1.41×10^{10} years
A = 232

1.2% thoria in thoria tungsten (ThW) wire

Wt of ThW wire used per tube = 0.1 gm

gm of Th/tube = 0.00105 (see calculation of equation (31))

From equation (23):

Radioactivity = S.A. $\frac{\mu Ci}{gmTH}$ x gm thorium actually used per tube
μc/tube

= 0.1094 x 0.00105 (from equation (29) and equation (31) below

(30) Radioactivity = 0.000115 μCi/tube of Thorium

2. Alternate approach for B1, above

1 gm of ThW wire contains 1.2% ThO_2 (Thoria)

1 gm of ThW wire contains 1 x .012 = .012 gms ThO_2

Atomic weight of Th = 232

Molecular weight of ThO_2 = 232 + 32 = 264

Therefore, ratio of Th to ThO_2 is:

$$\frac{232\ (Th)}{264\ (ThO_2)} = 0.879$$

The specific activity for thorium:
S.A. = 0.1094 μCi/gm thorium (Table B-1)

The specific activity for thoria:
S. A. = 0.1094 μCi/gm (S.A. of Th) x 0.879 (ratio of Th to ThO_2)
S. A. = 0.0962 μCi/gm thoria
The S. A. for thoria allows quick calculation of the tube μCi level for any % of thorium in thoriated tungsten wire.

Example:
1 gm of thorium tungsten (ThW) wire contains 1.2% ThO_2 (thoria)
(31) Radioactivity = (1.2%) (1 gm/gm ThW) x (0.0962 μCi/gm thoria)
= 0.00115 μCi/gm ThW
0.1 gm used per tube of ThW
(32) Radioactivity = (0.1 gm ThW/tube) x (0.0015 μCi/gm ThW)
= 0.000115 μCi/tube

3. For several radioactive compounds in an electron tube

When more than one radioactive compound is present in an electron tube, then the radioactivity of each compound is determined and the radioactivity results can then be added to give the total radioactivity for the electron tube.

SECTION C

RADIOACTIVE COMMODITIES - GP59

TYPE OR PART NUMBER SEQUENCE

SECTION C RADIOACTIVE COMMODITIES (GROUP 59)

C-1 Introduction. This section contains a list of radioactive commodities by part or type number in alpha-numerical sequence by FSC. The pertinent marking and labeling requirements have been summarized for each entry. Many of the commodities included in table C-1 are not currently in the Department of Defense supply system, but are included for information and future reference.

C-2 Inclusions. The data included in table C-1 applies to commodities in Group 59. Table C-1 includes eight columns of data which provides the essential data for proper marking and labeling for each item listed. These data columns are as follows:

(1) Type or part number of the radioactive commodity
(2) National stock number of the radioactive commodity
(3) Manufacturer of the radioactive commodity
(4) Quantity in microcuries of the radioisotope (see section B)
(5) Radioisotope
(6) Use and storage label requirements (see 11.2)
(7) DOT radioactive label requirements (see 11.3.11).
(8) DOT transport group of the radioisotope (see section A)

C-3 Requirements. The marking and labeling requirements that have been summarized in columns 6, 7, and 8 are consistent with and in accordance with the requirements of the standards and regulations for the modes of transportation, use or storage shown below:

(1)	Rail freight, express or baggage	(Title 49 CFR173.390) (see 11.3)
(2)	Highway carrier	(Title 49 CFR173.390) (see 11.3)
(3)	Water carrier	(Title 46 CFR146.19-5) (see 11.4)
(4)	Mail carrier	(Title 39 CFR and Pub. No. 6) (see 11.5)
(5)	Air carrier	(Title 14 CFR103) (see 11.6)
(6)	Air carrier (military)	(DSAM 4145.3, AFM 71-4, TM38-250, NAVSUPPUB 505, and MCO P 4030.19) (see 11.7)
(7)	Use and storage	(MIL-STD-1458)

C-3.1 Use and storage label (see figure 6). The requirements for this label for each listed commodity are shown in column 6, and are in accordance with MIL-STD-1458, and applies to commodities containing radioactive material in excess of the values shown in table I (see 11.2). This label is also applicable to shipping containers containing radioactive commodities that are exempt from DOT (49 CFR) labeling requirements. However, the marking and labeling requirements for shipping containers are not included in the tables herein.

C-3.1.1 Exempt shipping containers (10 CFR 20). See 11.2.2 herein.

C-3.2 DOT radioactive labels (see figure 7). The requirements for these labels are in accordance with Title 49 of the Code of Federal Regulations (see 11.3), but are also applicable to the other modes of transportation shown above. Thus, if the "radioactive white - I" label was listed under the DOT label column of table C-1, it would also be required for any or all other modes of transportation.

C-3.2.1 Exemptions. Exempt commodities shall conform to the requirements of 11.3.10.2.

C-3.3 DOT transport group (see section A). The transport groups shown in column 8 of table C-1 have been determined in accordance with the applicable standards and federal laws for the modes of transportation shown under C-3. The transport groups for the listed commodities are applicable to all modes of transportation.

C-4 Non-radioactive commodities. Tables C-1 includes many commodities that are not considered radioactive (see 6.38, 6.39, 6.44, and 6.47 herein). The commodities are included for information and reference only. When there is no data shown in columns 6, 7, and 8 for marking and labeling, the listed commodity is not considered radioactive.

TABLE C-1A

RADIOACTIVE COMMODITIES - FSC 5920

FUSES AND LIGHTING ARRESTORS

TYPE OR PART NUMBER SEQUENCE

Table C-1A

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part number	NSN 5920-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT Transport Group
TG101	629-2731	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG110	856-5965 896-5549	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG115	953-1924	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG134	950-0902	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG14	163-4107	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG151	789-7979	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG184	163-4106	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG191	011-4995	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG25	578-3088	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG27A	822-2329	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG31	787-7036	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG34	738-8074	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG40	027-4320	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG42A	858-0215	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG44	892-9060 027-8691	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG45	578-9265	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG48	727-0595	Signalite	< 1.0	Cesium 137	Required	Exempt	III

Table C-1A - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part number	NSN 5920-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT Transport Group
TG49	062-5995 062-3993	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG51	813-4039	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG52	822-2326	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG53	827-5751 679-3827	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG54	682-7301	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG55	827-5752	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG56	839-5538 806-1090	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG57	922-4902 608-2142	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG58	827-5753	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG59	613-0114	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG61	107-5371	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG76	713-4191	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG78	020-9745	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG83	687-2067	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG84	687-2066	Signalite	< 1.0	Cesium 137	Required	Exempt	III

Table C-1A - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part number	NSN 5920-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT Transport Group
TG86	822-2327	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG87	087-6337 856-5966	Signalite	<1.0	Cesium 137	Required	Exempt	III

TABLE C-1B

RADIOACTIVE COMMODITIES - FSC 5925

CIRCUIT BREAKERS

TYPE OR PART NUMBER SEQUENCE

Table C-1B

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part Number	NSN 5925-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
AM1513F2	265-2259	Heinemann Elec. Co.	0.05	Radium 226	Required	Exempt	I
AM1513F35	279-1029	Heinemann Elec. Co.	0.05	Radium 226	Required	Exempt	I
AM1614-25	279-1031	Heinemann Elec. Co.	0.05	Radium 226	Required	Exempt	I
AM1614M6	- - -	Heinemann Elec. Co.	0.05	Radium 226	Required	Exempt	I
AN3161P35	175-5222	Mechanical Prod, Inc.	(20 mi/hr at surface w/toggle out)	Radium 226	Required	Exempt	I
C6363-1-10	175-2587	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C363-1-12-5	503-5847	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-15	296-8123	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-2LT	155-8455	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-20LT	155-8463	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-25	144-0438	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-35	583-0590	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I

Table C-1B - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part Number	NSN 5925-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
C6363-1-5LT	258-7121	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-5	155-8456	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-6	583-8292	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-1-8	501-6168	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-2-10	144-0443	Metals and Controls, Inc.	- - -	Radium	Required	Exempt	I
C6363-2-12-1/2LT	889-0768	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-2-25	144-0451	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-2-3LT	299-1677	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-2-30	144-0453	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
C6363-2-5LT	175-2580	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-1-100	175-5227	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-1-120	144-0459	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-1-40	501-7729	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I

Table C-1B - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part Number	NSN 5925-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
D6[illegible]4-1-50	893-4299	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-1-60	144-0462	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-1-70	144-0464	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-1-80	144-0466	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-1-90	279-2930	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-2-100	144-0482	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-2-120	144-0473	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6364-2-60	586-6129	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
D6751-1-50	173-7627	Metals and Controls, Inc.	---	Radium	Required	Exempt	I
ET5943	679-5834	ITE Imperial Corp.	---	---	---	---	---
PAM1014MG3	581-0376	Heinemann Elec. Co.	0.05	Radium 226	Required	Exempt	I
1163SM6-5A125V	279-1350	Heinemann Elec. Co.	---	---	---	---	---

Table C-1B - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part Number	NSN 5925-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
24-1164	- - -	Cutler-Hammer	0.32 per lens	Radium 226	Required	Exempt	I
24-1939-2	- - -	Cutler-Hammer	0.32 per lens	Radium 226	Required	Exempt	I
24-1997-2	- - -	Cutler-Hammer	0.32 per lens	Radium 226	Required	Exempt	I
271-1289P14	- - -	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1289P16	- - -	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1289P18	506-4368	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1289P19	506-4367	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1889P3	- - -	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1289P4	506-4370	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1289P5	506-4365	Raytheon	- - -	- - -	- - -	- - -	- - -
271-1289P6	502-7420	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1290P19	506-4388	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1290P20	506-4389	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1290P23	- - -	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1290P24	506-4372	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1290P25	- - -	Raytheon	0.05	Radium 226	Required	Exempt	I
271-1290P6	506-4382	Raytheon	0.05	Radium 226	Required	Exempt	I

Table C-1B - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part Number	NSN 5925-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
271-1290P7	506-4384	Raytheon	- - -	- - -	- - -	- - -	- - -
271-1290P9	027-2102	Raytheon	0.05	Radium 226	Required	Exempt	I
3H900-80	109-2211	Metals and Controls, Inc.	- - -	Radium	Required	Exempt	I
6750-2L-15	- - - -	Metals and Controls, Inc.	5.0	Radium 226	Required	Exempt	I
6750-2L-25	- - - -	Metals and Controls, Inc.	5.0	Radium 226	Required	Exempt	I
6750-2-35	813-2093	Metals and Controls, Inc.	5.0	Radium 226	Required	Exempt	I
70-505	- - - - -	Heinemann Elec. Co.	0.05	Radium 226	Required	Exempt	I
70-505GMG3	- - - - -	Raytheon	0.05	Radium 226	Required	Exempt	I
70-613	- - - -	Heinemann Elec. Co.	0.05	Radium 226	Required	Exempt	I
8725K4	271-8658	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8751K4	159-0414	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I

TABLE C-1C

RADIOACTIVE COMMODITIES - FSC 5930

SWITCHES

TYPE OR PART NUMBER SEQUENCE

Table C-1C

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or part number	NSN 5930-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT transport Group
A9503C28	518-3174	Controls Co. of America	20 mr/hr at surface	Radium 226	Required	Exempt	II
A9503C30	504-3174	Controls Co. of America	- - -	- - -	- - -	- - -	- - -
B7A	232-6537	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
C6363-12 1/2A	760-2622	Metals and Controls, Inc.	- - -	Radium	Required	Exempt	I
C6363-6A	654-4356	Metals and Controls, Inc.	- - -	Radium	Required	Exempt	I
24-1164	320-9934	Cutler-Hammer	0.32	Radium 226	Required	Exempt	I
24-1939-2	- - -	Cutler-Hammer	0.32	Radium 226	Required	Exempt	I
24-1997	- - -	Cutler-Hammer	0.32	Radium 226	Required	Exempt	I
8200K12	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8201K11	187-3741	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8207K3	201-2545	Cutler-Hammer	0.2	Radium 226	Required	Exempt	I
8208K11	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I

Table C-1C - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part number	NSN 5930-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT transport Group
8209K11	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8210K12	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8211K12	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8212K11	259-8386	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8213K11	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8215K9	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8708	180-2541	Cutler-Hammer	- - -	- - -	- - -	- - -	- - -
8715K2	296-9017	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8800K12	272-1368	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8801K12	820-0566	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8802K9	669-7711	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8803K9	112-5288 655-1514	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I

Table C-1C - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part number	NSN 5930-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT transport Group
8808K12	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8809K12	655-1523	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8810K11	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8811K11	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8812K12	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8813K11	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8815K9	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8816K8	549-0116	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8817K8	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8818K8	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8819K8	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8820K13	991-9287	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8821K9	810-6128	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I

Table C-1C - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part number	NSN 5930-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT transport Group
8822K1	259-8350	Cutler-Hammer	- - -	- - -	- - -	- - -	- - -
8822K11	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8823K9	296-9664	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8824K11	950-7445	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8825K9	655-1582	Cutler-Hammer	0.32	Radium 226	Required	Exempt	I
8825K9	655-1582	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8826K3	486-9058	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8827K9	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8828K3	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8830K3	615-7880	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8905K514	565-9501	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8905K520	518-3135	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8905K526	687-1097	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I

Table C-1C - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Type or Part number	NSN 5930-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and labeling requirements		
					Use and storage label	DOT label (Radioactive)	DOT transport Group
8905K591	- - -	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
8906K1267	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8906K1268	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8906K1269	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8906K1270	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8906K1422	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8906K1665	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8906K2224	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8906K2428	- - -	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I
8916K504	473-9099	Cutler-Hammer	- - -	- - -	Required	Exempt	I

TABLE C-1D

RADIOACTIVE COMMODITIES - FSC 5960

ELECTRON TUBES

TYPE OR PART NUMBER SEQUENCE

Table C-1D

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
ATR-321	549-0045	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR-326	842-6660	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR-332	262-1696	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR345/5792	193-5141	Sylvania	1.0	Cobalt 60	Required	Exempt	III
ATR345	193-5141	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR346/5793	193-5142	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR346/5793	193-5142	Sylvania	0.1	Cobalt 60	Not Required	Exempt	III
ATR387	842-6661 248-8504	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR387/6024	272-9195 842-6661	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR388	272-9197	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR407	262-0289 060-6626	Varian	0.3	Cobalt 60	Required	Exempt	III
ATR407	262-0289	Sylvania	1.0	Cobalt 60	Required	Exempt	III
ATR-427	390-5241	Sylvania	0.15	Cobalt 60	Required	Exempt	III
ATR427	390-5241	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
A15030	847-1319	RCA	0.498	Thorium 232	Required	Exempt	III
A15034	- - -	RCA	0.249	Thorium 232	Required	Exempt	III

Table C-1D -- Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
A15039	- - -	RCA	0.58	Thorium 232	Required	Exempt	III
A2519B	- - -	RCA	0.0276	Thorium 232	Not Required	Exempt	III
A2548	- - -	RCA	0.032	Thorium 232	Not Required	Exempt	III
A2589	- - -	RCA	0.032	Thorium 232	Not Required	Exempt	III
BES-033	070-8080 902-0941	Varian	0.15	Cobalt 60	Required	Exempt	III
BES-034	904-7356	Varian	0.25	Cobalt 60	Required	Exempt	III
BES-045	434-0229	Varian	0.15	Cobalt 60	Required	Exempt	III
BES-046	856-8852 916-3670	Varian	0.4	Cobalt 60	Required	Exempt	III
BES-048	856-9953 916-3669	Varian	0.3	Cobalt 60	Required	Exempt	III
BES-050	222-1388	Varian	0.4	Cobalt 60	Required	Exempt	III
BES-052	405-8369	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-001	- - -	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-002	- - -	Varian	0.4	Cobalt 60	Required	Exempt	III
BL-A-004	- - -	Varian	0.3	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
BL-A-005	- - -	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-006	- - -	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-007	089-5851	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-A-007-1	089-5851	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-008	- - -	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-009	956-2318	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-011	222-1389	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-012	222-1397	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-013	- - -	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-026	903-3308	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-030	348-2498	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-A-034	615-9618	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-N-003	808-9472	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-N-012	948-9472	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-N-045	913-3128	Varian	0.3	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
BL-P-027D	973-7957	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-P-040D	056-7033	Varian	0.8	Cobalt 60	Required	Exempt	III
BL-P-105D	916-3369	Varian	0.6	Cobalt 60	Required	Exempt	III
BL-S-001	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-002	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-003	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-004	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-005	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-006	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-012	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-013	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-015	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-S-016	809-7515	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-017	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-018	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-019	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-020	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-021	880-5258	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-022	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-023	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-024	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-025	880-5259	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-027	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-028	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-029	968-0500	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-030	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-031	880-8713	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-032	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-504	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-505	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-S-506	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-S-508	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-509	- - -	Varian	0.20	Cobalt 60	Required	Exempt	III
BL-S-510	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-511	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-512	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-514	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-515	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-516	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-519	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-S-521	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-521A	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-523	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-524	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-525	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-526	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-527	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-528	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-530	027-5015	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-S-531	027-5017	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-T-001	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-002	- - -	Varain	0.15	Cobalt 60	Required	Exempt	III
BL-T-003	472-9435	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-004	754-5431	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-004A/ 7902	754-5431	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-005B	932-3067	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-006	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-007	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-009	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-010	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-011	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-012	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-013	- - -	Varian	0.80	Cobalt 60	Required	Exempt	III
BL-T-014	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-015	899-8118	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-017	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-018	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-019	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-T-020	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-021	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-022	620-1435	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-023	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-024	848-8575	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-025	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-026	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-027	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-028	617-3129	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-029	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-031	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-032	717-7844	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-033	472-9435, 817-6181	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-033/ TR610	817-6181, 472-9435	Varian	0.90	Cobalt 60	Required	Exempt	III
BL-T-035	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-T-036	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-037	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-038	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
[illegible]-T-039	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-040	719-7508	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-041	894-7127	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-042	844-5183	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-043	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-043A	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-045	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-049	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-050	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-051	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-T-052	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-053	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-054	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-055	780-7856	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-056	081----	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-057	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-058	781-8963	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-059/8061	894-7128	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-060	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-061	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-T-062	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-063	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-064	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-065	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-066	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-T-067	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-068	822-8875	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-069	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-070	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-071	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-072	897-6637	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-073	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-074	- - -	Varian	0.7	Cobalt 60	Required	Exempt	III
BL-T-75	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-076	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-077	903-5816	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-078	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-079	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-080	620-4528	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-081	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
B' -T-082	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-083	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-084	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-085	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-086	610-8486 852-1514	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-T-087	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-088	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-089	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-090	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-T-091	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-T-092	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-094	- - -	Varian	0.80	Cobalt 60	Required	Exempt	III
BL-T-095	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-096	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-T-097	849-3494	Varian	0.7	Cobalt 60	Required	Exempt	III
BL-T-098	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-T-099	914-6268	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-100	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-101	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-103	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-T-105	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-106	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-107	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-T-108	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-109	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-110	847-3752	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-T-112	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-W-004	754-5431	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-W-015	882-1998	Varian	0.4	Cobalt 60	Required	Exempt	III
BL-W-022	- - -	Varian	0.4	Cobalt 60	Required	Exempt	III
BL-10	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-11/6282	365-2548	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-121	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-137	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-142	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-146	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-15	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-16	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-18/6632	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-20	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-25/6322	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-26	390-5250	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-27/6334	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL27/6334	578-5483	Microwave	0.25	Cobalt 60	Required	Exempt	III
BL27/6334	578-5483	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
BL28/6568	538-2793 060-6629	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-29	709-2031	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-302	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-303	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-304	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-305	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-306	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-307	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-308	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-309/6592	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-31/6637	719-5454	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-310/6593	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-311/6594	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-313/6565	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-314/6614	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-316/6595	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-317/6596	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-320/6597	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-322/6599	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-324/6613	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-326/14	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-327/6609	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-328	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-329/6602	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-331	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-332	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-333	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-335	893-1757	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-336	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-337	968-0500	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-338	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
F -339	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-34	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-340, H	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-341	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-344	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-345	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-346	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-347	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-348	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-349	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-35/6560	501-1066	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-350	581-9031	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-351	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-352	615-0719	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-352A/7447	615-0719	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-354	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-355	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-356	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-357	578-8724	Varian	0.70	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-358	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-359	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-36	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-360H	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-361	617-5807	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-362	617-3736	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-363	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-365	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-366	672-3836	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-367	617-5806	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-367A	060-6825	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-367B	060-6825	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-367C	060-6825	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-368	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-369	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-37/6633	681-9793	Varian	0.7	Cobalt 60	Required	Exempt	III
BL-371	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-372	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-373	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-374	800-3537	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-375	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-377	800-3536	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-38	- - - -	Chatham (Tung-Sol)	0.055	Radium 226	Required	Exempt	I
BL-381	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-385	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-386	- - - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-387	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-387A	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-388	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-389	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-39	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-391	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-392	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-392A	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-394	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-395	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-397	983-5684 617-5807	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-397A, B, C	983-5684	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-398	990-3077	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-399	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-40	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-41	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-43/6304	617-5810	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-44	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-45	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-46/6639	295-3589	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-47	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-49	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-509/6604	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-51	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-52	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-54/6629	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-55/6630	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-56	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-57/6635	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-58	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-60/6640	543-0143	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL- 00/6642	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-601	701-7582	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-601/8048	701-7582	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-602	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-603	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-604/6646	905-7498	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-604H/6647	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-605	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-606	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-607	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-609	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-61/6455	727-5618	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-610	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-611H	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-612/7152	807-7374	Varian	0.6	Cobalt 60	Required	Exempt	III
BL-613/6905	729-3648	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-614	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-615/6648	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-616/6685	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-617	- - -	Varian	0.25	Cobalt 60	Required	Exempt	IIW
BL-618	- - -	Varian	0.90	Cobalt 60	Required	Exempt	III
BL-619	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-62/6378	296-5932	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-620	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-622	583-4175	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-623	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-624	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-625	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-628	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-629	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-63	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-630	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-631	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-632	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-633	- - -	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-634	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-635	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-636	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-637	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-638	- - -	Varian	0.80	Cobalt 60	Required	Exempt	III
BL-639	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-640	- - -	Varian	0.256	Cobalt 60	Required	Exempt	III
BL-640	688-9031	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-640B	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-641	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-642	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-643/6906	682-8864	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-644	503-4436	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-645	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-646	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-647	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-648	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-649	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-650	892-3323	Varian	0.203	Cobalt 60	Required	Exempt	III
BL-650/6890	892-3323 553-3519	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-651	543-0693	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-651H	801-6865	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-652	608-1960	Varian	0.80	Cobalt 60	Required	Exempt	III
BL-654	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-655	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-658	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-659	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-66	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-660	553-7337 962-3345	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-661	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-662	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-664	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-665A	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-665/6962	646-4719	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-666	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-667	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-668	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-669	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-67/6650	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-670	553-7338	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-672	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-673	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-674	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-678	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-68	060-6608	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-681	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-682	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-683	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-684	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-685	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-686	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-69	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-690	806-8155	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-693	799-9471	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-693/7309	633-6304	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-696	615-5824	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-697	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-698	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-699	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-70	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-700	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-702	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-703	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-706	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-71/6564	060-6628 841-2609	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-714	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-716	727-7374	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-717	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-718	519-9961	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-72	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-724	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-726	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-73	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-735	552-1759	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-74	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-744	538-3862	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-745	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-749	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-75	636-3613	Varian	0.3	Cobalt 60	Required	Exempt	III
BL-752	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-757	- - -	Varian	0.80	Cobalt 60	Required	Exempt	III
BL76	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-762	984-6113	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-763	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-77	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-772	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-774	800-3537	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-776	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-778	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-78	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-781	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-783	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-784	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-785	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-786	615-0842	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-787	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-79	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-792	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-799	- - -	Varian	0.80	Cobalt 60	Required	Exempt	III

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Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-8	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-80	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-81/6643	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-82	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-83	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-84	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-84H	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-85	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-86/6641	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-87/6636	800-0594	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-88	- - -	Varian	0.50	Cobalt 60	Required	Exempt	III
BL-89	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-90/6634	- - -	Varian	0.90	Cobalt 60	Required	Exempt	III
BL-901	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-902	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-904	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-905	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-907	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-908	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-909	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-910	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-911	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-912	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-913	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-914	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-915	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-916	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-917	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-918	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-919H	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-92	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-920	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-924	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-925	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-926	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-927	- - -	Varian	0.80	Cobalt 60	Required	Exempt	III
BL-928	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-929	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-931	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-932	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-933/7166	681-9793	Varian	0.70	Cobalt 60	Required	Exempt	III
BL933/7166	681-9793	Microwave	0.42	Cobalt 60	Required	Exempt	III
BL-934	835-2576	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-934A	835-2574	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-934B	835-2574	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-935	- - -	Varian	0.80	Cobalt 60	Required	Exempt	III
BL-938	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-94/6631	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-939	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-941	812-2113	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-942	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-943	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-944	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-945	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-946	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-947	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-948	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TL-949	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-95/6644	843-8063	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-95/6644	752-5259 752-5239	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-95H/6645	503-4497 073-9277	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-951	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-952	583-4641	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-953	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-954	800-3535	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-955	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-956	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-957	804-2215	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-959	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-96/6605	503-4493	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-96A/6605	581-5535	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-960A	754-9177	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-961	503-4493	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-962	661-0340	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-963	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BL-964	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-965	661-0339 811-6773	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-966	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-967	835-2575	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-967A	924-9606	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-969	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-97	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-970	824-8668	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-971	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-972	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-973	681-8037	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-974	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
BL-975	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
BL-976	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-977	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-978	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-979/7381	984-6164	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-98	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-981	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
F -982	681-8036	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-983	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-99/6638	569-9508	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-990	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-991-1	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-992	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-994	882-1994	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-994A	903-2852	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-995	903-2853	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-995B/8313	903-2853	Varian	0.15	Cobalt 60	Required	Exempt	III
BL-996	051-3188	Varian	0.30	Cobalt 60	Required	Exempt	III
BL-997	- - -	Varian	0.60	Cobalt 60	Required	Exempt	III
BL-998	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
BL-991-1	079-5942	Varian	0.30	Cobalt 60	Required	Exempt	III
BP-840	553-7338	Bendix Radio	1.0	Cobalt 60	Required	Exempt	III
BS-101/5962	188-6592	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
BS-10-/5962	188-6592	Eon Corp.	4.0	Nickel 63	Required	Exempt	IV
BS-101/5962	188-6592	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
BS-101/5962	188-6592	Electronic Products, Inc.	3.0	Nickel 63	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
BS-101/5962	188-6592	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
BS-101/5962	188-6592	Eon Corp.	0.1	Nickel 63	Required	Exempt	IV
BTR-121	760-1786	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-140	807-2032 739-7922	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-141	070-8080	Varian	0.3	Cobalt 60	Required	Exempt	III
BTR-147	847-3445	Varian	0.3	Cobalt 60	Required	Exempt	III
BTR-148A	947-7292	Varian	0.5	Cobalt 60	Required	Exempt	III
BTR-165	897-6964	Varian	0.3	Cobalt 60	Required	Exempt	III
BTR-183	762-6682 943-4392	Varian	0.25	Cobalt 60	Required	Exempt	III
BTR-537	075-6770	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-540	850-0788	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-541	868-6140	Varian	0.4	Cobalt 60	Required	Exempt	III
BTR-546	788-9889	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
BTR-548	902-0502	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-608	762-7692	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-614	464-4093	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-614A	320-6631	Varian	0.15	Cobalt 60	Required	Exempt	III
BTR-632A	403-1162	Varian	0.7	Cobalt 60	Required	Exempt	III
B107A	593-9860	Hartman Elec.	1.0	Radium 60	Required	Exempt	I
B300D	- - -	Amperex	100 mg	U02 enriched	Required	Exempt	III
B4021AL	811-6838	Burrough	<1.0	Krypton 85	Required	Exempt	III
Cem-306	- - -	Central Elec.	0.50	Cobalt 60	Required	Exempt	III
Cem-332	- - -	Central Elec.	1.0	Cobalt 60	Required	Exempt	III
CH-1067H	552-1501	Chatham (Tung-Sol)	0.0012	Krypton 85	Not Required	Exempt	III
CH-1145	- - -	Chatham (Tung-Sol)	0.05	Radium 226	Required	Exempt	I
CK1097-7	062-6692	Raytheon	0.9	Cesium 137	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
CK5829	272-8546	Raytheon	- - -	- - -	Not Required	Exempt	II
DOD-004	181-0310	Varian	0.3	Cobalt 60	Required	Exempt	III
DOD-005	011-8325	Varian	0.15	Cobalt 60	Required	Exempt	III
E-35/5956	890-6617	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
E-37B/5957	806-0292	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
E-38/8370	067-9364	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
E-39	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
E-40/5958	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
E-40	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
E-41/5959	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
ECC81/12AT7	166-7662	General Electric	0.00001	Rhenium 187	Not Required	Exempt	IV
EF95/6AK5	188-5545	General Electric	0.00001	Rhenium 187	Not Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
KP680/7615	825-4999	Elec. Prod.	- - -	- - -	Required	Exempt	II
KP-92A/7619	825-4562	Elec. Prod.	- - -	- - -	Required	Exempt	II
ET-415	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
EVM-1000	269-2736	Eon Corp.	<0.1	Nickel 63	Required	Exempt	IV
EVM-3500	593-2555	Eon Corp.	<0.1	Nickel 63	Required	Exempt	IV
EVM-3800	- - -	Eon Corp.	<0.1	Nickel 63	Required	Exempt	IV
F-175D5	- - -	Amprex Elec.	100 mg	U02 enriched	Required	Exempt	III
F-2700	- - -	ITT	1.0	Nickel 63	Required	Exempt	IV
F-2701	808-6977	ITT	1.5	Cesium 137	Required	Exempt	III
F-2702	- - -	ITT	1.5	Cesium 137	Required	Exempt	III
F-2703	- - -	ITT	1.5	Cesium 137	Required	Exempt	III
F-2704-3	882-9042	ITT	1.5	Cesium 137	Required	Exempt	III
F-2705	- - -	ITT	1.0	Nickel 63	Required	Exempt	IV
F-2750	- - -	ITT	0.08	Krypton 85	Not Required	Exempt	III
F-2753	- - -	ITT	0.165	Krypton 85	Required	Exempt	III
F-2755	- - -	ITT	0.08	Krypton 85	Not Required	Exempt	III
F-2813C	- - -	ITT	0.17	Krypton 85	Required	Exempt	III
F-2824A	- - -	ITT	0.2	Krypton 85	Required	Exempt	III
F-2865	- - -	ITT	0.04	Krypton 85	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
F-2887	- - -	ITT	0.20	Krypton 85	Required	Exempt	III
F-2897	- - -	ITT	0.26	Krypton 85	Required	Exempt	III
F-2899	- - -	ITT	0.40	Krypton 85	Required	Exempt	III
GE 12661	- - -	General Electric	0.00001	Rhenium 187	Not Required	Exempt	IV
GE 14501	- - -	General Electric	0.00001	Rhenium 187	Not Required	Exempt	IV
GE 16841	- - -	General Electric	0.00001	Rhenium 187	Not Required	Exempt	IV
GE 20111	- - -	General Electric	0.00001	Rhenium 187	Not Required	Exempt	IV
GL-5513	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-5556	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-5674	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-5740	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-5973	912-9285	General Electric	0.03	Thorium 232	Not Required	Exempt	III
Gl-6019	912-9285	General Electric	0.005	Thorium 232	Not Required	Exempt	III
GL-6039	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
GL 6182	- - -	General Electric	0.02	Thorium 232	Not Required	Exempt	III
GL-6251	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-6410	- - -	General Electric	0.60	Thorium 232	Required	Exempt	III
GL-6942	834-5522	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-7C29	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-7D21	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-7085/356	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GL-851	- - -	General Electric	0.03	Thorium 232	Not Required	Exempt	III
GV-3A	- - -	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV3A-1200	878-6554	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV3A-1400	- - -	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3A-1500	675-3439	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3A-1800	- - -	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3A-2000	812-6904	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3A-2500	850-6168	Victoreen	1.0	Nickel 63	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
GV3A-950	060-3441 617-3128	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV3B	- - -	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV3B-400	824-7834	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV3B-400/ VTR400	- - -	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3B-400/ VT-600	- - -	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3B-450	578-1141	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3B-600	686-6756	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3B-600/ VTR600	- - -	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3B-700	846-4538	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV3H	- - -	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV3S	- - -	Victoreen	0.265	Nickel 63	Required	Exempt	IV
GV4S-2200	855-8789	Victoreen	1.5 to 2.0	Nickel 63	Required	Exempt	IV
GV4S-2800	855-8790	Victoreen	1.5 to 2.0	Nickel 63	Required	Exempt	IV
GV4S-3250	855-8791	Victoreen	1.5 to 2.0	Nickel 63	Required	Exempt	IV
GV4S-410	897-8418	Victoreen	1.5 to 2.0	Nickel 63	Required	Exempt	IV
GV5A	- - -	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-1200	617-5825	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
GV5A-1300	858-4074	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-1400	892-0975	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-1600	811-7500	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-2000	617-4105	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-2200	828-0613	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-2500	679-8153	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-3000	682-8649	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5A-3300	617-3482	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5B	- - -	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5C	- - -	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV5C-3300	617-3482	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV5C-3800	850-1522	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV5C-4000	617-4449	- - -	1.0	Nickel 63	Required	Exempt	IV
GV5C-4300	852-7334	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV6A	- - -	Victoreen	0.20	Nickel 63	Required	Exempt	IV
GV6A-1000	880-5499	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV6A-1200	808-4217	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV6A-2000	729-5602	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV6A-2100	835-1517	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
GV6A-2100	810-7348	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV6A-700	826-1280	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV6C	- - -	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
GV6C-3800	840-0766	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV6R-1400	617-5647	- - -	1.0	Nickel 63	Required	Exempt	IV
GV6R-1400A	687-1034	- - -	1.0	Nickel 63	Required	Exempt	IV
GV9A	- - -	Victoreen	0.40	Nickel 63	Required	Exempt	IV
GV9A-1420	838-8881	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV9A-2000	613-6796	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV9A-600	933-1702	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV9A-900	- - -	Victoreen	1.0	Nickel 63	Required	Exempt	IV
GV9A-900	839-9525	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
HF-300	188-8648	Electronic Interprises	0.0002	Thorium 232	Not Required	Exempt	III
KU-14/6777	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-16	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-17	924-5255	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-21	899-9964	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
KU-22	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-23	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-24	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-25/8424	390-5208	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-26	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-27	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-28	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-29/8488	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-34	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-401/7603	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-402/8329	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-51	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-52/8264	852-5655 078-9500	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
KU-80	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-81	- - -	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KU-82/7583	925-2111	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
KX-642	501-0866 581-8178	Westinghouse	0.3	Krypton 85	Required	Exempt	III
MA-306	630-2941	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-306B/7379	617-5696	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-310	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3101	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3102	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3103A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3104	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3106A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3106B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3107	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3108	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3109	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-311	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3112	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
A3113A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3113B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3114	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3115	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3116	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3117	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3118	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3119	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3120	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3121	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3122	842-7692	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3123	842-7693	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3124S	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3126	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3127	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3129	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3131	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3132	877-6026	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3133	856-9805	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MA-3134	866-5427	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3136	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3136A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3136B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3137	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3138	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3148	464-4093	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3151	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3152	857-3083	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3152/3130	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3152/3135	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3153S	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3154	990-4631	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3157	914-6268	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3157D-8576	760-1786	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3158A	918-3721	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA316/6232	780-8151	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3160	948-5806	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3161S	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MA 3164/3162	947-7424	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3164/3163	145-3188	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3165	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3178	- - -	Microwave	0.4	Cobalt 60	Required	Exempt	III
MA-3192	942-6407	Microwave	0.42	Cobalt 60	Required	Exempt	III
MA-320	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3215-1	822-2494	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-324B	617-3129	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-325	725-4068	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3254-1	478-4198	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-326	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-327	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-331A	765-4539	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-331B	765-4540	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-332	620-1435	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-332B	628-1435	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-333	553-7337	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MA-335B	712-3891	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-336-7166	679-6507	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-336A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-336B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-336C	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-337, 337A	688-9031	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-337B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-337C	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-337D	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-338A/7381	895-0802	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-338B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-339/6962	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-340B	847-3752	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-340D	811-6773	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-340F	893-9153	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-340K	843-0702	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-340T	079-5341	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-341	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MA-346	581-5535	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-347S	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-348	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-349	620-4528	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-349B	897-6637	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-350	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-351A, B, C	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-352A, B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-354	765-4524	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-354A, B, C, D, E	- - -	Microwave	0.40	Cobalt	Required	Exempt	III
MA-355A	051-0095	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-356	707-0816 849-3494	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-356A	729-1269	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-356C	825-1000	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-356E	081-9255	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-356L	707-0816	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-356P	503-8046	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-357	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MA-358	824-8668	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-360/7309	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-361S	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-362A, B, C, D, E	056-8225 (C)	Microwave	0.40	Cobalt 60	Required	Exempt	III
	762-7692 (E)	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-363	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-365/7562	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-365A, B, C, D	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-366	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-366-2	835-0057	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-366-3	835-0058	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-366-4	835-0059	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-366C	835-0058	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-367	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-368A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-370A, AS	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-37019X	469-7363	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3702	801-6865	Microwave	0.40	Cobalt 60	Required	Exempt	III

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Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
MA-371A	056-8223	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-372	822-8875	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3722	893-0151	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-373	005-1194	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3743	661-0340	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-375-7563	762-6682	Microwave	0.42	Cobalt 60	Required	Exempt	III
MA-375A/6560	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3753	486-9161	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA376/6636	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3763	479-1624	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-377	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3770	112-9482	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-378A	610-8486	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3784	140-6535	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3785	139-3204	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-379	262-0174	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-379A, B, C, DS	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3799	003-7978	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
MA-38GI	959-7413	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-382A	056-8227	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-38155	763-8807	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-382A	856-8227	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3821Z	938-4359	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-383	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3830X	422-5376	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3847	105-3737	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3848Z	105-8594	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3855K	226-4306	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3879X	577-3250	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3886Z	160-2183	Microwave	≤50	Tritium (H3)	Required	Exempt	IV
MA-3887Z	160-2186	Microwave	≤50	Tritium (H3)	Required	Exempt	IV
MA-3895X	495-9113	Microwave	≤50	Tritium (H3)	Required	Exempt	IV
MA-3899Z	449-7994	Microwave	≤50	Tritium (H3)	Required	Exempt	IV
MA-390	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3919Z	009-8082	Microwave	≤50	Tritium (H3)	Required	Exempt	IV
MA-393	850-9920	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-394	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-395	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-3959Z	01-013-0079	Microwave	≤50	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MA-396	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-397	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MA-399	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
MCC-17A	788-9889	Metcom (Omni-wave)	0.20	Cobalt 60	Required	Exempt	III
MCT 14	295-3589	Metcom (Omni-wave)	0.40	Cobalt 60	Required	Exempt	III
MCT 20	503-4436	Metcom (Omni-Wave)	0.40	Cobalt 60	Required	Exempt	III
MDS-56/ 8311	064-7943	Metcom (Omni-Wave)	0.40	Cobalt 60	Required	Exempt	II
MD 100X2	134-0912	Micro Dynamics	3000.0	Tritium (H3)	Required	Exempt	IV
MD 100X3	134-0913	Micro Dynamics	- - -	Tritium (H3)	Required	Exempt	IV
MD 100X5	857-3083	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD70C1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70C2	262-0174	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70C3	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70C4	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70C5	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70C6	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD70C7	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70C8	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K10	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K2	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K201	937-9459	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K3	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K4	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K5	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K6	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K7	835-2575	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K8	762-7692	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70K9	822-8875	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70L1	707-0816	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70L2	942-6407	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70S1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70S2	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70S3	226-2035	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70V1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD70V2	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70V3	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70V4	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70V5	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70V6	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X1	188-3534	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X10	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X11	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X12	073-9277	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X13	760-1786	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X14	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X15	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X16	897-6637	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X17	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X18	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X19	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X2	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X20	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X201	897-6637	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD70X21	893-0151	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X22	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X3	583-0613	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X4	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X5	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X6	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X7	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X8	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD70X9	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD72L1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD72L2	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD72L3	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD73C1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73C2	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73C3	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73C4	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73K1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73K2	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73K3	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III

Table C-10 - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD73J4	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73K5	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73K6	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73K7	762-6682	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73K8	- - -	Micro Dynamics	1.0	Cpbalt 60	Required	Exempt	III
MD73S1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73V1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73V2	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X10	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X11	617-3129	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X12	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X13	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X14	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X15	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X16	947-7292	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X2	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X3	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X4	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD73X5	947-7424	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X6	801-6865	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X7	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X8	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD73X9	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD74S1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD79C1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD79K1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD79K2	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD79S1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD79U1	866-5263	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD79V1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD79X1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exmept	III
MD79X2	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD80C1	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C10	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C11	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD70C12	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C13	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					UCG and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD80C14	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C15	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C16	- - -	Micro Dynamics	36000	Tritium (H2)	Required	Exempt	IV
MD80C17	106-0423	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C19-1	106-0416	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C18	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C19	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C2	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C20	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C21	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C22	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C23	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C24	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C25	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C26	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C3	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C4	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C5	404-8546	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C6	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C7	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD80C8	225-3419	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80C9	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD80K1	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K7	449-7994	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K10	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K11	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K12	160-2186	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K13	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K14	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K15	160-2186	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K16	- - -	Micro Dynamcis	3000	Tritium (H3)	Required	Exempt	IV
MD80K17	009-8087	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K18	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K19	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K2	105-3757	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K20	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K21	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K22	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K23	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K24	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD90K25	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K26	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K27	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K28	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K29	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K3	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K30	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K31	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K32	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K33	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K4	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K5	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K6	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K7	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K8	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80K9	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80L1	- - -	Micro Dynamics	18000	Tritian (H3)	Required	Exempt	IV
MD80L2	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S1	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD80S10	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S11	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S12	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S13	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S2	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S3	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S4	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S5	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S6	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S7	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S8	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80S9	- - -	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD80X1	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X10	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X11	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X12	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X13	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X14	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X15	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD80X16	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X17	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X18	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X19	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X2	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X20	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X21	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X22	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X23	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X24	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X25	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X26	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X27	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X28	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X29	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X3	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X30	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X31	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X32	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD80X33	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X34	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X35	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X36	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X37	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X38	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X39	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X4	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X40	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X41	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X42	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X43	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X44	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X45	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X46	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X47	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X5	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X6	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X7	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV

Table C-19 - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD80X8	- - -	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD80X9	495-9113	Micro Dynamics	3000	Tritium (H3)	Required	Exempt	IV
MD81C1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD81K1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD81X1	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD81X2	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD81X3	- - -	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD81X4	422-5376	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD81X5	469-7363	Micro Dynamics	0.5	Cobalt 60	Required	Exempt	III
MD82L1	729-1269	Micro Dynamics	18000	Tritium (H3)	Required	Exempt	IV
MD83K1	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD84C1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD84K1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD84X1	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD84X2	- - -	Micro Dynamics	1.0	Cobalt 60	Required	Exempt	III
MD85C1	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD85C2	- - -	Micro Dynamics	36000	Tritium (H3)	Required	Exempt	IV
MD85K1	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K10	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD85K11	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K12	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K13	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K14	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K15	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K16	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K17	009-8082	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K18	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K2	105-8594	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K3	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K4	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K5	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K6	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K7	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K8	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85K9	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85X1	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85X2	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85X3	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MD85X4	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85X5	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85X6	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MD85X7	- - -	Micro Dynamics	6000	Tritium (H3)	Required	Exempt	IV
MKT-11/6282	365-2548	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
MLT-13/7823	729-1269	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
ML-199-8094	948-6413	Machlett	0.003	Thorium 232	Not Required	Exempt	III
ML-212E	- - -	Machlett	0.00068	Thorium 232	Not Required	Exempt	III
ML-241B	- - -	Machlett	0.00068	Thorium 232	Not Required	Exempt	III
ML-279	188-3541	Machlett	0.0031	Thorium 232	Not Required	Exempt	III
ML-356/5771	- - -	Machlett	0.036	Thorium 232	Not Required	Exempt	III
ML-357B	237-0108	Machlett	0.0011	Thorium 232	Not Required	Exempt	III
ML-379	- - -	Machlett	0.0031	Thorium 232	Not Required	Exempt	III
ML-5530	- - -	Machlett	0.0096	Thorium 232	Not Required	Exempt	III
ML-5531	- - -	Machlett	0.029	Thorium 232	Not Required	Exempt	III
ML-5541	- - -	Machlett	0.014	Thorium 232	Not Required	Exempt	III
ML-5681	- - -	Machlett	0.086	Thorium 232	Not Required	Exempt	III
ML-5682	755-9109	Machlett	0.20	Thorium 232	Required	Exempt	III
ML-5736	- - -	Machlett	0.006	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
ML-6256	- - -	Machlett	0.013	Thorium 232	Not Required	Exempt	III
ML-6257	755-9108	Machlett	0.013	Thorium 232	Not Required	Exempt	III
ML-6258	809-3372	Machlett	0.013	Thorium 232	Not Required	Exempt	III
ML-6420	- - -	Machlett	0.0091	Throium 232	Not Required	Exempt	III
ML-6421	- - -	Machlett	0.0091	Throium 232	Not Required	Exempt	III
ML-6422	- - -	Machlett	0.0091	Thorium 232	Not Required	Exempt	III
ML-6423	816-1386	- - -	0.0091	Thorium 232	Not Required	Exempt	III
ML-6424	- - -	Machlett	0.016	Thorium 232	Not Required	Exempt	III
ML-6425	- - -	Machlett	0.016	Thorium 232	Not Required	Exempt	III
ML-6426	- - -	Machlett	0.03	Thorium 232	Not Required	Exempt	III
ML-6427	- - -	Machlett	0.03	Thorium 232	Not Required	Exempt	III
ML-6544	561-8230	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
ML-6577	- - -	Machlett	0.036	Thorium 232	Not Required	Exempt	III
ML-6623	- - -	Machlett	0.006	Thorium 232	Not Required	Exempt	III
ML-6696	763-7806	Machlett	0.053	Thorium 232	Not Required	Exempt	III
ML-6908	- - -	Machlett	0.0066	Thorium 232	Not Required	Exempt	III
ML-7002	- - -	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
ML-7003	681-8017	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
ML-7003A	020-0074	Machlett	0.0055	Thorium 232	Not Required	Exempt	III

Table C-10 - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
ML-7107	- - -	Machlett	0.013	Thorium 232	Not Required	Exempt	III
ML-7120	- - -	Machlett	0.0091	Thorium 232	Not Required	Exempt	III
ML-7121	- - -	Machlett	0.0091	Thorium 232	Not Required	Exempt	III
ML-7124	- - -	Machlett	0.016	Thorium 232	Not Required	Exempt	III
ML-7125	- - -	Machlett	0.016	Thorium 232	Not Required	Exempt	III
ML-7248	615-5607	Machlett	0.0014	Throium 232	Not Required	Exempt	III
ML-7482/7560	- - -	Machlett	0.1078	Thorium 232	Required	Exempt	III
ML-7715	137-7692	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
ML-7845	- - -	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
ML-8094/199	984-6413	Machlett	0.003	Thorium 232	Not Required	Exempt	III
ML-8317	942-3980	Machlett	0.1078	Thorium 232	Required	Exempt	III
MPT-12/7821	799-9471	Omni-Wave (Metcom)	- - -	Cobalt 60	Required	Exempt	III
MPT-13/7901	689-1922 882-1994	Omni-Wave (Metcom)	1.0	Cobalt 60	Required	Exempt	III
MPT-16	842-9233	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
MPT-22	897-5744	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
MPT-23	894-7127	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
MPT-24	894-7128	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
MSA-10	553-7337	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
MSA-14	- - -	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
MST-60	845-6417	Omni-Wave (Metcom)	0.20	Cobalt 60	Required	Exempt	III
MXT-44	060-6825	Omni-Wave (Metcom)	0.20	Cobalt 60	Required	Exempt	III
MXT-61B	073-9277	Omni-Wave (Metcom)	0.20	Cobalt 60	Required	Exempt	III
MXT-91	583-4641	Omni-Wave (Metcom)	0.20	Cobalt 60	Required	Exempt	III
MXT-94	772-6061	Omni-Wave (Metcom)	0.20	Cobalt 60	Required	Exempt	III
PJ-4 (MX)	- - -	General Elec.	0.03	Thorium 232	Not Required	Exempt	III
PL-195	- - -	Penta Labs	0.0029	Thorium 232	Not Required	Exempt	III
PL-8295/172	993-5167	Penta Labs	0.0029	Thorium 232	Not Required	Exempt	III
PL-8295A	- - -	Penta Labs	0.0029	Thorium 232	Not Required	Exempt	III
P5A	- - -	Electronics, Inc.	0.02	Krypton 85	Not Required	Exempt	III
QKS-1347	- - -	Raytheon	0.35	Thorium 232	Required	Exempt	III
QKS-1350	- - -	Raytheon	0.01	Thorium 232	Not Required	Exempt	III
QKS-1380	- - -	Raytheon	0.37	Thorium 232	Required	Exempt	III
QKS-1442	- - -	Raytheon	0.01	Thorium 232	Not Required	Exempt	III
QKS-1443	- - -	Raytheon	0.22	Thorium 232	Required	Exempt	III
QKS-1452	- - -	Raytheon	1.0	Thorium 232	Required	Exempt	III
QKS-1484	- - -	Raytheon	0.22	Thorium 232	Required	Exempt	III
QKS-1517	- - -	Raytheon	0.01	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
QKS-1539	- - -	Raytheon	0.06	Thorium 232	Not Required	Exempt	III
QKS-1540	- - -	Raytheon	0.38	Thorium 232	Required	Exempt	III
QKS-1541	- - -	Raytheon	0.38	Thorium 232	Required	Exempt	III
QKS-1543	- - -	Raytheon	0.22	Thorium 232	Required	Exempt	III
QKS-1590	- - -	Raytheon	0.91	Thorium 232	Required	Exempt	III
QKS-1594	- - -	Raytheon	0.38	Thorium 232	Required	Exempt	III
QKS-1595	- - -	Raytheon	0.38	Thorium 232	Required	Exempt	III
QKS-1611	- - -	Raytheon	0.03	Thorium 232	Not Required	Exempt	III
QKS-1629	- - -	Raytheon	0.22	Thorium 232	Required	Exempt	III
QKS-1648	- - -	Raytheon	0.03	Thorium 232	Not Required	Exempt	III
QKS-1655	- - -	Raytheon	0.10	Thorium 232	Not Required	Exempt	III
QKS-1672	- - -	Raytheon	1.0	Thorium 232	Required	Exempt	III
QKS-1697	- - -	Raytheon	0.04	Thorium 232	Not Required	Exempt	III
QK-1000	- - -	Raytheon	0.013	Thorium 232	Not Required	Exempt	III
QK-1002	- - -	Raytheon	0.006	Thorium 232	Not Required	Exempt	III
QK-1102	- - -	Raytheon	0.006	Thorium 232	Not Required	Exempt	III
QK-1110	- - -	Raytheon	0.03	Thorium 232	Not Required	Exempt	III
QK-1122	- - -	Raytheon	0.006	Thorium 232	Not Required	Exempt	III
QK-1130	- - -	Raytheon	0.03	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
QK-1194	- - -	Raytheon	0.55	Thorium 232	Required	Exempt	III
QK-1220	- - -	Raytheon	0.10	Thorium 232	Not Required	Exempt	III
QK-1243	- - -	Raytheon	0.10	Thorium 232	Not Required	Exempt	III
QK-1244	- - -	Raytheon	0.01	Thorium 232	Not Required	Exempt	III
QK-1267	- - -	Raytheon	0.35	Thorium 232	Required	Exempt	III
QK-1286	- - -	Raytheon	0.37	Thorium 232	Required	Exempt	III
QK-172/6959	262-3768 951-6292	Raytheon	0.22	Thorium 232	Required	Exempt	III
QK-221/6002	- - -	Raytheon	0.22	Thorium 232	Required	Exempt	III
QK-235/6344	- - -	Raytheon	0.49	Thorium 232	Required	Exempt	III
QK-241	- - -	Raytheon	0.169	Thorium 232	Required	Exempt	III
QK-254/6518	061-0485	Raytheon	0.40	Thorium 232	Required	Exempt	III
QK-283A	- - -	Raytheon	0.02	Thorium 232	Not Required	Exempt	III
QK-324C/7452	- - -	Raytheon	0.17	Thorium 232	Required	Exempt	III
QK-327/7529	682-2771	Raytheon	0.19	Thorium 232	Required	Exempt	III
QK-338A/6410A	- - -	Raytheon	0.46	Thorium 232	Required	Exempt	III
QK-349/6249B	- - -	Raytheon	0.006	Thorium 232	Not Required	Exempt	III
QK-390	- - -	Raytheon	0.12	Thorium 232	Required	Exempt	III
QK-410A	- - -	Raytheon	0.008	Thorium 232	Not Required	Exempt	III
QK-427	- - -	Raytheon	0.003	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
QK-428A/6406A	- - -	Raytheon	0.35	Thorium 232	Required	Exempt	III
QK-437/6402B	- - -	Raytheon	0.07	Thorium 232	Not Required	Exempt	III
QK-447/6843	284-6000	Raytheon	0.61	Thorium 232	Required	Exempt	III
QK-494	- - -	Raytheon	0.05	Thorium 232	Not Required	Exempt	III
QK-496	- - -	Raytheon	0.04	Thorium 232	Not Required	Exempt	III
QK-506	- - -	Raytheon	0.04	Thorium 232	Not Required	Exempt	III
QK-622/8129	- - -	Raytheon	0.02	Thorium 232	Not Required	Exempt	III
QK-624/7718	- - -	Raytheon	0.10	Thorium 232	Not Required	Exempt	III
QK-665	- - -	Raytheon	0.81	Thorium 232	Required	Exempt	III
QK-665	- - -	Raytheon	3.50	Thorium 232	Required	Exempt	III
QK-666	- - -	Raytheon	3.50	Thorium 232	Required	Exempt	III
QK-668	- - -	Raytheon	0.008	Thorium 232	Not Required	Exempt	III
QK-727	- - -	Raytheon	0.04	Thorium 232	Not Required	Exempt	III
QK-783	- - -	Raytheon	0.02	Thorium 232	Not Required	Exempt	III
QK-846/7798	- - -	Raytheon	0.02	Thorium 232	Not Required	Exempt	III
QK-871	- - -	Raytheon	2.20	Thorium 232	Required	Exempt	III
QK-883	- - -	Raytheon	0.10	Thorium 232	Not Required	Exempt	III
QK-898	- - -	Raytheon	0.46	Thorium 232	Required	Exempt	III
QK-904	- - -	Raytheon	0.006	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
QK-912	- - -	Raytheon	2.30	Thorium 232	Required	Exempt	III
QK-942	- - -	Raytheon	1.25	Thorium 232	Required	Exempt	III
QK-943	- - -	Raytheon	0.006	Thorium 232	Not Required	Exempt	III
QK-976	- - -	Raytheon	2.20	Thorium 232	Required	Exempt	III
QK-990	- - -	Raytheon	0.38	Thorium	Required	Exempt	III
QS-1212	- - -	English Elec. Valve Company	0.10	Uranium (U02)	Required	Exempt	III
QS-1213	- - -	English Elec. Valve Company	0.10	Uranium (U02)	Required	Exempt	III
QS-1215	- - -	English Elec. Valve Company	0.10	Uranium (U02)	Required	Exempt	III
RK-6002	- - -	Raytheon	0.22	Thorium 232	Required	Exempt	III
RK-6249B	- - -	Raytheon	0.006	Thorium 232	Not Required	Exempt	III
RK-6344	- - -	Raytheon	0.49	Thorium 232	Required	Exempt	III
RK-6402B	- - -	Raytheon	0.07	Thorium 232	Not Required	Exempt	III
RK-6406A	- - -	Raytheon	0.03	Thorium 232	Not Required	Exempt	III
RK-6410A	- - -	Raytheon	0.19	Thorium 232	Required	Exempt	III
RK-6518	- - -	Raytheon	0.40	Thorium 232	Required	Exempt	III
RK-6543	- - -	Raytheon	0.61	Thorium 232	Required	Exempt	III
RK-6959	951-6292	Raytheon	0.22	Thorium 232	Required	Exempt	III
RK-7452	- - -	Raytheon	0.17	Thorium 232	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
RK-7529	- - -	Raytheon	0.19	Thorium 232	Required	Exempt	III
RK-7718	- - -	Raytheon	0.10	Thorium 232	Not Required	Exempt	III
RK-7798	- - -	Raythoen	0.19-0.48	Thorium 232	Required	Exempt	III
RK-8129	- - -	Raytheon	0.19-0.48	Thorium 232	Required	Exempt	III
R1130B/1B59	729-1719	- - -	- - -	- - -	Required	Exempt	II
R1131C	038-1663	Sylvania	- - -	- - -	Required	Exempt	II
R4340	- - -	Sylvania	- - -	- - -	Required	Exempt	II
R4410	665-3150	Sylvania	- - -	- - -	Required	Exempt	II
TD-19	- - -	Bendix	0.03	Radium 226	Required	Exempt	I
TD-36	855-8680	Bendix	0.90	Cesium 137	Required	Exempt	III
TD-36A	866-5264	Bendix	0.90	Cesium 137	Required	Exempt	III
TD-38	- - -	Bendix	0.60	Radium 226	Required	Exempt	I
TD-39	471-9818	Bendix	0.60	Radium 226	Required	Exempt	I
TD-40	081-0192	Bendix	0.60	Radium 226	Required	Exempt	I
TD-41	813-5616	Bendix	0.60	Radium 226	Required	Exempt	I
TD-42	968-5229	Bendix	0.60	Radium 226	Required	Exempt	I
TD-43	- - -	Bendix	0.60	Radium 226	Required	Exempt	I
TD-44/7988	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-49	- - -	Bendix	0.60	Radium 226	Required	Exempt	I

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TD-51	- - -	Bendix	0.60	Radium 226	Required	Exempt	I
TD-52	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-53	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-55	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-56	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-58	828-8004	Bendix	0.06	Radium 226	Required	Exempt	I
TD-61	855-8682	Bendix	0.06	Radium 226	Required	Exempt	I
TD-63	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-64	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-65	- - -	Bendix	0.03	Radium 226	Required	Exempt	I
TD-66	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-67	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-68	- - -	Bendix	0.03	Radium 226	Required	Exempt	I
TD-69	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-72/8059	844-5182 969-4162	Bendix	0.06	Radium 226	Required	Exempt	I
TD-74	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TD-78	852-5546	Bendix	0.06	Radium 226	Required	Exempt	I
TD-81	054-3205	Bendix	0.06	Radium 226	Required	Exempt	I
TD-9A	- - -	Bendix	0.03	Radium 226	Required	Exempt	I

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TE-31	- - -	Signalite	0.5 - 1.0 mg	Thorium 232 Thorium 228	Not Required	Exempt	I
TE-32	- - -	Signalite	0.5 - 1.0 mg	Thorium 232 Thorium 228	Not Required	Exempt	I
TE-33	- - -	Signalite	0.5 - 1.0 mg	Thorium 232 Thorium 228	Not Required	Exempt	I
TE-34	- - -	Signalite	0.5 - 1.0 mg	Thorium 232 Thorium 228	Not Required	Exempt	I
TE-72	- - -	Signalite	0.5 - 1.0 mg	Thorium 232 Thorium 228	Not Required	Exempt	I
TE-73	- - -	Signalite	0.5 - 1.0 mg	Thorium 232 Thorium 228	Not Required	Exempt	I
TG-100	(5841-989-2364)	- - -	- - -	- - -	- - -	- - -	- - -
TG-101	(5920-629-2731)	- - -	- - -	- - -	- - -	- - -	- - -
TG-102	(5841-774-9480)	- - -	- - -	- - -	- - -	- - -	- - -
TG-103	(5841-117-4090, 5840-251-8620)	- - -	- - -	- - -	- - -	- - -	- - -
TG-104	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-105	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-106	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-107	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-108	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-109	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-11	- - -	Signalite	3 - 5.0	Cesium 137	Required	Exempt	III
TG-110	(See 5920-856-5965, 1430-896-5689)	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-111	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-112	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-114	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-115	(See 5920-953-1924)						
TG-116	- - -	Signalite	1 - 2.00	Cesium 137	Required	Exempt	III
TG-117	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-118	(1270-673-6060)	- - -	- - -	- - -	- - -	- - -	- - -
TG-119	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-12	- - -	Signalite	3 - 5.0	Cesium 137	Required	Exempt	III
TG-120	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-121	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-122	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-123	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-124	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-125	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-126	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-127	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-13	- - -	Signalite	3 - 5.00	Cesium 137	Required	Exempt	III
TG-131	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-132	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-133	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-134	(See 5920-950-0902)	- - -	- - -	- - -	- - -	- - -	- - -
TG-135	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-136	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-139	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-14	(See 5920-163-4107)	- - -	- - -	- - -	- - -	- - -	- - -
TG-140	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-141	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-142	- - -	Signalite	0.09	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-143 thru TG-146	- - -	Signalite	0.06	Cesium 137	Required	Exempt	III
TG-148	077-1828	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-149	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-15	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-151	(See 5920-789-7979)	- - -	- - -	- - -	- - -	- - -	- - -
TG-153	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-155	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-156	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-157	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-16	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-160	(5840-791-5302)	- - -	- - -	- - -	- - -	- - -	- - -
TG-161	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-162	(5840-880-5304, 5840-760-1298)	- - -	- - -	- - -	- -	- - -	- - -
TG-163	(5840-880-5303)	- - -	- - -	- - -	- - -	- - -	- - -
TG-164	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III

Table C-10 - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-165	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-166	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-167	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-168	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-169	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-17	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-170	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-171	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-172	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-173	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-174	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-175	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-176	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-178	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-18	- - -	Signalite	0.1 - 0.2	Cesium 137	Required	Exempt	III
TG-183	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III
TG-184	(See 5920-163-4106)	- - -	- - -	- - -	- - -	- - -	- - -
TG-186	- - -	Signalite	<1.0	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-187	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-188	- - -	Signalite	1.0	Cesium 137	Required	Exempt	III
TG-189	(1430-613-9185)	- - -	- - -	- - -	- - -	- - -	- - -
TG-19	(5840-755-4307)	- - -	- - -	- - -	- - -	- - -	- - -
TG-190	(5841-978-2492)	- - -	- - -	- - -	- - -	- - -	- - -
TG-191	(See 5920-011-4995)	- - -	- - -	- - -	- - -	- - -	- - -
TG-192	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-194	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-196	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-197	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-198	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-2	171-9725	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-20A	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-21	- - -	Signalite	0.1 - 0.2	Cesium 137	Required	Exempt	III
TG-22	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-24	(1270-673-5107)	- - -	- - -	- - -	- - -	- - -	- - -

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
T -249	(5840-003-6050)	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-25	(See 5920-578-3088)	Signalite	1.0	Cesium 137	Required	Exempt	III
TG-26A	(5840-812-1976, 5821-400-5429)	- - -	- - -	- - -	- - -	Exempt	III
TG-27A	(See 5920-822-2329)	- - -	- - -	- - -	- - -	Exempt	III
TG-28A	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-29	(5840-819-0036) 878-1839	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-30	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-31	(See 5920-787-7036)	- - -	- - -	- - -	- - -	- - -	- - -
TG-32	(5840-557-5680) 853-0056	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-33	853-0056	Signalite	< 1.0	Cesium 137	Required	Exempt	III
TG-34	(See 5920-738-8074)	- - -	- - -	- - -	- - -	- - -	- - -
TG-35	821-6134	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-36	808-6977	Signalite	0.9	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-137	(5840-581-2170)	- - -	- - -	- - -	- - -	- - -	- - -
TG-38	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-39	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-40	(See 5920-027-4320)	- - -	- - -	- - -	- - -	- - -	- - -
TG-41A	800-4409	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-42A	(See 5920-858-0215)	- - -	- - -	- - -	- - -	- - -	- - -
TG-43A	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-44	(See 5920-027-8691, 5920-892-9060, 5895-056-9194)	- - -	- - -	- - -	- - -	- - -	- - -
TG-45	(See 5920-578-9265)	- - -	- - -	- - -	- - -	- - -	- - -
TG-46	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-47	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-48	(See 5020-727-0595) 077-1828	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-49	(See 5020-062-3993, 5920-062-5995)	- - -	- - -	- - -	- - -	- - -	- - -

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
[illegible]-50	805-3626	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-51	(See 5920-813-4039)	- - -	- - -	- - -	- - -	- - -	- - -
TG-52	(See 5020-822-2326)	- - -	- - -	- - -	- - -	- - -	- - -
TG-52/633B	865-4959	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-53	(See 5920-827-5751, 5920-679-3827)	- - -	- - -	- - -	- - -	- - -	- - -
TG-54	(See 5920-682-7301)	- - -	- - -	- - -	- - -	- - -	- - -
TG-55	(See 5920-827-5752)	- - -	- - -	- - -	- - -	- - -	- - -
TG-56	(See 5920-806-1090, 5920-839-5538)	- - -	- - -	- - -	- - -	- - -	- - -
TG-57	(See 5920-608-2142)	- - -	- - -	- - -	- - -	- - -	- - -
TG-58	(See 5920-827-5753)	- - -	- - -	- - -	- - -	- - -	- - -
TG-59	(See 5920-613-0114)	- - -	- - -	- - -	- - -	- - -	- - -
TG-6	- - -	Signalite	< 1.0	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-60	(5840-131-6679, 5840-010-7649)	- - -	- - -	- - -	- - -	- - -	- - -
TG-61	(See 5920-107-5371) 882-9042	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-62	882-9042	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-63	882-9042	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-64	(See 5840-010-7647) 435-1784	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-65	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-66	(See 5840-881-9675)	- - -	- - -	- - -	- - -	- - -	- - -
TG-67	(See 5840-010-7651) 882-9042	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-68 & 69	- - -	Signalite	0.90	Cesium 137	Required	Exempt	III
TG-7	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-70 & 71	- - -	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-72	966-9469	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-73	774-6338	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-74	774-6338	Signalite	0.9	Cesium 137	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-75	774-6338	Signalite	0.9	Cesium 137	Required	Exempt	III
TG-76	(See 5920-713-4191)	- - -	- - -	- - -	- - -	- - -	- - -
TG-77	774-6338	Signalite (Bendix)	< 1.0	Cesium 137	Required	Exempt	III
TG-78	(See 5920-020-9745)	- - -	- - -	- - -	- - -	- - -	- - -
TG-79	- - -	Signalite (Bendix)	0.90	Cesium 137	Required	Exempt	III
TG-8	- - -	Signalite (Bendix)	< 1.0	Cesium 137	Required	Exempt	III
TG-80 to 82	- - -	Signalite (Bendix)	0.90	Cesium 137	Required	Exempt	III
TG-83	(See 5920-687-2067)	- - -	- - -	- - -	- - -	- - -	- - -
TG-84	(See 5920-687-2066)	- - -	- - -	- - -	- - -	- - -	- - -
TG-85	- - -	Signalite (Bendix)	0.90	Cesium 137	Required	Exempt	III
TG-86	(See 5920-822-2327)	- - -	- - -	- - -	- - -	- - -	- - -
TG-87	(See 5920-856-5966, 5920-087-6337)	- - -	- - -	- - -	- - -	- - -	- - -

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TG-88	- - -	Signalite (Bendix)	<1.0	Cesium 137	Required	Exempt	III
TG-89	- - -	Signalite Bendix	<1.0	Cesium 137	Required	Exempt	III
TG-9	- - -	Signalite (Bendix)	<1.0	Cesium 137	Required	Exempt	III
TG-90	972-8990	Signalite (Bendix)	<1.0	Cesium 137	Required	Exempt	III
TG-91 thru TG-99	- - -	Signalite (Bendix)	1.0 - 2.0	Cesium 137	Required	Exempt	III
TG-98	(5840-754-7507)	- - -	- - -	- - -	- -	- - -	- - -
TG-99	- - -	Signalite (Bendix)	0.90	Cesium 137	Required	Exempt	III
TN-11	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TN-12	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TN-13	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TN-6	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TN-6	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TN-7	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TN-8	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TN-9	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
TR331/5925	262-1693 267-1693	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
TR361/5865	262-0174	Varian	0.15	Cobalt 60	Required	Exempt	III
TR361/5865	262-0174	Sylvania	1.0	Cobalt 60	Required	Exempt	III
TR368/5853	193-5147	Varian	0.4	Cobalt 60	Required	Exempt	III
TR368/5853	193-5147	Microwave	0.5	Cobalt 60	Required	Exempt	III
TR368/5853	193-5147	Sylvania	1.0	Cobalt 60	Required	Exempt	III
TR432/6232	390-5241	Varian	0.15	Cobalt 60	Required	Exempt	III
TR610/BLT033	817-6181	Varian	0.9	Cobalt 60	Required	Exempt	III
T236A/7416	866-5264	Signalite	0.9	Cesium 137	Required	Exempt	III
UE2-450	581-9594	United Electronics	0.0015	Thorium 232	Not Required	Exempt	III
USA6605	581-5535	Omni-Wave (Metcom)	0.1	Cobalt 60	Required	Exempt	III
USN8370/E38	067-9364	- - -	- - -	- - -	Required	Exempt	II
UX6653	636-2217	- - -	- - -	- - -	Required	Exempt	II
VDC1025	404-8546	Varian	30.0	Promethium 147	Required	Exempt	IV

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
VDC-1029	106-0423	Varian	35.0	Tritium (H3)	Required	Exempt	IV
VDK-1000A	- - -	Varian	30.0	Promethium 147	Required	Exempt	IV
VDS-1011	186-1964	Varian	70.0	Tritium (H3)	Required	Exempt	III
VDX-1015	- - -	Varian	35.0	Tritium (H3)	Required	Exempt	IV
VDS-1020	- - -	Varian	35.0	Tritium (H3)	Required	Exempt	IV
VDS-1032	- - -	Varian	35.0	Tritium (H3)	Required	Exempt	IV
VDX-1001A	- - -	Varian	35.0	Tritium (H3)	Required	Exempt	IV
VDX1003	469-7363	Varian	0.15	Cobalt 60	Required	Exempt	III
VDX1017	134-0912	Varian	30.0	Promethium 147	Required	Exempt	IV
VDX1017E	009-7572	Varian	30.0	Promethium 147	Required	Exempt	IV
VDX1031	134-0913	Varian	30.0	Promethium 147	Required	Exempt	IV
VDX1033	- - -	Varian	30.0	Promethium 147	Required	Exempt	IV
VDX1035	009-2771	Varian	35.0	Tritium (H3)	Required	Exempt	IV

Table C-10 - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
VTNC204	725-2234	Varian	- - -	- - -	Required	Exempt	II
VTR400/GV3B400	- - -	Victoreen	1.0	Nickel 63	Required	Exempt	IV
VTR600/GV3B600	- - -	Victoreen	1.0	Nickel 63	Not Required	Exempt	IV
VXR130	- - -	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR1500	731-1742	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR16000	296-4142	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR1800	578-8701	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR2500	816-3759	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR2501	- - -	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR2700	501-0865	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR2701	557-6401	Victoreen	1.00	Nickel 63	Required	Exempt	IV
VXR3002	- - -	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR3500	593-2555	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR3501	- - -	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR4000	617-4449	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR4001	- - -	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR5000	- - -	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
VXR7001	661-0267	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
WD160	134-0913	Westinghouse	10.0	Promethium 147	Required	Exempt	IV

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
WD160	134-0913	Westinghouse	45.0	Tritium (H3)	Required	Exempt	IV
WD191	425-6246	Westinghouse	10.0	Promethium 147	Required	Exempt	IV
WD191	425-6246	Westinghouse	45.0	Tritium (H3)	Required	Exempt	IV
WL-4404	- - -	Westinghouse	0.8	Krypton 85	Required	Exempt	III
WL-7188	- - -	Westinghouse	0.19	Uranium 235	Required	Exempt	III
WL-759	284-7229	Westinghouse	0.3	Krypton 85	Required	Exempt	III
WX-3891A, B, C, D	- - -	Westinghouse	0.8	Krypton 85	Required	Exempt	III
XAS-1117	- - -	General Elec.	6.0	Americium 241	Required	Exempt	I
XB818	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XB819	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XB846	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XD708	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
XD751	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
XD764	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
XD765	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
XD860	- - -	Bendix	50.0	Radium 226	Required	Exempt	I
XD972	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
XG-721	- - -	Bendix	1.0 - 2.0	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
[illegible]-722	- - -	Bendix	1.0 - 2.0	Cesium 137	Required	Exempt	III
XG-739	- - -	Bendix	0.80	Cesium 137	Required	Exempt	III
XG-768	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-769	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-828	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-836	- - -	Bendix	0.09	Cesium 137	Not Required	Exempt	III
XG-845	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-901	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-919	- - -	Bendix	0.09	Cesium 137	Not Required	Exempt	III
XG-946	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-949	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-953	- - -	Bendix	0.09	Cesium 137	Not Required	Exempt	III
XG-954	- - -	Bendix	0.09	Cesium 137	Not Required	Exempt	III
XG-962	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-964	- - -	Bendix	0.09	Cesium 137	Not Required	Exempt	III
XG-975	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-987	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-988	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-989	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
XG-990	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XG-992	- - -	Bendix	0.90	Cesium 137	Required	Exempt	III
XN-757	- - -	Bendix	0.06	Radium 226	Required	Exempt	I
XTT-4253	- - -	Sylvania	0.03	Krypton 85	Not Required	Exempt	III
X6007/5791	220-6526	Sylvania	1.0	Cobalt 60	Required	Exempt	III
X7108/5790	220-6525	Sylvania	1.0	Cobalt 60	Required	Exempt	III
X7109/5863	261-8671	Microwave	0.50	Cobalt 60	Required	Exempt	III
X7109/5863	261-8671	Sylvania	1.0	Cobalt 60	Required	Exempt	III
Y-1938	- - -	General Elec.	0.0000001	Rhenium 187	Not Required	Exempt	IV
Y-1939	- - -	General Elec.	0.0000001	Rhenium 187	Not Required	Exempt	IV
Y-300	- - -	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
Y-4075	- - -	General Elec.	0.0000001	Rhenium 187	Not Required	Exempt	IV
Y-4102	- - -	General Elec.	0.0000001	Rhenium 187	Not Required	Exempt	IV
Y-4108	- - -	General Elec.	0.0000001	Rhenium 187	Not Required	Exempt	IV
Y-4109	- - -	- - -	- - -	- - -	- - -	- - -	- - -
0A2	503-4880 557-6883	Raytheon	0.03	Krypton 85	Not Required	Exempt	III
0A2WA	503-4880 769-0869 617-6367	CBS Hytron	0.02	Cobalt 60	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
0A2WA	503-4880	Raytheon	0.03	Krypton 85	Not Required	Exempt	III
0A2WA	503-4880	Sylvania	0.013	Krypton 85	Not Required	Exempt	III
0A2WA	503-4880	RCA	0.01	Nickel 63	Not Required	Exempt	IV
0A2WA	- - -	English Elec. Valve Company	0.10	Uranium Oxide (U02)	Required	Exempt	III
0A3A	- - -	Raytheon	0.05	Krypton 85	Not Required	Exempt	III
0B2	166-7648 557-6885	Raytheon	0.04	Krypton 85	Not Required	Exempt	III
0B2WA	624-4718	RCA	0.01	Nickel 63	Not Required	Exempt	IV
0B2WA	624-4718	Raytheon	0.04	Krypton 85	Not Required	Exempt	III
0B2WA	624-4718	CBS Hytron	0.05	Nickel 63	Not Required	Exempt	IV
0B2WA/6627	624-4718	Jack & Heintz	6.0	Radium 226	Required	Exempt	IV
0B2WA	624-4718	Tung-Sol (Chatham)	0.005	Radium 226	Not Required	Exempt	I
0B2WA	- - -	English Elec. Valve Company	0.10	Uranium Oxide (U02)	Required	Exempt	III
0B3A	- - -	Raytheon	0.08	Krypton 85	Not Required	Exempt	III
0C2	800-0556	Raytheon	0.025	Krypton 85	Not Required	Exempt	III
0C3A	- - -	Raytheon	0.05	Krypton 85	Not Required	Exempt	III
0C3W	188-0968	Raytheon	0.05	Krypton 85	Not Required	Exempt	III
0D3A	- - -	Raytheon	0.067	Krypton 85	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
0D3W	193-5085	Raytheon	0.067	Krypton 85	Not Required	Exempt	III
0G3	836-6273	Tung-Sol (Chatham)	0.004	Krypton 85	Not Required	Exempt	III
1AD2	715-1833	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
1AL2	- - -	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
1B22	193-5088	Varian	0.25	Cobalt 60	Required	Exempt	III
1B23	355-7250 188-3535	Varian	0.15	Cobalt 60	Required	Exempt	III
1B23	188-3535	General Elec.	1.0	Cobalt 60	Required	Exempt	III
1B23	188-3535	Central Sales	1.0	Cobalt 60	Required	Exempt	III
1B24	188-3533	Westinghouse	2.0	Radium 226	Required	Exempt	I
1B24A	193-5091	Varian	0.15	Cobalt 60	Required	Exempt	III
1B24A	193-5091	General Elec.	0.475	Cobalt 60	Required	Exempt	III
1B24A	193-5091	Microwave	0.5	Cobalt 60	Required	Exempt	III
1B24A	193-5091	Sylvania	1.0	Cobalt 60	Required	Exempt	III
1B24A	193-5091	Westinghouse	2.0	Radium 226	Required	Exempt	I
1B26	262-0137	Varian	0.15	Cobalt 60	Required	Exempt	III
1B27	193-5092	Varian	0.15	Cobalt 60	Required	Exempt	III
1B29	261-9155	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
1B3GT	193-5087	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
1B3[illegible]	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
1B32	188-6582	Westinghouse	- - -	- - -	Required	Exempt	II
1B35A	262-1356	Varian	0.30	Cobalt 60	Required	Exempt	III
1B35A	262-1356	Sylvania	1.0	Cobalt 60	Required	Exempt	III
1B35A	262-1356	Omni-Wave (Metcom)	0.2	Cobalt 60	Required	Exempt	III
1B36	262-0122	Varian	0.3	Cobalt 60	Required	Exempt	III
1B36A	755-4210	Varian	0.3	Cobalt 60	Required	Exempt	III
1B37	188-6581	Varian	0.30	Cobalt 60	Required	Exempt	III
1B37A	220-6892	General Elec.	0.950	Cobalt 60	Required	Exempt	III
1B37A	220-6892	Sylvania	1.0	Cobalt 60	Required	Exempt	III
1B37A	220-6892	Varian	0.30	Cobalt 60	Required	Exempt	III
1B38	237-2413	Varian	0.6	Cobalt 60	Required	Exempt	III
1B38	237-2413	General Elec.	0.475	Cobalt 60	Required	Exempt	III
1B40	237-2414	Varian	0.3	Cobalt 60	Required	Exempt	III
1B40	237-2414	Sylvania	1.0	Cobalt 60	Required	Exempt	III
1B41	262-0123	Varian	0.25	Cobalt 60	Required	Exempt	III
1B41	262-0123	Westinghouse	1.0	Radium 226	Required	Exempt	I
1B42	262-0124	Machlett	1.0	Radium 226	Required	Exempt	I
1B44	193-5093	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
1B44	193-5093	General Elec.	0.475	Cobalt 60	Required	Exempt	III
1B44	193-5093	Sylvania	1.0	Cobalt 60	Required	Exempt	III
1B45	262-0125	Varian	0.25	Cobalt 60	Required	Exempt	III
1B45	262-0125	Westinghouse	2.0	Radium 226	Required	Exempt	I
1B49	- - -	Westinghouse	2.0	Radium 226	Required	Exempt	I
1B50	256-9985	Varian	0.15	Cobalt 60	Required	Exempt	III
1B51	256-9988	Varian	0.30	Cobalt 60	Required	Exempt	III
1B52	262-0191	Varian	0.30	Cobalt 60	Required	Exempt	III
1B53	245-9561 262-0192	Varian	0.30	Cobalt 60	Required	Exempt	III
1B54	295-9561	Varian	0.30	Cobalt 60	Required	Exempt	III
1B55	060-3475 262-0230	Varian	0.40	Cobalt 60	Required	Exempt	III
1B56	193-5094	Varian	0.30	Cobalt 60	Required	Exempt	III
1B56	193-5094	General Elec.	0.475	Cobalt 60	Required	Exempt	III
1B56	193-5094	Sylvania	1.0	Cobalt 60	Required	Exempt	III
1B57	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
1B58	193-5095	Varian	0.40	Cobalt 60	Required	Exempt	III
1B58	193-5095	General Elec.	0.475	Cobalt 60	Required	Exempt	III
1B58	193-5095	Sylvania	1.0	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
1b58A	665-1057	Varian	0.40	Cobalt 60	Required	Exempt	III
1B58A	665-1057	Microwave	0.42	Cobalt 60	Required	Exempt	III
1B59/R1130B	729-1719	- - -	- - -	- - -	Required	Exempt	II
1B60	853-6468 193-5091	Varian	0.15	Cobalt 60	Required	Exempt	III
1B60	193-5096	Westinghouse	2.0	Radium 226	Required	Exempt	I
1B63	- - -	General Elec.	0.475	Cobalt 60	Required	Exempt	III
1B63A	735-4210 188-3534	Varian	0.15	Cobalt 60	Required	Exempt	III
1B63A	188-3534	General Elec.	0.475	Cobalt 60	Required	Exempt	III
1B63A	188-3534	Microwave	0.5	Cobalt 60	Required	Exempt	III
1B63A	188-3534	Sylvania	1.0	Cobalt 60	Required	Exempt	III
1B63B	365-6183	Varian	.15	Cobalt 60	Required	Exempt	III
1DNS	- - -	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
1G3GT	193-5087 752-5270	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
1J3	- - -	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
1K3	676-7979	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
1R5	188-3954	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
1S5	188-3952	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
1T4	188-3595	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
1U4	188-3593	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
1U5	188-0844	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
100IG	- - -	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
100R	- - -	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
100TH	556-1236 116-9979	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
100TL	- - -	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
100D1	- - -	Eimac	0.00056	Thorium 232	Not Required	Exempt	III
1010/6476	864-2984	Raytheon	0.90	Cesium 137	Required	Exempt	III
1022	- - -	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
1037/6437	800-5552	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
1038	- - -	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
1039/6438	- - -	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
1056	- - -	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
1058/1058A	- - -	Raytheon	0.02	Nickel 63	Not Required	Exempt	IV
1061/5787A	262-3771	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1068/5783A	284-7166 230-5253	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1069/6542A	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1071	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1072	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
1073	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1075/6213A	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1077	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1078	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1079	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1080	- - -	Raytheon	0.9	Cesium 137	Required	Exempt	III
1096	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
1097	- - -	Raytheon	0.9	Cesium 137	Required	Exempt	III
1098	- - -	Raytheon	0.9	Cesium 137	Required	Exempt	III
12AT7	179-4446 166-7662	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
12AT7WA	087-4931 262-0167	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
12AT7WB	752-5892	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
12AT7WC	179-4446	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
12AT8	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
12AU7A	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
12AX7	841-2352	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
12DT8	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
1332-0-40Y	- - -	ITE Circuit	10.0	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
1500T	556-1232 615-5568	Eimac	0.0013	Thorium 232	Not Required	Exempt	III
152TH	189-5976	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
172/PL8295	993-5167	Penta Labs	0.0029	Thorium 232	Not Required	Exempt	III
175A	855-1853	Eimac	0.0008	Thorium 232	Not Required	Exempt	III
177A	- - -	Eimac	0.0011	Thorium 232	Not Required	Exempt	III
177WA	950-6085	Eimac	0.0011	Thorium 232	Not Required	Exempt	III
19EZ8	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
199/ML8094	984-6413	Machlett	0.003	Thorium 232	Not Required	Exempt	III
2-150D	507-3122	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
2-2000A	- - -	Eimac	0.0018	Thorium 232	Not Required	Exempt	III
2-240A	508-1044	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
2-25A	319-0568	Eimac	0.000083	Thorium 232	Not Required	Exempt	III
2-240A	581-9594	Eimac	0.0012	Thorium 232	Not Required	Exempt	III
2-50A	284-6120	Eimac	0.000111	Thorium 232	Not Required	Exempt	III
2DF4	843-4580	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
2X2A	556-1231	RCA	0.0000176	Thorium 232	Not Required	Exempt	III
2X3000F	729-3424	Eimac	0.002	Thorium 232	Not Required	Exempt	III
2X3000F3	729-3424	Eimac	0.0017	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
2041	740-8350	RCA	0.032	Thorium 232	Not Required	Exempt	III
2054	043-4743	RCA	0.580	Thorium 232	Required	Exempt	III
211W	166-7643	U. E.	0.0006	Thorium 232	Not Required	Exempt	III
211W	166-7643	RCA	0.000125	Thorium 232	Not Required	Exempt	III
2150A	507-3122	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
22000A	- - -	Eimac	0.0018	Thorium 232	Not Required	Exempt	III
2240A	508-1044	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
22754	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
22868	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
22869	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
22923	- - -	Westinghouse	0.000191	Thorium (nat)	Not Required	Exempt	III
22947	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
22948	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
22949	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
23033	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23044	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
23051	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
23065	- - -	Westinghouse	14.464	Uranium 235	Required	Exempt	III
23070	- - -	Westinghouse	22.60	Uranium 235	Required	Exempt	III
23071	- - -	Westinghouse	121.475	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
23072	- - -	Westinghouse	44.41	Uranium 235	Required	Exempt	III
23073	- - -	Westinghouse	0.271	Uranium 235	Required	Exempt	III
23074	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23075	- - -	Westinghouse	23.73	Uranium 235	Required	Exempt	III
23076	- - -	Westinghouse	0.559	Uranium depleted	Required	Exempt	III
23077	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23088	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23089	- - -	Westinghouse	0.154	Uranium 235	Required	Exempt	III
23090	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
23091	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
23092	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
23093	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
23094	- - -	Westinghouse	0.001	Uranium 235	Not Required	Exempt	III
23110	- - -	Westinghouse	23.50	Uranium 235	Required	Exempt	III
23149	- - -	Westinghouse	46.90	Uranium 235	Required	Exempt	III
23150	- - -	Westinghouse	47.46	Uranium 235	Required	Exempt	III
23170	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
23172	- - -	Westinghouse	0.015	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
2' 195	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
23202	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23234	- - -	Westinghouse	0.932	Uranium 235	Required	Exempt	III
23238	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23254	- - -	Westinghouse	0.153	Uranium 235	Required	Exempt	III
23261	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
23263	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
23264	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
23265	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
23266	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23284	- - -	Westinghouse	0.079	Uranium 235	Required	Exempt	III
23287	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
23292	- - -	Westinghouse	0.006	Uranium 235	Not Required	Exempt	III
23430	- - -	Westinghouse	10.06	Uranium 235	Required	Exempt	III
23432	- - -	Westinghouse	3.19	Uranium 235	Required	Exempt	III
23434	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
23435	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23436	- - -	Westinghouse	0.0904	Uranium 235	Required	Exempt	III
23448	- - -	Westinghouse	0.071	Uranium 234	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
23465	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23466	- - -	Westinghouse	1.13	Uranium 235	Required	Exempt	III
23467	- - -	Westinghouse	1.13	Uranium 235	Required	Exempt	III
23468	- - -	Westinghouse	1.13	Uranium 235	Required	Exempt	III
23470	- - -	Westinghouse	205.66	Uranium 235	Required	Exempt	III
23477	- - -	Westinghouse	23.56	Uranium 235	Required	Exempt	III
23478	- - -	Westinghouse	7.23	Uranium 235	Required	Exempt	III
23485	- - -	Westinghouse	0.141	Uranium 235	Required	Exempt	III
23489	- - -	Westinghouse	154.25	Uranium 235	Required	Exempt	III
23604	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23610	- - -	Westinghouse	0.046	Uranium 235	Required	Exempt	III
23612	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23621	- - -	Westinghouse	0.046	Uranium 235	Required	Exempt	III
23622	- - -	Westinghouse	0.077	Uranium 235	Required	Exempt	III
23623	- - -	Westinghouse	0.057	Uranium 235	Required	Exempt	III
23625	- - -	Westinghouse	88.14	Uranium 235	Required	Exempt	III
23630	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23637	- - -	Westinghouse	0.185	Uranium 235	Required	Exempt	III
23639	- - -	Westinghouse	0.0001	Uranium depleted	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
23640	- - -	Westinghouse	0.0001	Uranium depleted	Not Required	Exempt	III
23642	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
23643	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23644	- - -	Westinghouse	0.0003	Uranium depleted	Not Required	Exempt	III
23650	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23651	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23652	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23653	- - -	Westinghouse	0.046	Uranium 235	Required	Exempt	III
23660	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23669	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23670	- - -	Westinghouse	0.678	Uranium 235	Required	Exempt	III
23671	- - -	Westinghouse	1.02	Uranium 235	Required	Exempt	III
23684	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23698	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23700	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
23718	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23723	- - -	Westinghouse	121.48	Uranium 235	Required	Exempt	III
23724	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
23733	- - -	Westinghouse	43.62	Uranium 235	Required	Exempt	III
23734	- - -	Westinghouse	20.34	Uranium 235	Required	Exempt	III
23735	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23747	- - -	Westinghouse	0.000191	Thorium (nat)	Not Required	Exempt	III
23761	- - -	Westinghouse	0.103	Carbon - 14	Required	Exempt	IV
23767	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23771	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
23777	- - -	Westinghouse	3.96	Uranium 235	Required	Exempt	III
23782	- - -	Westinghouse	0.000191	Thorium (nat)	Not Required	Exempt	III
23789	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
23790	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
23792	- - -	Westinghouse	0.226	Uranium 235	Required	Exempt	III
23798	- - -	Westinghouse	0.057	Uranium 235	Required	Exempt	III
23814	- - -	Westinghouse	0.187	Uranium 235	Required	Exempt	III
23816	- - -	Westinghouse	0.226	Uranium 235	Required	Exempt	III
2450A	581-9594	Eimac	0.0012	Thorium 232	Not Required	Exempt	III
25T	319-0569	Eimac	0.000083	Thorium 232	Not Required	Exempt	III
250R	116-9944	Eimac	0.0006	Thorium 232	Not Required	Exempt	III
250TH	617-8569 114-3826	Eimac	0.0006	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
25TL	617-8563 116-9982	Eimac	0.0006	Thorium 232	Not Required	Exempt	III
253	615-5666 508-1046	Eimac	0.0002	Thorium 232	Not Required	Exempt	III
254W	- - -	Eimac	0.0002	Thorium 232	Not Required	Exempt	III
264	759-9336	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
284	518-1688	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
294	- - -	Eimac	0.00009	Thorium 232	Not Required	Exempt	III
3-1000Z	954-4825	Eimac	0.00073	Thorium 232	Not Required	Exempt	III
3-200A3/592	781-1808	Eimac	0.0005	Thorium 232	Not Required	Exempt	III
3-200A3	- - -	Eimac	0.00032	Thorium 232	Not Required	Exempt	III
3-400Z	781-1808	Eimac	0.0008	Thorium 232	Not Required	Exempt	III
3-500Z	- - -	Eimac	0.0008	Thorium 232	Not Required	Exempt	III
3B24WA	060-3449 082-3306	Tung-Sol (Chatham)	0.0005	Uranium 232	Not Required	Exempt	I
3B24WB	060-3449	United Elec.	7×10^{-6}	Thorium (nat)	Not Required	Exempt	III
3CV1500A7	- - -	Eimac	0.0015	Thorium (nat)	Not Required	Exempt	III
3CV30000A1	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CV30000A3	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CV30000H3	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
3CV35000A	- - -	Eimac	0.0034	Thorium 232	Not Required	Exempt	III
3CV50000A7	- - -	Eimac	0.0175	Thorium 232	Not Required	Exempt	III
3CW10000A3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CW10000H3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CW20000A	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CW20000A1	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CW20000A3	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CW20000A7	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CW20000H3	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CW25000A3	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CW30000H3	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CW30000H7	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CW40000H3	- - -	Eimac	0.01	Thorium 232	Not Required	Exempt	III
3CW5000A1	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CW5000A3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CW5000F1	679-1791	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CW5000F3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CW5000H3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX1000A7	- - -	Eimac	0.0015	Thorium 232	Not Required	Exempt	III

Table C-10 - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
3CX1[illegible]000A1	988-1583	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CX10000A3	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CX10000A7	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CX10000H3	- - -	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
3CX1500A7	- - -	Eimac	0.0015	Thorium 232	Not Required	Exempt	III
3CX15000A3	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CX15000A7	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CX15000H3	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
3CX20000A3	- - -	Eimac	0.01	Thorium 232	Not Required	Exempt	III
3CX20000A7	- - -	Eimac	0.01	Thorium 232	Not Required	Exempt	III
3CX20000H3	- - -	Eimac	0.01	Thorium 232	Not Required	Exempt	III
3CX2500A3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX2500F3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX2500H3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX3000A1	893-1184	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX3000A7	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX3000F1	957-0951	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX3000F7	989-9810	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3CX5000A3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
3CX5000H3	- - -	Eimac	0.002	Thorium 232	Not Required	Exempt	III
3C24	116-9931	Eimac	0.000083	Thorium 232	Not Required	Exempt	III
3C45W	713-7014	ITT	0.08	Thorium 232	Not Required	Exempt	III
3S4	100-5163	General Elec.	0.00002	Uranium 235	Not Required	Exempt	III
3V4	188-3524	General Elec.	0.00001	Uranium 235	Not Required	Exempt	III
3W5000A1	- - -	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3W5000A3	- - -	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3W5000F1	679-1791	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3W5000F3	- - -	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3X2500A3	230-5298	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3X2500F3	617-4891	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3X3000A1	893-1184	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3X3000A7	- - -	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3X3000F1	- - -	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
3X3000F7	- - -	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
30AG11	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
30045	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
30055	- - -	Westinghouse	5.424	Uranium 235	Required	Exempt	III
30084	- - -	Westinghouse	0.154	Uranium 235	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
30224	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
30301	114-4858	Westinghouse	0.559	Uranium depleted	Required	Exempt	III
30303	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
304TH	114-4858, 061-1209, 100-7152	Eimac	0.00084	Thorium 232	Not Required	Exempt	III
304TL	023-9497 100-7152	Eimac	0.00084	Thorium 232	Not Required	Exempt	III
30501	- - -	Westinghouse	0.054	Uranium 235	Required	Exempt	III
30548	- - -	Westinghouse	10.06	Uranium 235	Required	Exempt	III
30549	- - -	Westinghouse	0.38	Uranium depleted	Required	Exempt	III
30572	- - -	Westinghouse	6.10	Uranium 235	Required	Exempt	III
30573	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
30574	- - -	Westinghouse	0.001	Uranium depleted	Required	Exempt	III
30585	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
30588	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
30604	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
30606	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
30609	- - -	Westinghouse	0.249	Uranium 235	Required	Exempt	III
30612	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
30626	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
30627	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
30655	- - -	Westinghouse	1.164	Uranium 235	Required	Exempt	III
30656	- - -	Westinghouse	1.164	Uranium 235	Required	Exempt	III
30665	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
30666	- - -	Westinghouse	13.56	Uranium 235	Required	Exempt	III
30673	- - -	Westinghouse	4.435	Uranium 235	Required	Exempt	III
30683	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
30689	- - -	Westinghouse	0.034	Uranium 235	Required	Exempt	III
30691N	- - -	Westinghouse	0.684	Thorium (nat)	Required	Exempt	III
30711	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
30713	- - -	Westinghouse	0.452	Uranium 235	Required	Exempt	III
30715	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
30727	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
30748	- - -	Westinghouse	0.559	Uranium depleted	Required	Exempt	III
30758	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
30760	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
30797	- - -	Westinghouse	0.09	Uranium 235	Required	Exempt	III
30817	- - -	Westinghouse	1.774	Uranium 235	Required	Exempt	III
30820	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
30863	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
30868	- - -	Westinghouse	0.071	Uranium 235	Required	Exempt	III
30869	- - -	Westinghouse	0.057	Uranium 235	Required	Exempt	III
30874	- - -	Westinghouse	0.000384	Thorium (nat)	Not Required	Exempt	III
30881	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
30883	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
30904	- - -	Westinghouse	0.09	Uranium 235	Required	Exempt	III
30933	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
30942	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
30943	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
30944	- - -	Westinghouse	0.695	Uranium 235	Required	Exempt	III
30960	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
30961	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
30964	- - -	Westinghouse	0.0005	Uranium depleted	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
30965	- - -	Westinghouse	0.002	Uranium depleted	Not Required	Exempt	III
30969	- - -	Westinghouse	0.780	Uranium 235	Required	Exempt	III
30970	- - -	Westinghouse	0.780	Uranium 235	Required	Exempt	III
30971	- - -	Westinghouse	0.780	Uranium 235	Required	Exempt	III
30977	- - -	Westinghouse	0.170	Uranium 235	Required	Exempt	III
30980	- - -	Westinghouse	0.0005	Uranium depleted	Not Required	Exempt	III
30981	- - -	Westinghouse	0.002	Uranium depleted	Not Required	Exempt	III
30988	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
31002	- - -	Westinghouse	0.001	Uranium 235	Not Required	- - -	- - -
31093	- - -	Westinghouse	342.39	Uranium 235	Required	Exempt	III
31095	- - -	Westinghouse	46.895	Uranium 235	Required	Exempt	III
31100	- - -	Westinghouse	47.46	Uranium 235	Required	Exempt	III
31152	- - -	Westinghouse	0.144	Uranium 235	Required	Exempt	III
31168	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
31169	- - -	Westinghouse	0.166	Uranium 235	Required	Exempt	III
31183	- - -	Westinghouse	0.045	Uranium depleted	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
31186	- - -	Westinghouse	0.0021	Thorium (nat)	Not Required	Exempt	III
31234	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
31246	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
31261	- - -	Westinghouse	0.932	Uranium 235	Required	Exempt	III
31291	- - -	Westinghouse	0.002	Uranium 235	Not Required	Exempt	III
31293	- - -	Westinghouse	0.678	Uranium 235	Required	Exempt	III
313C	801-5578 116-9975	Western Elec.	0.50	Krypton 85	Required	Exempt	III
313C	801-5578 116-9975	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
313C	116-9973 801-5578	Cetron	0.5	Krypton 85	Required	Exempt	III
313CA	230-5311	Western Elec.	0.50	Krypton 85	Required	Exempt	III
313CA	230-5311	Cetron	0.5	Krypton 85	Required	Exempt	III
313CA	230-5311	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
313CB	- - -	Cetron	0.50	Krypton 85	Required	Exempt	III
313CB	- - -	Western Elec.	0.50	Krypton 85	Required	Exempt	III
313CC	800-0578 230-5293	Western Elec.	0.50	Krypton 85	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
313CC	800-0578 230-5293	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
313CC	800-0578	Cetron	0.5	Krypton 85	Required	Exempt	III
313CC	- - -	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
313CCJW	800-0578	Western Elec.	0.50	Krypton 85	Required	Exempt	III
313CD	188-3964	Western Elec.	0.50	Krypton 85	Required	Exempt	III
313CJW	- - -	Western Elec.	0.50	Krypton 85	Required	Exempt	III
3120/MA3152 & 3135/MA3152	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
31335	- - -	Westinghouse	0.015	Uranium 235	Required	Exempt	III
31354	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
31356	- - -	Westinghouse	0.078	Uranium depleted	Not Required	Exempt	III
31369	- - -	Westinghouse	204.53	Uranium 235	Required	Exempt	III
31384	- - -	Westinghouse	204.53	Uranium 235	Required	Exempt	III
31417	- - -	Westinghouse	7.063	Uranium 235	Required	Exempt	III
31418	- - -	Westinghouse	2.204	Uranium 235	Required	Exempt	III
31419	- - -	Westinghouse	1.243	Uranium 235	Required	Exempt	III
31424	- - -	Westinghouse	0.002	Uranium 235	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
31434	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
31438	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
31440	- - -	Westinghouse	0.678	Uranium 235	Required	Exempt	III
31441	- - -	Westinghouse	0.678	Uranium 235	Required	Exempt	III
31442	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
31456	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
31458	- - -	Westinghouse	0.003	Uranium depleted	Not Required	Exempt	III
31463	- - -	Westinghouse	2.825	Uranium 235	Required	Exempt	III
31465	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
31471	- - -	Westinghouse	0.678	Uranium 235	Required	Exempt	III
31474	- - -	Westinghouse	0.232	Uranium 232	Required	Exempt	III
31479	- - -	Westinghouse	0.0005	Uranium depleted	Not Required	Exempt	III
31480	- - -	Westinghouse	0.002	Uranium depleted	Not Required	Exempt	III
31491	- - -	Westinghouse	0.037	Uranium 235	Required	Exempt	III
31493	- - -	Westinghouse	0.170	Uranium 235	Required	Exempt	III
31496	- - -	Westinghouse	0.170	Uranium 235	Required	Exempt	III
31517	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
31542	- - -	Westinghouse	0.000191	Thorium (nat)	Not Required	Exempt	III
31543	- - -	Westinghouse	115.83	Uranium 235	Required	Exempt	III
31546	- - -	Westinghouse	13.56	Uranium 235	Required	Exempt	III
31552	- - -	Westinghouse	0.170	Uranium 235	Required	Exempt	III
31553	- - -	Westinghouse	0.187	Uranium 235	Required	Exempt	III
31554	- - -	Westinghouse	0.006	Uranium 235	Required	Exempt	III
31563	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
31568	- - -	Westinghouse	46.61	Uranium 235	Required	Exempt	III
31573	- - -	Westinghouse	0.037	Uranium 235	Required	Exempt	III
31574	- - -	Westinghouse	0.037	Uranium 235	Required	Exempt	III
31575	- - -	Westinghouse	0.037	Uranium 235	Required	Exempt	III
31576	- - -	Westinghouse	0.037	Uranium 235	Required	Exempt	III
31578	- - -	Westinghouse	0.037	Uranium 235	Required	Exempt	III
31579	- - -	Westinghouse	0.037	Uranium 235	Required	Exempt	III
3162/MA3164 & 3163/MA3164	- - -	Microwave	0.40	Uranium 235	Required	Exempt	III
31640	- - -	Westinghouse	1.61	Uranium 235	Required	Exempt	III
31656	- - -	Westinghouse	3.955	Uranium 235	Required	Exempt	III
31671	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
31687	- - -	Westinghouse	0.0002	Uranium depleted	Not Required	Exempt	III
31688	- - -	Westinghouse	0.0002	Uranium depleted	Not Required	Exempt	III
31721	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
31749	- - -	Westinghouse	166.675	Uranium 235	Required	Exempt	III
31756	- - -	Westinghouse	2.32	Uranium 235	Required	Exempt	III
31771	- - -	Westinghouse	3.955	Uranium 235	Required	Exempt	III
31772	- - -	Westinghouse	3.955	Uranium 235	Required	Exempt	III
31790	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
31830	- - -	Westinghouse	46.895	Uranium 235	Required	Exempt	III
31854	- - -	Westinghouse	0.000384	Thorium (nat)	Not Required	Exempt	III
31875	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
31942	- - -	Westinghouse	1.446	Uranium 235	Required	Exempt	III
31943	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
31964	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
32172	- - -	Westinghouse	14.464	Uranium 235	Required	Exempt	III
32173	- - -	Westinghouse	0.009	Uranium 235	Not Required	Exempt	III
32174	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
32253	- - -	Westinghouse	0.046	Uranium 235	Required	Exempt	III

Table C-10 - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
32254	- - -	Westinghouse	0.057	Uranium 235	Required	Exempt	III
346A	984-8065	Western Elec.	1.98	Krypton 85	Required	Exempt	III
346C	849-3769	Cetron	4.5	Krypton 85	Required	Exempt	III
346C	849-3769	Western Elec.	4.5	Krypton 85	Required	Exempt	III
346CJW	849-3769	Western Elec.	4.5	Krypton 85	Required	Exempt	III
35T	116-9980	Eimac	0.000096	Thorium 232	Not Required	Exempt	III
35TG	114-4871	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
3514	- - -	Westinghouse	20.34	Uranium 235	Required	Exempt	III
3527	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
353A	937-9870	Cetron	0.5	Krypton 85	Required	Exempt	III
353A	188-8594 937-9870	Western Elec.	0.01	Radium 226	Required	Exempt	I
353A	188-8594	Western Elec.	0.50	Krypton 85	Required	Exempt	III
356/5771/6576	- - -	Hachlett	0.02	Thorium 232	Not Required	Exempt	III
356/CL7085	- - -	General Elec.	0.03	Thorium 232	Not Required	Exempt	III
358A	- - -	Western Elec.	0.05	Krypton 85	Not Required	Exempt	III
3586	- - -	Westinghouse	4.92	Uranium 235	Required	Exempt	III
359A	188-8633 439-5705	Western Elec.	1.20	Krypton 85	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
359AJW	188-8633	Western Elec.	1.1	Krypton 85	Required	Exempt	III
3595	- - -	Westinghouse	23.17	Uranium 235	Required	Exempt	III
3709	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
371B	116-9960	Electronic Enterprises	0.0003	Thorium 232	Not Required	Exempt	III
371B	- - -	United Elec.	0.0005	Thorium 232	Not Required	Exempt	III
375/7563	762-6682	Microwave	0.84	Cobalt 60	Required	Exempt	III
3755	- - -	Westinghouse	46.90	Uranium 235	Required	Exempt	III
3756	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
376B	- - -	Western Elec.	4.0	Krypton 85	Required	Exempt	III
376C	537-3959	Western Elec.	4.0	Krypton 85	Required	Exempt	III
376C	537-3959	Cetron	4.0	Krypton 85	Required	Exempt	III
3786	- - -	Westinghouse	23.17	Uranium 235	Required	Exempt	III
3787	- - -	Westinghouse	20.34	Uranium 235	Required	Exempt	III
3806	- - -	Westinghouse	104.53	Uranium 235	Required	Exempt	III
3833	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
3871	- - -	Westinghouse	22.60	Uranium 235	Required	Exempt	III
3872	- - -	Westinghouse	22.60	Uranium 235	Required	Exempt	III
3880	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
3881	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
3884	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
3905	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
3906	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
3916	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
3930	- - -	Westinghouse	104.53	Uranium 235	Required	Exempt	III
3931	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
3933	- - -	Westinghouse	23.73	Uranium 235	Required	Exempt	III
3935	- - -	Westinghouse	9.492	Uranium 235	Required	Exempt	III
3936	- - -	Westinghouse	9.492	Uranium 235	Required	Exempt	III
3937	- - -	Westinghouse	0.492	Uranium 235	Required	Exempt	III
3941	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
395A	556-0920 230-5291	Western Elec.	1.6	Krypton 85	Required	Exempt	III
395AJW	- - -	Western Elec.	1.6	Krypton 85	Required	Exempt	III
3958	- - -	Westinghouse	120.91	Uranium 235	Required	Exempt	III
3968	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
3996	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
4-1000A	189-5968, 615-5689, 864-7480, 578-1524	Eimac	0.0007	Thorium 232	Not Required	Exempt	III

Table C-10 - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Par. Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
4-125A/4D21	723-4226 188-0921	Eimac	0.00029	Thorium232	Not Required	Exempt	III
4-250A	188-0948, 845-2633, 887-2618	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
4-400A	556-1759, 617-8660 243-5018	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
4-400C	- - -	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
4-500A	- - -	Eimac	0.0015	Thorium 232	Not Required	Exempt	III
4-65A	985-1110 243-5017	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
4CV100000C	- - -	Eimac	0.04	Thorium 232	Not Required	Exempt	III
4CV20000A	- - -	Eimac	0.003	Thorium 232	Not Required	Exempt	III
4CV250000A	- - -	Eimac	0.1214	Thorium 232	Required	Exempt	III
4CV35000A	- - -	Eimac	0.007	Thorium 232	Not Required	Exempt	III
4CV50000E	- - -	Eimac	0.0175	Thorium 232	Not Required	Exempt	III
4CV50000J	- - -	Eimac	0.0175	Thorium 232	Not Required	Exempt	III
4CV75000A	- - -	Eimac	0.04	Thorium 232	Not Required	Exempt	III
4CB8000A	- - -	Eimac	0.0023	Thorium 232	Not Required	Exempt	III
4CW10000A	845-5743	Eimac	0.0031	Thorium 232	Not Required	Exempt	III
4CW100000D	- - -	Eimac	0.04	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
4CW100000E	- - -	Eimac	0.0012	Thorium 232	Not Required	Exempt	III
4CW25000A	478-7692	Eimac	0.007	Thorium 232	Not Required	Exempt	III
4CW250000A	- - -	Eimac	0.1214	Thorium 232	Required	Exempt	III
4CW50000E	- - -	Eimac	0.0175	Thorium 232	Not Required	Exempt	III
4CW50000J	- - -	Eimac	0.0175	Thorium 232	Not Required	Exempt	III
4CX10000D	054-1987	Eimac	0.0031	Thorium 232	Not Required	Exempt	III
4CX10000J	- - -	Eimac	0.0037	Thorium 232	Not Required	Exempt	III
4CX1500A	- - -	Eimac	0.0025	Thorium 232	Not Required	Exempt	III
4CX15000A	905-9126	Eimac	0.007	Thorium 232	Not Required	Exempt	III
4CX15000J	479-1377	Eimac	0.0057	Thorium 232	Not Required	Exempt	III
4CX3000A	078-7091	Eimac	0.0023	Thorium 232	Not Required	Exempt	III
4CX35000C	- - -	Eimac	0.04	Thorium 232	Not Required	Exempt	III
4CX5000A	996-5975 052-4112	Eimac	0.0031	Thorium 232	Not Required	Exempt	III
4CX5000J	479-1378	Eimac	0.0037	Thorium 232	Not Required	Exempt	III
4CX5000R	- - -	Eimac	0.003	Thorium 232	Not Required	Exempt	III
4C35	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
4C35A/6268	552-8277	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
4D21	188-0921	Eimac	0.00029	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
4D21A	- - -	Eimac	0.00029	Thorium 232	Not Required	Exempt	III
4E27A/5-125B	262-1358	Eimac	0.0003	Thorium 232	Not Required	Exempt	III
4PR65A	080-8751	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
4PR1000A	080-8750	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
4PR1000B	- - -	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
4PR125A	078-1643	Eimac	0.00029	Thorium 232	Not Required	Exempt	III
4PR250C	958-3154	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
4PR400A	476-7964 080-8748	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
4PR65A	080-8751	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
4W20000A	- - -	Eimac	0.021	Thorium 232	Not Required	Exempt	III
4W20000A	993-0695	Eimac	0.0300	Thorium 232	Not Required	Exempt	III
4X500A	865-0259	Eimac	0.0005	Thorium 232	Not Required	Exempt	III
4014	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
4021A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
4021AL	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
4022AL	811-6837	Burroughs	<1.0	Krypton 85	Required	Exempt	III
4023A	- - -	Burroughs	- - -	- - -	Required	Exempt	II
4024A	- - -	Burroughs	- - -	- - -	Required	Exempt	II
4025A	- - -	Burroughs	- - -	- - -	Required	Exempt	II

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
4026A	- - -	Burroughs	< 1.0	Krypton 85	Required	Exempt	III
402A	- - -	Western Elec.	1.6	Krypton 85	Required	Exempt	III
4031	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
4031A	- - -	Burroughs	< 1.0	Krypton 85	Required	Exempt	III
4032A	- - -	Burroughs	< 1.0	Krypton 85	Required	Exempt	III
40330A	- - -	Burroughs	< 1.0	Krypton 85	Required	Exempt	III
40331A	- - -	Burroughs	< 1.0	Krypton 85	Required	Exempt	III
4036	- - -	Westinghouse	106.22	Uranium 235	Required	Exempt	III
4093	- - -	Westinghouse	26.56	Uranium 235	Required	Exempt	III
4094	- - -	Westinghouse	23.73	Uranium 235	Required	Exempt	III
41000A	189-5968	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
4107	- - -	Westinghouse	120.91	Uranium 235	Required	Exempt	III
4110	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
413	578-1140	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
413B	- - -	Western Elec.	4.4	Krypton 85	Required	Exempt	III
413B	- - -	Cetron	4.0	Krypton 85	Required	Exempt	III
414	228-8961	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
4152	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
4162	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
417	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
4174	- - -	Westinghouse	46.90	Uranium 235	Required	Exempt	III
4182	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
420A	272-9197	Cetron	2.0	Krypton 85	Required	Exempt	III
4214	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
423A	248-3065	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
423C	813-0750	Western Elec.	4.50	Krypton 85	Required	Exempt	III
4245A	- - -	Westinghouse	46.90	Uranium 235	Required	Exempt	III
425	- - -	Cetron	2.0	Krypton 85	Required	Exempt	III
425A	844-7209	Western Elec.	2.10	Krypton 85	Required	Exempt	III
426A	- - -	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
426A	- - -	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
426A	- - -	Western Elec	2.0	Krypton 85	Required	Exempt	III
427A	333-3540	Western Elec	4.00	Krypton 85	Required	Exempt	III
430-B	849-3768	Cetron	4.5	Krypton 85	Required	Exempt	III
430-B	849-3768	Western Elec.	4.5	Krypton 85	Required	Exempt	III
430-C	- - -	Western Elec.	15.00	Krypton 85	Required	Exempt	III
4314	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
432B	849-6864	Western Elec.	4.50	Krypton 85	Required	Exempt	III
4320	- - -	Westinghouse	0.019	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
4336	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
434	- - -	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
4343	- - -	Westinghouse	0.559	Uranium depleted	Required	Exempt	III
4344	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
435	- - -	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
4359	- - -	Westinghouse	0.117	Uranium 235	Required	Exempt	III
436	- - -	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
439A	547-2928	Western Elec.	3.00	Krypton 85	Required	Exempt	III
4392	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
4396	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
4414	- - -	Westinghouse	44.41	Uranium 235	Required	Exempt	III
4420	- - -	Westinghouse	106.22	Uranium 235	Required	Exempt	III
4422	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
4423	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
443	- - -	Cetron	2.0	Krypton 85	Required	Exempt	III
443A	- - -	Western Elec.	2.00	Krypton 85	Required	Exempt	III
446A	107-7607	Western Elec.	0.10	Krypton 85	Not Required	Exempt	III
447A	849-3721	Western Elec.	0.10	Krypton 85	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
4475	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
4491	- - -	Westinghouse	0.441	Uranium 235	Required	Exempt	III
450TH	116-9962 615-5570	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
450TL	116-9963	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
451A	194-1474	Western Elec.	2.10	Krypton 85	Required	Exempt	III
4516	- - -	Westinghouse	120.91	Uranium 235	Required	Exempt	III
453A	- - -	Western Elec.	0.30	Krypton 85	Required	Exempt	III
4559	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
4576	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
458A	- - -	Western Elec.	1.00	Radium 226	Required	Exempt	I
4585	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
4628	770-1927	RCA	0.003	Thorium 232	Not Required	Exempt	III
4645	- - -	Westinghouse	0.232	Uranium 235	Required	Exempt	III
4647	- - -	RCA	0.0707	Thorium 232	Not Required	Exempt	III
4648	- - -	RCA	0.136	Thorium 232	Required	Exempt	III
4652	- - -	Westinghouse	92.10	Uranium 235	Required	Exempt	III
4652A	- - -	Westinghouse	92.10	Uranium 235	Required	Exempt	III
4661	- - -	Westinghouse	0.141	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
4676	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
4677	- - -	Westinghouse	0.559	Uranium depleted	Required	Exempt	III
469A	- - -	Western Elec.	1.00	Radium 226	Required	Exempt	I
4690	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
4706	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
4712	- - -	Westinghouse	0.000384	Thorium (nat)	Not Required	Exempt	III
4757	- - -	Westinghouse	0.218	Uranium 235	Required	Exempt	III
476	615-5822	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
4765	- - -	Westinghouse	121.47	Uranium 235	Required	Exempt	III
4766	- - -	Westinghouse	12.15	Uranium 235	Required	Exempt	III
4767	- - -	Westinghouse	1.20	Uranium 235	Required	Exempt	III
477	816-3759	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
483	824-7834	Lionel Elec.	0.25	Nickel 63	Required	Exempt	IV
4863	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
487	721-2495	Anton Labs	1.0	Carbon 14	Required	Exempt	IV
4925	- - -	Westinghouse	0.311	Uranium 235	Required	Exempt	III
4948	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
5-125B	- - -	Eimac	0.00032	Thorium 232	Not Required	Exempt	III
5-500A	- - -	Eimac	0.0015	Throium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
5CX1500A	- - -	Eimac	0.0025	Thorium 232	Not Required	Exempt	III
5CX3000A	156-0297	Eimac	0.0023	Thorium 232	Not Required	Exempt	III
5C22/6279	116-9969	Kuthe Labs (ITT)	0.080	Uranium (nat)	Not Required	Exempt	III
5003	- - -	Westinghouse	111.87	Uranium 235	Required	Exempt	III
5016A	- - -	Brurroughs	<1.0	Krypton 85	Required	Exempt	III
5022	- - -	Westinghouse	20.34	Uranium 235	Required	Exempt	III
5027	- - -	Westinghouse	0.001	Uranium depleted	Not Required	Exempt	III
5030	- - -	Westinghouse	0.622	Uranium 235	Required	Exempt	III
5031A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
50344A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
50346A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
50348A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
5046	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
5092A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
5406	- - -	Westinghouse	0.271	Uranium 235	Required	Exempt	III
5449	- - -	Westinghouse	23.73	Uranium 235	Required	Exempt	III
545	557-5105	United Elec.	0.0001	Thorium (nat)	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
5589(376B)	- - -	Western Elec.	1.0	Radium 226	Required	Exempt	III
5644	262-0184	Raytheon	0.006	Cobalt 60	Not Required	Exempt	III
5651	617-8685, 262-0286, 167-0389	Raytheon (see 5651 WA)	0.0125	Krypton 85	Not Required	Exempt	III
5651A	- - -	Raytheon	0.0125	Krypton 85	Not Required	Exempt	III
5651WA	262-0286	Raytheon	0.0125	Krypton 85	Not Required	Exempt	III
5651WA	262-0286	Tung-Sol	0.005	Radium 226	Not Required	Exempt	I
5651WA	262-0286	RCA	0.01	Nickel 63	Not Required	Exempt	IV
5651WA	262-0286	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
5651WA	262-0286	Sylvania	0.013	Krypton 85	Not Required	Exempt	III
5654	134-6031, 262-1357	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5654W	045-8639	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5663	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5670	134-5994	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5670W	188-6584	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5671	- - -	RCA	0.0892	Thorium 232	Not Required	Exempt	III
5672	188-6588	- - -	- - -	Thorium 232	Required	Exempt	II

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
5681	- - -	Machlett	0.039	Thorium 232	Not Required	Exempt	III
5682	- - -	Machlett	0.088	Thorium 232	Not Required	Exempt	III
5682	847-6738	General Elec.	0.20	Thorium 232	Required	Exempt	III
5685	262-0174	Omni-Wave (Metcom)	0.20	Cobalt 60	Required	Exempt	III
5696	617-8677	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5725	134-6064, 237-6917	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5725W	134-6064 237-6917	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5736	682-2777	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
5751	082-4139 193-5145	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
576A	296-9997	Electronic Ent.	0.0004	Thorium 232	Not Required	Exempt	III
5762/7C24	889-7697 262-0204	RCA	0.0071	Thorium 232	Not Required	Exempt	III
577	262-0198	United Elec.	0.0005	Thorium 232	Not Required	Exempt	III
577W	878-6030	United Elec.	0.00002	Thorium 232	Not Required	Exempt	III
5770	- - -	RCA	0.0892	Thorium 232	Not Required	Exempt	III
5771/356/6576	- - -	Machlett	0.02	Thorium 232	Not Required	Exempt	III
5771	061-1127 501-0906	RCA	0.2511	Thorium 232	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
5783	230-5253 284-7166	Raytheon	0.0033	Krypton 85	Not Required	Exempt	III
5783A/1068	230-5253 284-7166	Raytheon	0.7	Nickel 63	Required	Exempt	IV
5783WA	284-7166	Tung-Sol (Chatham)	0.0013	Krypton 85	Not Required	Exempt	III
5783WA	284-7166	Raytheon	0.0033	Krypton 85	Not Required	Exempt	III
5786	689-1896	RCA	0.0051	Thorium 232	Not Required	Exempt	III
5787	272-8545 262-3771	Raytheon	0.0067	Krypton 85	Not Required	Exempt	III
5787A/1061	262-3771	Raytheon	0.70	Nickel 63	Required	Exempt	IV
5787A(CK1061)	- - -	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
5787WA	617-8876	Tung-Sol (Chatham)	0.0028	Krypton 85	Not Required	Exempt	III
5787WA	272-8545	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
5787WA	272-8545	Raytheon	0.0067	Krypton 85	Not Required	Exempt	III
5790/X7108	220-6525	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5791/X6007	220-6526	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5792/ATR345	193-5141	Varian	0.30	Cobalt 60	Required	Exempt	III
5792/ATR345	193-5141	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5792	193-5141	Varian	0.3	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
5793/ATR346	193-5142	Varian	0.3	Cobalt 60	Required	Exempt	III
5793/ATR346	193-5142	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5814A	262-0210	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5823	248-3078	Tung-Sol (Chatham)	0.0018	Krypton 85	Not Required	Exempt	III
5825	262-0211	RCA	0.0000077	Thorium 232	Not Required	Exempt	III
5841	819-1154 262-0213	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
5841	262-0213 819-1154	Victoreen	1.0	Nickel 63	Required	Exempt	IV
5853/TR368	193-5147	Varian	0.4	Cobalt 60	Required	Exempt	III
5853/TR368	193-5147	Microwave	0.50	Cobalt 60	Required	Exempt	III
5853/TR368	193-5147	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5863	261-8671	Varian	0.15	Cobalt 60	Required	Exempt	III
5863/X7109	261-8671	Microwave	0.50	Cobalt 60	Required	Exempt	III
5863/X7109	261-8671	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5864/ATR321	549-0045 842-6660	Varian	0.3	Cobalt 60	Required	Exempt	III
5864/ATR321	549-0045	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5865/MA379	262-0174	Microwave	0.4	Cobalt 60	Required	Exempt	III
5865/TR361	262-0174	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
5865/TR361	262-0174	Sylvania	1.0	Cobalt 60	Required	Exempt	III
5867A	- - -	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
5883	262-0225	Varian	0.30	Cobalt 60	Required	Exempt	III
592/3-200A3	781-1808	Eimac	0.00032	Thorium 232	Not Required	Exempt	III
5921	248-1271	Varian	0.30	Cobalt 60	Required	Exempt	III
5922	248-1270	Varian	0.30	Cobalt 60	Required	Exempt	III
5925/TR331	262-1693 267-1693	Varian	0.15	Cobalt 60	Required	Exempt	III
5927	237-0103	Varian	0.40	Cobalt 60	Required	Exempt	III
5939	636-1812 262-0176	Westinghouse	3.30	Radium 226	Required	Exempt	I
5939A	038-1660 636-1812	Varian	3.30	Cobalt 60	Required	Exempt	III
5939A	038-1660 636-1812	Westinghouse	3.30	Radium 226	Required	Exempt	I
5948A	752-5384	Tung-Sol	- - -	- - -	Required	Exempt	II
5950	800-2357	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
5956	890-6617 179-4746	Kuthe Labs (ITT)	0.080	Uranium (nat)	Not Required	Exempt	III
5957	806-0292	Kuthe Labs (ITT)	0.080	Uranium (nat)	Not Required	Exempt	III
5958/E40	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
5959/E41	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
5961A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
5962	- - -	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
5962/BS-101	188-6592	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
5962/BS-101	188-6592	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
5962/BS-101	188-6592	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
5962/BS-101	188-6592	Electronic Products	3.0	Nickel 63	Required	Exempt	IV
5962/BS-101	188-6592	Eon Corp.	<0.1	Nickel 63	Required	Exempt	IV
5965A	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
5991A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
5991A	- - -	National Electronics (Varian)	0.21	Krypton 85	Required	Exempt	III
59917A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
59918A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
59919A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
5992A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
59920A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
59921A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6AB4	262-0190	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6AK5/EF95	188-3545	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6AK5WB	134-6037, 503-0607	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6C21	810-8310 114-3831	Eimac	0.00056	Thorium 232	Not Required	Exempt	III
6DT8	728-1775	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6D10	938-2670	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6EZ8	726-8926	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6GY8	166-7662	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6002	261-8678	Raytheon	0.22	Thorium 232	Required	Exempt	III
6022/ATR332	262-1690	Varian	0.30	Cobalt 60	Required	Exempt	III
6024/ATR387	842-6661 272-9195	Varian	0.30	Cobalt 60	Required	Exempt	III
6033	262-6356 548-3803	Varian	0.30	Cobalt 60	Required	Exempt	III
6034	220-6892 548-3802	Varian	0.30	Cobalt 60	Required	Exempt	III
6035	264-2996	Varian	0.15	Cobalt 60	Required	Exempt	III
6072	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6072A	892-3809	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6081/ATR407	262-0289 262-0287 060-6626	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
608 /ATR407	262-0289 262-0289	Sylvania	1.0	Cobalt 60	Required	Exempt	III
6081	060-6626	Omni-Wave (Metcom)	0.32	Cobalt 60	Required	Exempt	III
6091A	- - -	Burroughs	<1.0	Krypton 85	Required	Exempt	III
6117	272-9196	Varian	0.40	Cobalt 60	Required	Exempt	III
6117	272-9196	General Elec.	0.475	Cobalt 60	Required	Exempt	III
6117	272-9196	Microwave	0.5	Cobalt 60	Required	Exempt	III
6117	272-9196	Sylvania	1.0	Cobalt 60	Required	Exempt	III
6119	319-0527	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
6135	617-4911	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6140	561-8233 553-3770	Western Elec.	4.50	Krypton 85	Required	Exempt	III
6141/427A	188-3531 284-6554	Western Elec.	4.00	Krypton 85	Required	Exempt	III
6143	842-6659	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
6143	842-6659	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
6155	905-8020	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
6156	- - -	Eimac	0.0003	Thorium (nat)	Not Required	Exempt	III
6162/ATR388	272-9197	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6163	060-6664	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
6163	264-2998 543-1968	Varian	0.30	Cobalt 60	Required	Exempt	III
6163	264-2998 543-1968	Microwave	0.25	Cobalt 60	Required	Exempt	III
6164	583-0613 577-1537	Varian	0.15	Cobalt 60	Required	Exempt	III
6164	583-0613	Microwave	0.50	Cobalt 60	Required	Exempt	III
6166	902-7423 669-6865	RCA	0.0276	Thorium 232	Not Required	Exempt	III
6166A/7007	883-7030	RCA	0.0276	Thorium 232	Not Required	Exempt	III
6167	264-3000	Western Elec.	3.00	Krypton 85	Required	Exempt	III
6199	813-0755	Victoreen	1.0	Nickel 63	Required	Exempt	III
6201	179-4446 296-3354	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6213	682-9452 851-7848	Raytheon	0.7	Nickel 63	Required	Exempt	IV
6213A	- - -	Raytheon	0.7	Nickel 63	Required	Exempt	IV
6214	608-2774	Varian	0.40	Cobalt 60	Required	Exempt	III
6214	608-2774	Tracerlab, Inc	0.1	Cobalt 60	Required	Exempt	III
6232/ATR427	780-8151 390-5241	Sylvania	0.15	Cobalt 60	Required	Exempt	III
6232/TR427	390-5241	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6232/ATR427	390-5241	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
6232/MA316	780-8151	Microwave	0.50	Cobalt 60	Required	Exempt	III
6249A	543-1142 752-0641	Westinghouse	0.016	Radium 226	Required	Exempt	I
6249B	451-5824 752-0641	Raytheon	0.006	Thorium 232	Not Required	Exempt	III
626	- - -	Victoreen	0.25	Nickel 63	Required	Exempt	IV
626A	- - -	Victoreen	0.25	Nickel 63	Required	Exempt	IV
6260	272-9201	Westinghouse	2.0	Radium 226	Required	Exempt	I
6260	272-9201	Varian	0.30	Cobalt 60	Required	Exempt	III
6265	646-4613	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6268/4C35A	552-8277	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
6276	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
6279	116-9969	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
6282/BL-11	365-2548	Varian	0.15	Cobalt 60	Required	Exempt	III
6282/MKT-11	365-2548	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
6284	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
6303	804-0954	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
6303A	892-3413	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
6304/BL43	617-5810	Varian	0.30	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6305	804-0954	Klystronics	0.000309	Thorium (nat)	Not Required	Exempt	III
6312	519-6175	Klystronics	0.15	Thorium (nat)	Required	Exempt	II
6322	296-7326	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
6322/BL25	296-7326 263-9910 415-1625 577-3205	Varian	0.15	Cobalt 60	Required	Exempt	III
633B/TG52	865-4959	Signalite	0.90	Cesium 137	Required	Exempt	III
6334	578-5483	Sylvania	1.0	Cobalt 60	Required	Exempt	III
6334	574-5483 752-0594	Nuclear	1.0	Cobalt 60	Required	Exempt	III
6334/BL27	759-5483 578-5483 504-7571	Varian	0.25	Cobalt 60	Required	Exempt	III
6334	752-0594	Omni-Wave (Metcom)	0.20	Cobalt 60	Required	Exempt	III
6334/BL27	578-5483	Microwave	0.25	Cobalt 60	Required	Exempt	III
6334/BL27	578-5483 759-5483	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
6344	- - -	Raytheon	0.49	Thorium 232	Required	Exempt	III
6357	850-6633	- - -	- - -	- - -	Required	Exempt	II
6368	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6369	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
6376	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
6376A	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6378/BL62	548-9734 296-5932	Varian	0.15	Cobalt 60	Required	Exempt	III
6386	636-2244	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6388	- - -	Western Elec.	2.00	Krypton 85	Required	Exempt	III
6393/BL68	060-6608	Varian	0.30	Cobalt 60	Required	Exempt	III
6396	296-5509	Varian	0.30	Cobalt 60	Required	Exempt	III
6396	296-5509	Sylvania	1.0	Cobalt 60	Required	Exempt	III
6402B	- - -	Raytheon	0.07	Thorium 232	Not Required	Exempt	III
6406A	- - -	Raytheon	0.35	Thorium 232	Required	Exempt	III
6410A	- - -	Raytheon	0.46	Thorium 232	Required	Exempt	III
6414	054-3946 581-9404 812-3745	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6414W	054-3946	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
642	- - -	Westinghouse	0.3	Krypton 85	Required	Exempt	III
6420/6421	- - -	Machlett	0.008	Thorium 232	Not Required	Exempt	III
6421/6420	- - -	Machlett	0.008	Thorium 232	Not Required	Exempt	III
6422	- - -	Machlett	0.008	Thorium 232	Not Required	Exempt	III
6423	926-7263	Machlett	0.008	Thorium 232	Not Required	Exempt	III
6424/6425	- - -	Machlett	0.014	Thorium 232	Not Required	Exempt	III
6425/6424	- - -	Machlett	0.014	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6426/6427	- - -	Machlett	0.026	Thorium 232	Not Required	Exempt	III
6427/6426	- - -	Machlett	0.026	Thorium 232	Not Required	Exempt	III
6437 & 6438	800-5552	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
6448	- - -	RCA	0.032	Thorium 232	Not Required	Exempt	III
6455/BL61	727-5618	Varian	0.25	Cobalt 60	Required	Exempt	III
6501	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6518/QK254	061-0485	Raytheon	0.40	Cobalt 60	Required	Exempt	III
6542	553-7091	Tung-Sol (Chatham)	0.0025	Krypton 85	Not Required	Exempt	III
6542	754-9916 553-7091 578-5241	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
6542	754-9916 578-5247 553-7091	Raytheon	0.006	Cobalt 60	Not Required	Exempt	III
6542A/1069	- - -	Raytheon	0.70	Nickel 63	Required	Exempt	IV
6544	561-8230	Machlett	0.002	Thorium 232	Not Required	Exempt	III
6545	752-0185	Varian	0.15	Cobalt 60	Required	Exempt	III
6546	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
6560	501-1066	Omni-Wave (Metcom)	0.40	Cobalt 60	Required	Exempt	III
6560/BL35	296-1065 501-1066 296-2698	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
65 0/MA375A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
654/BL71	060-6628 841-2609	Varian	0.25	Cobalt 60	Required	Exempt	III
6565/BL313	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6566	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6568/BL28	538-2793	Varian	0.15	Cobalt 60	Required	Exempt	III
6569	060-6570	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
6576/356/5771	- - -	Machlett	0.02	Thorium 232	Not Required	Exempt	III
6580	- - -	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
6587	553-7010	Kuthe Labs (ITT)	0.0080	Uranium (nat)	Not Required	Exempt	III
6591	975-2250	Varian	0.30	Cobalt 60	Required	Exempt	III
6592/BL309	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6593/BL310	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6594/BL311	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6595/BL316	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6596/BL317	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6597/BL320	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6599/BL322	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6601/BL327	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6602/BL329	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
6604/BL509	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6605/BL96A	556-8812 581-5535	Varian	0.60	Cobalt 60	Required	Exempt	III
6605/MA346	581-5535	Microwave	0.40	Cobalt 60	Required	Exempt	III
6605/BL96	503-4493 834-0571 501-5535	Varian	0.6	Cobalt 60	Required	Exempt	III
6609/BL327	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6613/BL324	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6614/BL314	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6615/BL312	646-4803	Varian	0.15	Cobalt 60	Required	Exempt	III
6616/BL326	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6620	060-6573 390-5239	Varian	0.15	Cobalt 60	Required	Exempt	III
6624	975-2251	Varian	0.25	Cobalt 60	Required	Exempt	III
6626/OA2WA	557-6926 503-4880 769-0869	CBS Hytron	0.01	Krypton 85	Not Required	Exempt	III
6626/OA2WA	262-0964	RCA	0.01	Nickel 63	Not Required	Exempt	IV
6626/OA2WA	557-6926 617-8973	RCA	0.01	Nickel 63	Not Required	Exempt	IV
6626/OA2WA	557-6926	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III

Table C-10 - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6627/OB2WA	624-4718	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
6627/OB2WA	624-4718	Tung-Sol (Chatham)	0.005	Radium 226	Not Required	Exempt	I
6627/OB2WA	624-4718 800-0554	Jack & Heintz, Inc.	6.0	Radium 226	Required	Exempt	I
6627/OB2WA	624-4718	CBS Hytron	0.05	Nickel 63	Not Required	Exempt	IV
6628/BL38	- - -	Tung-Sol (Chatham)	0.055	Radium 226	Required	Exempt	IV
6629/BL54	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
6630/BL55	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
6631/BL94	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
6632/BL18	060-6630	Varian	0.70	Cobalt 60	Required	Exempt	III
6633	850-0925	Microwave	0.25	Cobalt 60	Required	Exempt	III
6633/BL37	646-4720	Varian	0.70	Cobalt 60	Required	Exempt	III
6634/BL90	- - -	Varian	0.90	Cobalt 60	Required	Exempt	III
6635/BL57	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6636/BL87	800-0594	Varian	0.70	Cobalt 60	Required	Exempt	III
6636/MA376	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
6637/BL31	719-5454	Varian	0.15	Cobalt 60	Required	Exempt	III
6638/BL99	569-9508	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6639/BL46	295-3589	Varian	0.15	Cobalt 60	Required	Exempt	III
6640/BL60	543-0143	Varian	0.25	Cobalt 60	Required	Exempt	III
6641/BL86	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6642/BL600	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6643/BL81	- - -	Varian	0.40	Cobalt 60	Required	Exempt	III
6644	752-5239	Tracerlab, Inc	0.1	Cobalt 60	Not Required	Exempt	III
6644/BL95	843-8063 752-5239	Varian	0.15	Cobalt 60	Required	Exempt	III
6645	080-9194 503-4497	Varian	0.15	Cobalt 60	Required	Exempt	III
6645	080-9194	Microwave	0.4	Cobalt 60	Required	Exempt	III
6645	080-9194	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
6646/BL604	905-7498	Varian	0.25	Cobalt 60	Required	Exempt	III
6647/BL604H	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6648/BL615	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6649/BL56	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6650/BL67	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6664	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6679	179-4446 878-2510	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6680	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6631	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6685/BL-616	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
6696	932-0426 935-0171	Machlett	0.042	Thorium 232	Not Required	Exempt	III
6696A	135-0130	Eimac	0.054	Thorium 232	Not Required	Exempt	III
6696A	179-3104	Machlett	0.042	Thorium 232	Not Required	Exempt	III
6697	932-0426 935-0171	Machlett	0.042	Thorium 232	Not Required	Exempt	III
6697A	935-0171 932-0426	Eimac	0.054	Thorium 232	Not Required	Exempt	III
6697A	932-0426	Machlett	0.042	Thorium 232	Not Required	Exempt	III
6697AW	- - -	Machlett	0.042	Thorium 232	Not Required	Exempt	III
6777/KU-14	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
6785	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
6795	941-2639	Varian	0.15	Cobalt 60	Required	Exempt	III
6795	941-2639	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
6795A	089-7831	Varian	0.15	Cobalt 60	Required	Exempt	III
6796	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6797	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6805/BL625	880-8596	Varian	0.25	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6806	- - -	RCA	0.032	Thorium 232	Not Required	Exempt	III
6829	646-4756	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
6843	- - -	Raytheon	0.61	Thorium 232	Required	Exempt	III
6844A	833-5515	National Electronics (Varian)	0.06	Krypton 85	Not Required	Exempt	III
6890/BL650	892-3323	Varian	0.30	Cobalt 60	Required	Exempt	III
6899/MA349	581-8645 620-4528	Microwave	0.40	Cobalt 60	Required	Exempt	III
6904/BL348	- - -	Varian	0.25	Cobalt 60	Required	Exempt	III
6905/BL613	682-8544 729-3648	Varian	0.25	Cobalt 60	Required	Exempt	III
6906/BL643	682-8864 729-0285	Varian	0.15	Cobalt 60	Required	Exempt	III
6941	- - -	Westinghouse	23.165	Uranium 235	Required	Exempt	III
6941A	- - -	Westinghouse	23.165	Uranium 235	Required	Exempt	III
6949	- - -	RCA	0.249	Thorium 232	Required	Exempt	III
6949V1	- - -	RCA	0.249	Thorium 232	Required	Exempt	III
6950	752-5426	RCA	0.249	Thorium 232	Required	Exempt	III
6959	951-6292	Raytheon	0.22	Thorium 232	Required	Exempt	III
6962/BL665	646-4719	Varian	0.60	Cobalt 60	Required	Exempt	III
6962/MA339	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
6971	- - -	Westinghouse	20.34	Uranium 235	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
6971A	- - -	Westinghouse	20.34	Uranium 235	Required	Exempt	III
7C24/5762	889-7697 262-0204	RCA	0.0071	Thorium 232	Not Required	Exempt	III
7002	- - -	Machlett	0.002	Thorium 232	Not Required	Exempt	III
7003A	020-0074	Machlett	0.002	Thorium 232	Not Required	Exempt	III
7007	- - -	Machlett	0.012	Thorium 232	Not Required	Exempt	III
7009A	- - -	National Electronics (Varian)	0.06	Krypton 85	Not Required	Exempt	III
705WA	900-3508	United Elec.	0.00002	Thorium (nat)	Not Required	Exempt	III
705WA	900-3508	United Elec.	0.0001	Thorium (nat)	Not Required	Exempt	III
7077	688-6706	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
7099	754-5782	Tung-Sol (Chatham)	0.0025	Radium 226	Not Required	Exempt	I
7114	- - -	Varian	0.70	Cobalt 60	Required	Exempt	III
7115/BL915	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
7131	- - -	Nuclear	1.0	Cobalt 60	Required	Exempt	III
7152/BL612	834-0571 807-7374 615-5047	Varian	0.60	Cobalt 60	Required	Exempt	III
7152/MA348A	834-0571	Microwave	0.80	Cobalt 60	Required	Exempt	III
7159	685-9806	United Elec.	0.0001	Thorium (nat)	Not Required	Exempt	III
7161	168-7809 883-4793	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
7161	168-7809 883-4793	Westinghouse	0.7	Uranium 235	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
7162	816-3759	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
7166/BL933	681-9793 834-2902	Varian	0.70	Cobalt 60	Required	Exempt	III
7166/MA366	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7186	- - -	Westinghouse	0.151	Uranium 235	Required	Exempt	III
7187	- - -	Westinghouse	46.895	Uranium 235	Required	Exempt	III
7188	- - -	Westinghouse	4.916	Uranium 235	Required	Exempt	III
7205	- - -	CBS Hytron	0.10	Nickel 63	Not Required	Exempt	IV
721A	295-9829 188-3913	Western Elec.	0.1	Cobalt 60	Not Required	Exempt	III
721A	188-3913	Varian	0.15	Cobalt 60	Required	Exempt	III
721A	- - -	Sylvania	0.02	Cobalt 60	Not Required	Exempt	III
721B	188-3913	Varian	0.15	Cobalt 60	Required	Exempt	III
724B	193-5125	Varian	0.15	Cobalt 60	Required	Exempt	III
7229	- - -	CBS Hytron	0.10	Nickel 63	Not Required	Exempt	IV
7230	- - -	CBS Hytron	0.10	Nickel 63	Not Required	Exempt	IV
7231	- - -	CBS Hytron	0.10	Nickel 63	Not Required	Exempt	IV
7232	- - -	CBS Hytron	0.10	Nickel 63	Not Required	Exempt	IV
724A	193-5125	Western Elec.	0.10	Cobalt 60	Not Required	Exempt	III
724B	193-5125	Varian	0.15	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
727A	- - -	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
7286	082-4112	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
7309/BL693	633-6304	Varian	0.30	Cobalt 60	Required	Exempt	III
7309/MA360	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7310	688-2414	United Elec.	0.0002	Thorium (nat)	Not Required	Exempt	III
7323	988-0874	Tung-Sol (Chatham)	0.33	Krypton 85	Required	Exempt	III
7324/BL931	- - -	Varian	0.30	Cobalt 60	Required	Exempt	III
7369	- - -	Varian	0.15	Cobalt 60	Required	Exempt	III
7379/MA306B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7380/MA332	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7381/BL979	984-6164 688-3756	Varian	0.25	Cobalt 60	Required	Exempt	III
7381	984-6164	Microwave	0.30	Cobalt 60	Required	Exempt	III
7381/MA338A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7387	- - -	Westinghouse	1.90	Uranium 235	Required	Exempt	III
7400	- - -	Tung-Sol (Chatham)	0.0015	Krypton 85	Not Required	Exempt	III
7401	- - -	Tung-Sol (Chatham)	0.0008	Krypton 85	Not Required	Exempt	III
7402	- - -	Klystronics	0.00309	Throium (nat)	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
7402	914-0064	United Elec.	0.0001	Thorium (nat)	Not Required	- - -	III
7416/TZ36A	866-5264	Signalite	0.90	Cesium 137	Required	Exempt	III
7421	825-7752	Anton	0.25	Nickel 63	Required	Exempt	IV
744	- - -	Victoreen	2.05	Nickel 63	Required	Exempt	IV
7447/BL352A	615-0719	Varian	0.25	Cobalt 60	Required	Exempt	III
7452	- - -	Raytheon	0.17	Thorium 235	Required	Exempt	III
7462	752-5460	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
7479	- - -	Machlett	0.026	Throium 232	Not Required	Exempt	III
748	- - -	Eimac	0.054	Thorium 232	Not Required	Exempt	III
7480	- - -	Machlett	0.042	Thorium 232	Not Required	Exempt	III
7482	- - -	Machlett	0.089	Thorium 232	Not Required	Exempt	III
7486	883-0971	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
75TH	617-9056	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
75TL	615-5565 188-8571 853-5846	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
750TL	556-1238 188-3900 615-5565	Eimac	0.001	Thorium 232	Not Required	Exempt	III
7529	- - -	Raytheon	0.19	Thorium 232	Required	Exempt	III
7560/ML7482	- - -	Machlett	0.1078	Thorium 232	Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
7560V	179-8054	Machlett	0.089	Thorium 232	Not Required	Exempt	III
7562/MA365	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7562A/MA365A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7563/375	762-6682	Microwave	0.84	Cobalt 60	Required	Exempt	III
7563/MA375	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7564/MA378A	610-8486	Microwave	0.40	Cobalt 60	Required	Exempt	III
7583/KU82	778-3857	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
759	- - -	Westinghouse	6.60	Radium 226	Required	Exempt	I
7603/KU401	- - -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
7615/EP680	825-4999	Elec. Prod.	3.0	Nickel 63	Required	Exempt	IV
7615	825-4999	Eon Corp.	0.1	Nickel 63	Not Required	Exempt	IV
7617	825-4562	Eon Corp.	<0.17	Nickel 63 (No radioactive material used after 1975)	Required	Exempt	IV
7652/MA362A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
7657	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
7676	- - -	Westinghouse	0.000384	Thorium (nat)	Not Required	Exempt	III
7715	- - -	Machlett	0.002	Thorium 232	Not Required	Exempt	III
7718	- - -	Raytheon	0.10	Thorium 232	Not Required	Exempt	III
7720	- - -	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
7743/MA363	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
7753762P001	- - -	General Elec.	0.40	Cobalt 60	Required	Exempt	III
7798	- - -	Raytheon	0.02	Thorium 232	Not Required	Exempt	III
7813	- - -	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
7821	799-9471	Varian	0.30	Cobalt 60	Required	Exempt	III
7821/MPT12	799-9471	Omni-Wave (Metcom)	- - -	Thorium 232	Required	Exempt	III
7823/MLT-13	729-1269	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
7823/MA356A	729-1269	Microwave	0.40	Cobalt 60	Required	Exempt	III
7835	843-7356	RCA	0.580	Thorium 232	Required	Exempt	III
7859	105-1481	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
7894	991-1566	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
7901/MPT-13	882-1994	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
7902/BLT004A	754-5431	Varian	0.25	Cobalt 60	Required	Exempt	III
7903	- - -	Westinghouse	0.000191	Thorium 232	Not Required	Exempt	III
7910	020-0071	General Elc.	0.00001	Rhenium 187	Not Required	Exempt	IV
7977A	- - -	National Electronics (Varian)	0.06	Krypton 85	Not Required	Exempt	III
7988/TD-44	707-3336	Signalite	0.06	Radium 226	Required	Exempt	I
7996	- - -	Raytheon	0.02	Nickel 63	Not Required	Exempt	IV
8000	188-3936	RCA	0.0002	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
8005	615-5619 116-9988	RCA	0.00012	Thorium 232	Not Required	Exempt	III
801A	581-8177 116-9985	RCA	0.00002	Thorium 232	Not Required	Exempt	III
8013A	726-9305	RCA	0.000058	Thorium 232	Not Required	Exempt	III
8020	808-4522 615-9871	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
8020	808-4522 114-3846	Eimac	0.0002	Thorium 232	Not Required	Exempt	III
8020W	808-4522	Cetron	0.0016	Thorium oxide	Not Required	Exempt	III
8020W	808-4522	United Elec.	0.00002	Thorium oxide	Not Required	Exempt	III
803	116-9984	RCA	0.0003	Thorium 232	Not Required	Exempt	III
8038	- - -	Machlett	0.042	Thorium 232	Not Required	Exempt	III
804	114-4881	RCA	0.00013	Thorium 232	Not Required	Exempt	III
8040	- - -	Machlett	0.042	Thorium 232	Not Required	Exempt	III
8041	- - -	Machlett	0.042	Thorium 232	Not Required	Exempt	III
8048/BL601	701-7582	Varian	0.30	Cobalt 60	Required	Exempt	III
805	114-4841	United Elec.	0.0002	Thorium 232	Not Required	Exempt	III
805	114-4881	RCA	0.00013	Thorium 232	Not Required	Exempt	III
805	114-4881	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
8059	854-8643	Bendix	1.2	Cesium 137	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
8059	854-8643	Hewlett Packard	1.2	Cesium 137	Required	Exempt	III
8059/TD-72	969-4162	Bendix Corp.	0.06	Radium 226	Required	Exempt	I
8059/TD-72	844-5182	Signalite	0.06	Radium 226	Required	Exempt	I
8060/BLT041	894-7127	Machlett	0.003	Thorium 232	Not Required	Exempt	III
8061/BLT059	894-7128	Varian	0.15	Cobalt 60	Required	Exempt	III
8073	- - -	Westinghouse	94.92	Uranium 235	Required	Exempt	III
808	114-3850	RCA	0.0001	Thorium 232	Not Required	Exempt	III
8082	908-7622	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
8083	990-5914	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
8089	- - -	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
809	114-4867 615-5562	RCA	0.000029	Thorium 232	Not Required	Exempt	III
8090	- - -	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
8094/NL199	984-6413	Machlett	0.003	Thorium 232	Not Required	Exempt	III
810	114-3863 615-5561 567-4415	RCA	0.0002	Thorium 232	Not Required	Exempt	III
810	114-3863	United Elec.	0.0002	Thorium 232	Not Required	Exempt	III
811A	556-1454 789-5973	RCA	0.000056	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
811A	189-5973	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
8112/BL640	688-9031	Varian	0.60	Cobalt 60	Required	Exempt	III
812A	552-1107 030-1901	RCA	0.000056	Thorium 232	Not Required	Exempt	III
812A	030-1901	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
8129	- - -	Raytheon	0.02	Thorium 232	Not Required	Exempt	III
813	556-1455 114-3843	RCA	0.000245	Thorium 232	Not Required	Exempt	III
813-V1	- - -	RCA	0.000245	Thorium 232	Not Required	Exempt	III
814	617-8653 114-4877	RCA	0.00013	Thorium 232	Not Required	Exempt	III
8152/TD-40	810-0192	Bendix	0.06	Radium 226	Required	Exempt	I
816	- - -	Victoreen	2.0	Nickel 63	Required	Exempt	IV
8252W	177-1716	Eimac	< 5.0	Thorium 232	Required	Exempt	III
8256	- - -	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
8257	- - -	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
8264/KU52	078-9500	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
8265/MA355A	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
8265	702-5028	Microwave	0.42	Cobalt 60	Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
827R	682-8629	RCA	0.00256	Thorium 232	Not Required	Exempt	III
8271/MA356D	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
8272/MA356E	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
8273/MA356F	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
828	170-4586 553-4582 114-4876	RCA	0.00012	Thorium 232	Not Required	Exempt	III
829	- - -	Victoreen	2.0	Nickel 63	Required	Exempt	IV
830B	114-4860, 615-5559	RCA	0.000049	Thorium 232	Not Required	Exempt	III
8311/MDS-56	064-7943	Omni-Wave (Metcom)	3000.0	- - -	Required	Exempt	II
8312/BL960B	754-9177	Varian	0.15	Cobalt 60	Required	Exempt	III
8312	754-9177 897-9177	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
8313/BL995B	903-2853	Varian	0.15	Cobalt 60	Required	Exempt	III
8317	942-3980	Machlett	0.089	Thorium 232	Not Required	Exempt	III
8329/KU402	116-9965	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
833A	617-8539	RCA	0.00049	Thorium 232	Not Required	Exempt	III
834	617-9037 538-4709	RCA	0.000081	Thorium 232	Not Required	Exempt	III
8359/MA365B	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
8370/E38	067-9364	ITT	0.08	Uranium (nat)	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
838	114-4888	RCA	0.00013	Thorium 232	Not Required	Exempt	III
8385/MA325	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
8419/MA362	- - -	Microwave	0.40	Cobalt 60	Required	Exempt	III
8424/KU-25	390-5208	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
8437	948-2686	RCA	0.003	Thorium 232	Not Required	Exempt	III
8438-4-400A	243-5018	- - -	- - -	- - -	Required	Exempt	II
845	114-4705 873-8884	RCA	0.000125	Thorium 232	Not Required	Exempt	III
845W	873-8884 193-5127	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
8470/BL994A	903-2852	Varian	0.15	Cobalt 60	Required	Exempt	III
8488/KU29	- -	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
8501	- - -	RCA	0.003	Thorium 232	Not Required	Exempt	III
8514	- - -	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
8515	945-1822	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
8516	- - -	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
861	118-3927	RCA	0.001	Thorium 232	Not Required	Exempt	III
8612	226-6861	Victoreen	0.2	Nickel 63	Required	Exempt	IV
8618	- - -	Machlett	0.041	Thorium 232	Not Required	Exempt	III

Table C-1D - Continued

RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

Tube Type or Part Number	NSN 5960-00-	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	DOT Label (Radioactive)	DOT Transport Group
8793	- - -	RCA	0.003	Thorium 232	Not Required	Exempt	III
8794	- - -	RCA	0.003	Thorium 232	Not Required	Exempt	III
8795	- - -	Machlett	0.088	Thorium 232	Not Required	Exempt	III
8806	- - -	RCA	0.003	Thorium 232	Not Required	Exempt	III
8807	- - -	RCA	0.003	Thorium 232	Not Required	Exempt	III
885	- - -	Victoreen	0.25	Nickel 63	Required	Exempt	IV
8890	- - -	RCA	0.003	Thorium 232	Not Required	Exempt	III
8891	- - -	RCA	0.003	Thorium 232	Not Required	Exempt	III
8991	- - -	Victoreen	0.2	Nickel 63	Required	Exempt	IV
9C25	- - -	RCA	0.043	Thorium 232	Not Required	Exempt	III
999/445	980-6749	Microwave	0.80	Cobalt 60	Required	Exempt	III

SECTION D

RADIOACTIVE COMMODITIES - GP59

FIIN SEQUENCE

SECTION D - RADIOACTIVE COMMODITIES - FIIN SEQUENCE

D-1 INTRODUCTION

The tables included in this section are identical to the section C tables, except the commodities are identified to an NSN in FIIN (Federal Item Identification Number) sequence.

TABLE D-1A

RADIOACTIVE COMMODITIES - FSC 5920

FUSES AND LIGHTNING ARRESTERS

FIIN SEQUENCE

Table D-1A
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5920-00-	TYPE OR PART NUMBER	MANUFACTURER	QUANTITY (MICROCURIES)	RADIOISOTOPE	MARKING AND LABELING REQUIREMENTS		
					USE AND STORAGE LABEL	DOT LABEL (RADIOACTIVE)	DOT TRANSPORT GROUP
011-499	TG191	Signalite	<1.0	Cesium 137	Required	Exempt	III
020-9745	TG78	Signalite	<1.0	Cesium 137	Required	Exempt	III
027-4320	TG40	Signalite	<1.0	Cesium 137	Required	Exempt	III
027-8691	TG44	Signalite	<1.0	Cesium 137	Required	Exempt	III
062-3993	TG49	Signalite	<1.0	Cesium 137	Required	Exempt	III
062-5995	TG49	Signalite	<1.0	Cesium 137	Required	Exempt	III
087-6337	TG87	Signalite	<1.0	Cesium 137	Required	Exempt	III
107-5371	TG61	Signalite	<1.0	Cesium 137	Required	Exempt	III
163-4106	TG184	Signalite	<1.0	Cesium 137	Required	Exempt	III
163-4107	TG14	Signalite	<1.0	Cesium 137	Required	Exempt	III
578-3088	TG25	Signalite	<1.0	Cesium 137	Required	Exempt	III
578-9265	TG45	Signalite	<1.0	Cesium 137	Required	Exempt	III
608-2142	TG-57	Signalite	<1.0	Cesium 137	Required	Exempt	III
613-0114	TG59	Signalite	<1.0	Cesium 137	Required	Exempt	III
629-2731	TG101	Signalite	<1.0	Cesium 137	Required	Exempt	III
679-3827	TG53	Signalite	<1.0	Cesium 137	Required	Exempt	III
682-7301	TG54	Signalite	<1.0	Cesium 137	Required	Exempt	III
687-2066	TG84	Signalite	<1.0	Cesium 137	Required	Exempt	III

Table D-1A - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5920-00-	TYPE OR PART NUMBER	MANUFACTURER	QUANTITY (MICROCURIES)	RADIOISOTOPE	MARKING AND LABELING REQUIREMENTS		
					USE AND STORAGE LABEL	DOT LABEL (RADIOACTIVE)	DOT TRANSPORT GROUP
687-2067	TG83	Signalite	<1.0	Cesium 137	Required	Exempt	III
713-4191	TG76	Signalite	<1.0	Cesium 137	Required	Exempt	III
727-0595	TG48	Signalite	<1.0	Cesium 137	Required	Exempt	III
738-8074	TG34	Signalite	<1.0	Cesium 137	Required	Exempt	III
787-7036	TG31	Signalite	<1.0	Cesium 137	Required	Exempt	III
789-7979	TG151	Signalite	<1.0	Cesium 137	Required	Exempt	III
806-1090	TG56	Signalite	<1.0	Cesium 137	Required	Exempt	III
813-4039	TG51	Signalite	<1.0	Cesium 137	Required	Exempt	III
822-2326	TG52	Signalite	<1.0	Cesium 137	Required	Exempt	III
822-2327	TG86	Signalite	<1.0	Cesium 137	Required	Exempt	III
822-2329	TG27A	Signalite	<1.0	Cesium 137	Required	Exempt	III
827-5751	TG53	Signalite	<1.0	Cesium 137	Required	Exempt	III
827-5752	TG55	Signalite	<1.0	Cesium 137	Required	Exempt	III
827-5753	TG58	Signalite	<1.0	Cesium 137	Required	Exempt	III
839-5538	TG56	Signalite	<1.0	Cesium 137	Required	Exempt	III
856-5965	TG110	Signalite	<1.0	Cesium 137	Required	Exempt	III
856-5966	TG87	Signalite	<1.0	Cesium 137	Required	Exempt	III

Table D-1A - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5920-00-	TYPE OR PART NUMBER	MANUFACTURER	QUANTITY (MICROCURIES)	RADIOISOTOPE	MARKING AND LABELING REQUIREMENTS		
					USE AND STORAGE LABEL	DOT LABEL (RADIOACTIVE)	DOT TRANSPORT GROUP
858-0215	TG42A	Signalite	<1.0	Cesium 137	Required	Exempt	III
892-9060	TG44	Signalite	<1.0	Cesium 137	Required	Exempt	III
896-5549	TG110	Signalite	<1.0	Cesium 137	Required	Exempt	III
922-4902	TG57	Signalite	<1.0	Cesium 137	Required	Exempt	III
950-0902	TG134	Signalite	<1.0	Cesium 137	Required	Exempt	III
953-1924	TG115	Signalite	<1.0	Cesium 137	Required	Exempt	III

TABLE D-1B

RADIOACTIVE COMMODITIES - FSC 5925

CIRCUIT BREAKERS

FIIN SEQUENCE

Table D-1B
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5925-00-	Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
027-2102	271-1290P9	Raytheon	0.05	Radium 226	Required	Exempt	I
109-2211	3H900-80	Metals and Controls, Inc.	- - -	Radium	Required	Exempt	I
144-0438	C6363-1-25	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0443	C6363-2-10	Metals and Controls, Inc.	- - -	Radium	Required	Exempt	I
144-0451	C6363-2-25	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0453	C6363-2-30	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0459	D6364-1-120	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0462	D6364-1-60	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0464	D6364-1-70	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0466	D6364-1-80	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0473	D6364-2-120	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
144-0482	D6364-2-100	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I

Table D-1B - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5925-00-	Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
155-8455	C6363-1-2LT	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
155-8456	C6363-1-5	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
155-8463	C6363-1-20LT	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
159-0414	8751K4	Cutler-Hammer	- - -	Radium 226	Required	Exempt	I
173-7627	D6751-1-50	Metals and Controls, Inc.	- - -	Radium	Required	Exempt	I
175-2580	C6363-2-5LT	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
175-2587	C6363-1-10	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
175-5222	AN3161P35	Mechanical Prod., Inc.	20 mi/hr at surface with toggles out	Radium 226	Required	Exempt	I
175-5227	D6364-1-100	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
258-7121	C6363-1-5LT	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
265-2259	AM1513F2	Heinemann Elec. Company	0.05	Radium 226	Required	Exempt	I
271-8658	8725K4	Cutler-Hammer	0.05	Radium 226	Required	Exempt	I

Table D-1B - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5925-00-	Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
279-1029	AM1513F35	Heinemann Elec. Company	0.05	Radium 226	Required	Exempt	I
279-1031	AM1614-25	Heinemann Elec. Company	0.05	Radium 226	Required	Exempt	I
279-1350	1163SM6-5A125V	Heinemann Elec. Company	- - -	- - -	- - -	- - -	- - -
279-2930	D6364-1-90	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
296-8123	C6363-1-15	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
299-1677	C6363-2-3LT	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
501-6168	C6363-1-8	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
501-7729	D6364-1-40	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
502-7420	271-1289P6	Raytheon	0.05	Radium 226	Required	Exempt	I
503-5847	C6363-1-12-5	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
506-4365	271-1289P5	Raytheon	- - -	- - -	- - -	- - -	- - -
506-4367	271-1289P19	Raytheon	0.05	Radium 226	Required	Exempt	I
506-4368	271-1289P18	Raytheon	0.05	Radium 226	Required	Exempt	I

Table D-1B - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5925-00-	Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
506-4370	271-1289P4	Raytheon	0.05	Radium 226	Required	Exempt	I
506-4372	271-1290P24	Raytheon	0.05	Radium 226	Required	Exempt	I
506-4382	271-1290P6	Raytheon	0.05	Radium 226	Required	Exempt	I
506-4384	271-1290P7	Raytheon	- - -	- - -	- - -	- - -	- - -
506-4388	271-1290P19	Raytheon	0.05	Radium 226	Required	Exempt	I
506-4389	271-1290P20	Raytheon	0.05	Radium 226	Required	Exempt	I
581-0376	PAM1014MG3	Heinemann Elec. Company	0.05	Radium 226	Required	Exempt	I
583-0590	C6363-1-35	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
583-8292	C6363-1-6	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
586-6129	D6364-2-60	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
679-5834	ET5943	ITE Imperial Corp	- - -	- - -	- - -	- - -	- - -
813-2093	6750-2-35	Metals and Controls, Inc.	5.0	Radium 226	Required	Exempt	I
889-0768	C6363-2-12-1/2LT	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I
893-4299	D6364-1-50	Metals and Controls, Inc.	60.0	Radium	Required	Exempt	I

TABLE D-1C

RADIOACTIVE COMMODITIES - FSC 5930

SWITCHES

FIIN SEQUENCE

Table D-1C
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 593- -00-	Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
112-5288	8803K9	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
180-2541	8708	Cutler-Hammer	- - -	- - -	- - -	- - -	- - -
187-3741	8201K11	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
201-2545	8207K3	Cutler-Hammer	0.2	Radium 226	Required	Exempt	I
232-6537	B7A	- - -	- - -	- - -	- - -	- - -	- - -
259-8350	8822K1	Cutler-Hammer	- - -	- - -	- - -	- - -	- - -
259-8386	8212K11	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
272-1368	8800K12	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
296-5899	8851K3	Cutler-Hammer	- - -	- - -	- - -	- - -	- - -
296-9017	8715K2	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
296-9664	8823K9	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
320-9934	24-1164	Cutler-Hammer	0.32	Radium 226	Required	Exempt	I
473-9099	8916K504	Cutler-Hammer	- - -	- - -	Required	Exempt	I
486-9058	8826K3	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
504-8679	A9503C30	Controls Company of America	- - -	- - -	- - -	- - -	- - -
518-3135	8905K520	Cutler-Hammer	- - -	Radium 226	Required	Exempt	I
518-3174	A9503C28	Controls Company of America	20 mi/hr at at surface	Radium 226	Required	Exempt	I

Table D-1C - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5930-00-	Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
549-0116	8816K8	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
565-9501	8905K514	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
615-7880	8830K3	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
654-4356	C6363-6A	Metals and Controls, Inc.	- - -	- - -	- - -	- - -	- - -
655-1514	8803K9	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
655-1523	8809K12	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
655-1582	8825K9	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
655-1582	8825K9	Cutler-Hammer	0.32	Radium 226	Required	Exempt	I
669-7711	8802K9	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
687-1097	8905K526	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
760-2622	C6363-12 1/2A	Metals and Controls, Inc.	- - -	- - -	- - -	- - -	- - -
810-6128	8821K9	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
820-0566	8801K12	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
950-7445	8824K11	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I
991-9287	8820K13	Cutler-Hammer	0.15	Radium 226	Required	Exempt	I

TABLE D-1D

RADIOACTIVE COMMODITIES - FSC 5960

ELECTRON TUBES

FIIN SEQUENCE

Table D-1D
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
003-7978	MA3799	Microwave	0.4	Cobalt 60	Required	Exempt	III
005-1194	MA3743	Microwave	0.4	Cobalt 60	Required	Exempt	III
009-2771	VDX-1035	Varian	35.0	Tritium (H3)	Required	Exempt	IV
009-8082	MA3919Z	Microwave	≤50	Tritium (H3)	Required	Exempt	IV
009-8082	MD85K17	Micro Dynamics	6,000.0	Tritium (H3)	Required	Exempt	IV
009-8087	MD85K17	Micro Dynamics	≤50	Tritium (H3)	Required	Exempt	IV
011-8325	DOD-005	Varian	0.15	Cobalt 60	Required	Exempt	III
020-0071	7910	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
020-0074	ML7003A	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
023-9497	304TL	Eimac	0.00084	Thorium 232	Not Required	Exempt	III
030-1901	812A	RCA	0.000056	Thorium 232	Not Required	Exempt	III
030-1901	812A	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
038-1660	5939A	Westinghouse	2.0	Radium 226	Required	Exempt	I
038-1660	5939A	Varian	0.30	Cobalt 60	Required	Exempt	III
038-1663	R1131C	Sylvania	---	---	Required	Exempt	II
043-4743	2054	RCA	0.580	Thorium 232	Required	Exempt	III
045-8639	5654	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
051-0095	MA355A	Microwave	0.84	Cobalt 60	Required	Exempt	III
051-3188	BL996	Varian	0.30	Cobalt 60	Required	Exempt	III
054-1987	4CX10000D	Eimac	0.0031	Thorium 232	Not Required	Exempt	III
054-3205	TD-81	Bendix	0.06	Radium 226	Required	Exempt	I
054-3946	6414W	General Elec.	0.00001	Rhenium 187	Not required	Exempt	IV
056-7033	BL-P-040D	Varian	0.8	Cobalt 60	Required	Exempt	III
056-8223	MA-371A	Microwave	0.40	Cobalt 60	Required	Exempt	III
056-8225	MA-382C	Microwave	0.4	Cobalt 60	Required	Exempt	III
056-8227	MA-382A	Microwave	0.40	Cobalt 60	Required	Exempt	III
060-3441	GV3A-950	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
060-3449	3B24WB	United Elec.	7×10^{-6}	Thorium (nat)	Not Required	Exempt	III
060-3478	1B55	Varian	0.40	Cobalt 60	Required	Exempt	III
060-6570	6569	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
060-6604	6163	Varian	0.30	Cobalt 60	Required	Exempt	III
060-6604	6163	Omni-Wave (Metcom)	0.10	Cobalt 60	Required	Exempt	III
060-6608	6393/BL68	Varian	0.30	Cobalt 60	Required	Exempt	III
060-6626	6081/ATR407	Varian	0.30	Cobalt 60	Required	Exempt	III
060-6626	8081/ATR407	Sylvania	1.0	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
060-6626	6081	Omni-Wave (Metcom)	0.32	Cobalt 60	Required	Exempt	III
060-6628	6564/BL71	Varian	0.25	Cobalt 60	Required	Exempt	III
060-6629	BL28/6568	Varian	0.15	Cobalt 60	Required	Exempt	III
060-6630	6632/BL18	Varian	0.70	Cobalt 60	Required	Exampt	III
060-6825	BL-367A, B, C	Varian	0.15	Cobalt 60	Required	Exempt	III
061-1127	5771	RCA	0.2511	Thorium 232	Required	Exempt	III
061-1209	304TH	Eimac	0.00084	Thorium 232	Not Required	Exempt	III
062-6692	CK1097-7	Raytheon	0.9	Cesium 137	Required	Exempt	III
064-0204	5751	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
067-9364	8370/E38	ITT	0.08	Uranium (nat)	Not Required	Exempt	III
070-8080	BES-033	Varian	0.15	Cobalt 60	Required	Exempt	III
070-8080	BTR-141	Varian	0.3	Cobalt 60	Required	Exempt	III
073-9277	102663(BL95H)	Varian	0.15	Cobalt 60	Required	Exempt	VI
075-6770	BTR-537	Varian	0.15	Cobalt 60	Required	Exempt	III
077-1828	TG-148	Signalite	<1.0	Cesium 137	Required	Exempt	III
078-1643	4PR-125A	Eimac	0.00029	Thorium 232	Not Required	Exempt	III
078-7091	4CX3000A	Eimac	0.0023	Thorium 232	Not Required	Exempt	III
078-9500	8264/KU52	ITT	0.08	Uranium (nat)	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
079-5341	MA340T	Microwave	0.40	Cobalt 60	Required	Exempt	III
079-5942	BL-999-1	Varian	0.30	Cobalt 60	Required	Exempt	III
080-8748	4PR400A/8188	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
080-8751	4PR65A/8187	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
080-9194	6645	Varian	0.15	Cobalt 60	Required	Exempt	III
080-9194	6645	Microwave	0.40	Cobalt 60	Required	Exempt	III
080-9194	6645	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
081-0192	TD-40	Bendix	0.60	Radium 226	Required	Exempt	I
081----	BL-T-056	Varian	0.15	Cobalt 60	Required	Exempt	III
081-9255	MA-356E	Microwave	0.40	Cobalt 60	Required	Exempt	III
082-3306	3B24WBM	United Elec.	7×10^{-6}	Thorium (nat)	Not Required	Exempt	III
082-4112	7286	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
082-4139	5751	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
087-9010	5957	Kuthe Labs (ITT)	0.080	Uranium (nat)	Not Required	Exempt	III
089-5851	BL-A-007	Varian	0.25	Cobalt 60	Required	Exempt	III
089-5851	BL-A-007-1	Varian	0.3	Cobalt 60	Required	Exempt	III
100-5163	3S4	General Elec.	0.00002	Uranium 238	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
100-7152	304TL	Eimac	0.00084	Thorium 232	Not Required	Exempt	III
105-1481	7859	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
105-3737	MA3847	Microwave	0.4	Cobalt 60	Required	Exempt	III
105-8594	MD85K2	Microdynamics	6,000.0	Tritium (H^3)	Required	Exempt	IV
105-8594	MA3848Z	Microwave	0.4	Cobalt 60	Required	Exempt	III
106-0416	MD80C17-1	Microdynamics	≤ 50	Tritium (H^3)	Required	Exempt	IV
106-0423	MD80C17	Microdynamics	≤ 50	Tritium (H^3)	Required	Exempt	IV
106-0423	VDC-1029	Varian	35.0	Tritium (H^3)	Required	Exempt	IV
107-7607	446A	Western Elec	0.10	Krypton 85	Not Required	Exempt	III
112-9482	MA3770	Microwave	0.40	Cobalt 60	Required	Exempt	III
144-3826	250TH	Eimac	0.0006	Thorium 232	Not Required	Exempt	III
114-3831	6C21	Eimac	0.00056	Thorium 232	Not Required	Exempt	III
114-3843	813	RCA	0.000245	Thorium 232	Not Required	Exempt	III
114-3846	8020	Eimac	0.0002	Thorium 232	Not Required	Exempt	III
114-3850	808	RCA	0.0001	Thorium 232	Not Required	Exempt	III
114-3863	810	RCA	0.0002	Thorium 232	Not Required	Exempt	III
114-3863	810	United Elec.	0.0002	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
114-4705	845	RCA	0.000125	Thorium 232	Not Required	Exempt	III
114-4841	805	United Elec.	0.0002	Thorium 232	Not Required	Exempt	III
114-4849	2X2A	RCA	0.0000176	Thorium 232	Not Required	Exempt	III
114-4858	304TH	Eimac	0.00084	Thorium 232	Not Required	Exempt	III
114-4860	830B	RCA	0.000049	Thorium 232	Not Required	Exempt	III
114-4867	809	RCA	0.000029	Thorium 232	Not Required	Exempt	III
114-4871	35TG	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
114-4876	828	RCA	0.00012	Thorium 232	Not Required	Exempt	III
114-4877	814	RCA	0.00013	Thorium 232	Not Required	Exempt	III
114-4880	811A	RCA	0.000056	Thorium 232	Not Required	Exempt	III
114-4880	811A	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
114-4881	805	RCA	0.00013	Thorium 232	Not Required	Exempt	III
114-4881	805	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
114-4888	838	RCA	0.00013	Thorium 232	Not Required	Exempt	III
116-9931	3C24	Eimac	0.000083	Thorium 232	Not Required	Exempt	III
116-9944	250R	Eimac	0.0006	Thorium 232	Not Required	Exempt	III
116-9950	GL-851	General Elec.	0.03	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
116-9960	371B	Electronic Enterprises	0.0003	Thorium 232	Not Required	Exempt	III
116-9962	450TH	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
116-9963	450TL	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
116-9965	833A	RCA	0.00049	Thorium 232	Not Required	Exempt	III
116-9969	5C22/6279	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
116-9975	313C	Western Elec.	0.50	Krypton 85	Required	Exempt	III
116-9975	313C	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
116-9975	313C	Western Elec.	0.48	Krypton 85	Required	Exempt	III
116-9975	313C	Cetron	0.5	Krypton 85	Required	Exempt	III
116-9979	100TH	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
116-9980	35T	Eimac	0.000096	Thorium 232	Not Required	Exempt	III
116-9982	250TL	Eimac	0.0006	Thorium 232	Not Required	Exempt	III
116-9984	803	RCA	0.0003	Thorium 232	Not Required	Exempt	III
116-9985	801A	RCA	0.00002	Thorium 232	Not Required	Exempt	III
116-9988	8005	RCA	0.00012	Thorium 232	Not Required	Exempt	III
134-6031	5654	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
135-0130	6696A	Eimac	0.054	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
137-7692	ML-7715	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
139-3204	MA3785	Microwave	0.4	Cobalt 60	Required	Exempt	III
140-6535	MA3784	Microwave	0.4	Cobalt 60	Required	Exempt	III
145-3128	MA3164-3163	Microwave	0.40	Cobalt 60	Required	Exempt	III
156-0297	5CX3000A	Eimac	0.0023	Thorium 232	Not Required	Exempt	III
160-2183	MA3886Z	Microwave	≤ 50	Tritium (H^3)	Required	Exempt	IV
160-2186	MD80K15	Microdynamics	3,000.0	Tritium (H^3)	Required	Exempt	IV
160-2186	MA3887Z	Microwave	≤ 50	Tritium (H^3)	Required	Exempt	IV
166-7643	211W	United Elec.	0.0006	Thorium 232	Not Required	Exempt	III
166-7643	211W	RCA	0.000125	Thorium 232	Not Required	Exempt	III
166-7648	OB2	Raytheon	0.04	Krypton 85	Not Required	Exempt	III
166-7662	12AT7	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
167-0389	5651	Raytheon	0.0125	Krypton 85	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
168-7809	7161	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
168-7809	7161	Westinghouse	0.7	Uranium 235	Required	Exempt	III
177-1716	825W	Eimac	<5.0	Thorium 232	Required	Exempt	III
179-4446	12AT7WC	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
179-8054	7560V	Machlett	0.089	Thorium 232	Not Required	Exempt	III
181-0310	DOD-004	Varian	0.3	Cobalt 60	Required	Exempt	III
186-1964	VDS-1011	Varian	70.0	Tritium (H^3)	Required	Exempt	IV
188-0844	1U5	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
188-0921	4D21	Eimac	0.000029	Thorium 232	Not Requried	Exempt	III
188-3524	3V4	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
188-3531	6141/427A	Western Elec.	4.00	Krypton 85	Required	Exempt	III
188-3534	1B63A	Varian	0.15	Cobalt 60	Required	Exempt	III
188-3534	1B63A	General Elec.	0.475	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
188-3534	1B63A	Microwave	0.5	Cobalt 60	Required	Exempt	III
188-3534	1B63A	Sylvania	1.0	Cobalt 60	Required	Exempt	III
188-3535	1B23	Varian	0.15	Cobalt 60	Required	Exempt	III
188-3535	1B23	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
188-3535	1B23	Central Salea	1.0	Cobalt 60	Required	Exempt	III
188-3545	6AK5/EF95	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
188-3567	0B3	Raytheon	0.08	Krypton 85	Not Required	Exempt	III
188-3593	1U4	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
188-3595	1T4	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
188-3900	750TL	Eimac	0.001	Thorium 232	Not Required	Exempt	III
188-3913	721B	Varian	0.15	Cobalt 60	Required	Exempt	III
188-3936	8000	RCA	0.0002	Thorium 232	Not Required	Exempt	III
188-3952	1S5	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
188-3954	1R5	General Elec.	0.00001	Uranium 238	Not Required	Exempt	III
188-3964	313CD	Western Elec.	0.50	Krypton 85	Required	Exempt	III
188-6575	1960	RCA	- - -	- - -	Required	Exempt	II
188-6581	1B37	Varian	0.30	Cobalt 60	Required	Exempt	II

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
188-6582	1B32	Westinghouse	- - -	- - -	Required	Exempt	II
188-6584	5670	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
188-6588	5672	- - -	- - -	- - -	Required	Exempt	II
188-6592	5962/BS101	Anton/Lionel (now Eon Corp.)	1.0	Carbon 14	Required	Exempt	IV
188-6592	5962/BS101	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
188-6592	5962/BL101	Victoreen	0.001	Nickel 63	Not Requried	Exempt	IV
188-6592	5962/BS101	Electronic Products	3.0	Nickel 63	Required	Exempt	IV
188-6592	BS101/5962	Varian	0.001	Nickel 63	Not required	Exempt	IV
188-6592	5962/BS101	Eon Corp.	<0.1	Nickel 63	Not required	Exempt	IV
188-6593	5696	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
188-8571	75TL	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
188-8594	353A	Western Elec	0.01	Radium 226	Required	Exempt	I
188-8594	353A	Western Elec.	0.50	Krypton 85	Required	Exempt	III
188-8633	359A	Western Elec.	1.20	Krypton 85	Required	Exempt	III
188-8648	HF-300	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
189-5968	4-1000A	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
189-5973	811A	RCA	0.000056	Thorium 232	Not Required	Exempt	III
189-5973	811A	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
189-5976	152TH	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
193-5085	0D3W	Raytheon	0.067	Krypton 85	Not Required	Exempt	III
193-5087	1B3GT	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
193-5088	1B22	Varian	0.25	Cobalt 60	Required	Exempt	III
193-5091	1B24A	General Elec.	0.475	Cobalt 60	Required	Exempt	III
193-5091	1B24A	Microwave	0.5	Cobalt 60	Required	Exempt	III
193-5091	1B24A	Sylvania	1.0	Cobalt 60	Required	Exempt	III
193-5091	1B24A	Westinghouse	2.0	Radium 226	Required	Exempt	I
193-5092	1B27	Varian	0.15	Cobalt 60	Required	Exempt	III
193-5093	1B44	Varian	0.30	Cobalt 60	Required	Exempt	III
193-5093	1B44	General Elec.	0.475	Cobalt 60	Required	Exempt	III
193-5093	1B44	Sylvania	1.0	Cobalt 60	Required	Exempt	III
193-5094	1B56	Varian	0.30	Cobalt 60	Required	Exempt	III
193-5094	1B56	General Elec.	0.475	Cobalt 60	Required	Exempt	III
193-5094	1B56	Sylvania	1.0	Cobalt 60	Required	Exempt	III
193-5095	1B58	Varian	0.40	Cobalt 60	Required	Exempt	III
193-5095	1B58	General Elec.	0.475	Cobalt 60	Required	Exempt	III
193-5095	1B58	Sylvania	1.0	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-( )-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
193-5125	724B	Varian	0.15	Cobalt 60	Required	Exempt	III
193-5127	845W	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
193-5141	5792/ATR345	Varian	0.30	Cobalt 60	Required	Exempt	III
193-5141	5792/ATR345	Sylvania	1.0	Cobalt 60	Required	Exempt	III
193-5142	5793/ATR346	Varian	0.30	Cobalt 60	Required	Exempt	III
193-5142	5793/ATR346	Sylvania	1.0	Cobalt 60	Required	Exempt	III
193-5145	5751	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
193-5147	5853/TR368	Varian	0.4	Cobalt 60	Required	Exempt	III
193-5147	5853/TR368	Microwave	0.5	Cobalt 60	Required	Exempt	III
193-5147	5853/TR368	Sylvania	1.0	Cobalt 60	Required	Exempt	III
194-1474	451A	Western Elec.	2.10	Krypton 85	Required	Exempt	III
220-6525	5790/X7108	Sylvania	1.0	Cobalt 60	Required	Exempt	III
220-6526	5791/X6007	Sylvania	1.0	Cobalt 60	Required	Exempt	III
220-6892	1B37A	General Elec.	0.950	Cobalt 60	Required	Exempt	III
220-6892	1B37A	Sylvania	1.0	Cobalt 60	Required	Exempt	III
220-6892	1B37A	Varian	0.30	Cobalt 60	Required	Exempt	III
222-1388	BES-050	Varian	0.40	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
222-1389	BLA-011	Varian	0.30	Cobalt 60	Required	Exempt	III
222-1397	BLA-012	Varian	0.30	Cobalt 60	Required	Exempt	III
225-3419	MD80C8	Micro Dynamics	≤50	Tritium (H^3)	Required	Exempt	IV
226-4306	MA3855K	Microwave	0.4	Cobalt 60	Required	Exempt	III
226-6861	8612	Victoreen	0.20	Nickel 63	Required	Exempt	IV
228-8961	414	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
230-5253	5783	Raytheon	0.0033	Krypton 85	Not Required	Exempt	III
230-5253	5783/1064	Raytheon	0.70	Nickel 63	Required	Exempt	IV
230-5291	395A	Western Elec.	1.6	Krypton 85	Required	Exempt	III
230-5293	313CC	Western Elec.	0.50	Krypton 85	Required	Exempt	III
230-5293	313CC	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
230-5293	313CC	Cetron	0.5	Krypton 85	Required	Exempt	III
230-5298	3X2500A3	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
230-5311	313CA	Western Elec.	0.50	Krypton 85	Required	Exempt	III
230-5311	313CA	Cetron	0.5	Krypton 85	Required	Exempt	III
230-5311	313CA	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
237-0103	5927	Varian	0.40	Cobalt 60	Required	Exempt	III
237-0108	ML-357B	Machlett	0.0011	Thorium 232	Not Required	Exempt	III
237-2413	1B38	Varian	0.6	Cobalt 60	Required	Exempt	III
237-2413	1B38	General Elec.	0.475	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
237-2414	1B40	Varian	0.3	Cobalt 60	Required	Exempt	III
237-2414	1B40	Sylvania	1.0	Cobalt 60	Required	Exempt	III
237-6917	5725	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
243-5017	4-65A	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
243-5018	8438-4-400A	- - -	- - -	- - -	Required	Exempt	II
244-8041	3B24WA	Tung-Sol (Chatham)	0.0005	Uranium 232	Not Required	Exempt	I
248-1270	5922	Varian	0.30	Cobalt 60	Required	Exempt	III
248-1271	5921	Varian	0.30	Cobalt 60	Required	Exempt	III
248-3065	423A	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
248-3078	5823	Tung-Sol (Chatham)	0.0018	Krypton 85	Not Required	Exempt	III
248-8504	ATR387	Varian	0.30	Cobalt 60	Required	Exempt	III
256-9985	1B50	Varian	0.15	Cobalt 60	Required	Exempt	III
256-9988	1B51	Varian	0.30	Cobalt 60	Required	Exempt	III
261-8671	5863	Varian	0.15	Cobalt 60	Required	Exempt	III
261-8671	5863/X7109	Microwave	0.50	Cobalt 60	Required	Exempt	III
261-8671	5863/X7109	Sylvania	1.0	Cobalt 60	Required	Exempt	III
261-8678	6002	Raytheon	0.22	Thorium 232	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
261-9155	1B29	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
262-0122	1B36	Varian	0.30	Cobalt 60	Required	Exempt	III
262-0123	1B41	Varian	0.25	Cobalt 60	Required	Exempt	III
262-0123	1B41	Westinghouse	1.0	Radium 226	Required	Exempt	I
262-0125	1B45	Varian	0.25	Cobalt 60	Required	Exempt	III
262-0125	1B45	Westinghouse	2.0	Radium 226	Required	Exempt	I
262-0137	1B26	Varian	0.15	Cobalt 60	Required	Exempt	III
262-0167	12AT7WA	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
262-0174	5865/MA379	Microwave	0.40	Cobalt 60	Required	Exempt	III
262-0174	5865/TR361	Varian	0.15	Cobalt 60	Required	Exempt	III
262-0174	5865/TR361	Sylvania	1.0	Cobalt 60	Required	Exempt	III
262-0176	5939	Westinghouse	3.30	Radium 226	Required	Exempt	I
262-0184	5644	Raytheon	0.006	Cobalt 60	Not Required	Exempt	III
262-0190	6AB4	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
262-0191	1B52	Varian	0.30	Cobalt 60	Required	Exempt	III
262-0192	1B53	Varian	0.30	Cobalt 60	Required	Exempt	III
262-0198	577	United Elec.	0.0005	Thorium 232	Not Required	Exempt	III
262-0204	5762/7C24	RCA	0.0071	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
262-0210	5814A	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
262-0211	5825	RCA	0.0000077	Thorium 232	Not Required	Exempt	III
262-0213	5841	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
262-0213	5841	Victoreen	1.0	Nickel 63	Required	Exempt	IV
262-0225	5883	Varian	0.30	Cobalt 60	Required	Exempt	III
262-0230	1B55	Varian	0.40	Cobalt 60	Required	Exempt	III
262-0286	5651WA	Raytheon	0.0125	Krypton 85	Not Required	Exempt	III
262-0286	5651WA	RCA	0.01	Nickel 63	Not Required	Exempt	IV
262-0286	5651WA	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
262-0286	5651WA	Sylvania	0.013	Krypton 85	Not Required	Exempt	III
262-0286	5651WA	Tung-Sol (Chatham)	0.005	Radium 226	Not Required	Exempt	I
262-0289	6081/ATR407	Varian	0.30	Cobalt 60	Required	Exempt	III
262-0289	6081/ATR407	Sylvania	1.0	Cobalt 60	Required	Exempt	III
262-0289	6081	Omni-Wave (Metcom)	0.32	Cobalt 60	Required	Exempt	III
262-1356	1B35A	Varian	0.30	Cobalt 60	Required	Exempt	III
262-1356	1B35A	General Elec.	0.95	Cobalt 60	Required	Exempt	III
262-1356	1B35A	Sylvania	1.0	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
262-1356	1B35A	Omni-Wave (Metcom)	0.2	Cobalt 60	Required	Exempt	III
262-1357	5654	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
262-1358	4E27A/5-125B	Eimac	0.0003	Thorium 232	Not Required	Exempt	III
262-1693	5925/TR331	Varian	0.15	Cobalt 60	Required	Exempt	III
262-1696	6022/ATR332	Varian	0.30	Cobalt 60	Required	Exempt	III
262-3771	5787	Raytheon	0.0067	Krypton 85	Not Required	Exempt	III
263-9910	BL25/6322	Varian	0.15	Cobalt 60	Required	Exempt	III
264-2996	6035	Varian	0.15	Cobalt 60	Required	Exempt	III
264-2998	6163	Varian	0.30	Cobalt 60	Required	Exempt	III
264-2998	6163	Microwave	0.25	Cobalt 60	Required	Exempt	III
264-3000	6167	Western Elec.	3.00	Krypton 85	Required	Exempt	III
269-2736	EVM-1000	Eon Corp.	<0.1	Nickel 63	Not Required	Exempt	IV
272-8545	5787WA	Tung-Sol (Chatham)	0.0028	Krypton 85	Not Required	Exempt	III
272-8545	5787WA	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
272-8545	5787WA	Raytheon	0.0067	Krypton 85	Not Required	Exempt	III
272-9195	6024/ATR387	Varian	0.30	Cobalt 60	Required	Exempt	III
272-9196	6117	Varian	0.40	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
272-919[illegible]	6117	General Elec.	0.475	Cobalt 60	Required	Exempt	III
272-9196	6177	Microwave	0.5	Cobalt 60	Required	Exempt	III
272-9196	6117	Sylvania	1.0	Cobalt 60	Required	Exempt	III
272-9197	6162/ATR388	Varian	0.30	Cobalt 60	Required	Exempt	III
272-9197	420	Cetron	2.0	Krypton 85	Required	Exempt	III
272-9194	420A	Cetron	2.0	Krypton 85	Required	Exempt	III
272-9199	6213	Raytheon	0.7	Nickel 63	Required	Exempt	IV
272-9201	6260	Westinghouse	2.0	Radium 226	Required	Exempt	I
272-9201	6260	Varian	0.30	Cobalt 60	Required	Exempt	III
284-6000	QK-447	Raytheon	0.61	Thorium 232	Required	Exempt	III
284-6120	2-50A	Eimac	0.000111	Thorium 232	Not Required	Exempt	III
284-6554	6141/427A	Western Elec.	4.0	Krypton 85	Required	Exempt	III
284-7166	5783WA	Tung-Sol (Chatham)	0.0013	Krypton 85	Not Required	Exempt	III
284-7166	5783WA	Raytheon	0.0033	Krypton 85	Not Required	Exempt	III
284-7229	WL759	Westinghouse	0.166	Krypton 85	Required	Exempt	III
295-3589	BL46/6639	Varian	0.15	Cobalt 60	Required	Exempt	III
295-9561	1B54	Varian	0.30	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
296-0507	6143	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
296-0507	6143	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
296-2698	6560/BL35	Varian	0.25	Cobalt 60	Required	Exempt	IV
296-3354	6201	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
296-4142	VXR16000	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
296-5509	6396	Varian	0.30	Cobalt 60	Required	Exempt	III
296-5932	6378/BL62	Varian	0.15	Cobalt 60	Required	Exempt	III
296-7326	6322	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
296-7326	6322/BL25	Varian	0.15	Cobalt 60	Required	Exempt	III
296-9997	576A	Electronic Enterprises	0.0004	Thorium 232	Not Required	Exempt	III
319-0527	6119	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
319-0568	2-25A	Eimac	0.000083	Thorium 232	Not Required	Exempt	III
319-0569	25T	Eimac	0.000083	Thorium 232	Not Required	Exempt	III
320-6631	BTR-614A	Varian	0.15	Cobalt 60	Required	Exempt	III
333-3540	427A	Western Elec.	4.00	Krypton 85	Required	Exempt	III
348-2498	BL-A-030	Varian	0.3	Cobalt 60	Required	Exempt	III
355-7250	1B23	Varian	0.15	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
355-7290	QK-254/6518	Raytheon	0.40	Thorium 232	Required	Exempt	III
365-2548	BL11/6282	Varian	0.15	Cobalt 60	Required	Exempt	III
365-6183	1B63B	Varian	0.15	Cobalt 60	Required	Exempt	III
390-5208	KU25/8424	Kuthe Labs (ITT)	0.08	Uranium (nat.)	Not Required	Exempt	III
390-5239	6620	Varian	0.15	Cobalt 60	Required	Exempt	III
390-5241	6232/ATR427	Sylvania	0.15	Cobalt 60	Required	Exempt	III
403-1162	BTR632A	Varian	0.7	Cobalt 60	Required	Exempt	III
405-8367	BES-052	Varian	0.3	Cobalt 60	Required	Exempt	III
422-5376	MA3830X	Microwave	0.4	Cobalt 60	Required	Exempt	III
434-0229	BES-045	Varian	0.15	Cobalt 60	Required	Exempt	III
435-1784	TG-64	Signalite	0.9	Cesium 137	Required	Exempt	III
439-5705	359A	Western Elec.	1.20	Krypton 85	Required	Exempt	III
449-7994	MD80K7	Micro Dynamics	≤ 50	Tritium (H_3)	Required	Exempt	IV
449-7994	MA3899Z	Microwave	≤ 50	Tritium (H_3)	Required	Exempt	IV
464-4093	MA3148	Microwave	0.40	Cobalt 60	Required	Exempt	III
469-7363	VDX-1003	Varian	0.15	Cobalt 60	Required	Exempt	III
469-7363	MA37019X	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
471-9818	TD-39	Bendix	0.60	Radium 226	Required	Exempt	I
472-9435	BLT-003	Varian	0.30	Cobalt 60	Required	Exempt	III
478-4198	MA3254-1	Microwave	0.40	Cobalt 60	Required	Exempt	III
478-7692	4CW25000A	Eimac	0.007	Thorium 232	Not Required	Exempt	III
479-1378	4CX5000J	Eimac	0.0037	Thorium 232	Not Required	Exempt	III
479-1624	MA3763	Microwave	0.40	Cobalt 60	Required	Exempt	III
486-9161	MA3753	Microwave	0.40	Cobalt 60	Required	Exempt	III
495-9113	MA3895X	Microwave	≤ 50	Tritium (H_3)	Required	Exempt	IV
501-0865	VXR2700	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
501-0866	KX-642	Westinghouse	0.3	Krypton 85	Required	Exempt	III
501-1066	6560	Omni-Wave (Metcom)	0.40	Cobalt 60	Required	Exempt	III
501-5535	6605/BL96	Varian	0.6	Cobalt 60	Required	Exempt	III
503-0607	6AK4WB	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
503-3115	812A	RCA	0.000056	Thorium 232	Not Required	Exempt	III
503-4436	BL-644	Varian	0.25	Cobalt 60	Required	Exempt	III
503-4493	BL96/6605	Varian	0.60	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
503-4497	BL-95H/6645	Varian	0.15	Cobalt 60	Required	Exempt	III
503-4880	OA2WA	CBS Hytron	0.02	Cobalt 60	Not Required	Exempt	III
503-4880	OA2WA	Raytheon	0.03	Krypton 85	Not Required	Exempt	III
503-4880	OA2WA	Sylvania	0.013	Krypton 85	Not Required	Exempt	III
503-4880	OA2WA	RCA	0.01	Nickel 63	Not Required	Exempt	IV
503-4880	OA2	Raytheon	0.03	Krypton 85	Not Required	Exempt	III
503-8046	MA356P	Microwave	0.4	Cobalt 60	Required	Exempt	III
504-7571	6334/BL27	Varian	0.25	Cobalt 60	Required	Exempt	III
507-3122	2-150D	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
508-1044	2-240A	Eimac	0.00042	Thorium 232	Not Required	Exempt	III
508-1046	253	Eimac	0.0002	Thorium 232	Not Required	Exempt	III
509-3171	5651	Raytheon	0.0125	Krypton 85	Not Required	Exempt	III
518-1688	284	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
519-6175	6312	- - -	0.15	- - -	Required	Exempt	II
537-3959	376C	Western Elec.	4.0	Krypton 85	Required	Exempt	III
537-3959	376C	Cetron	4.0	Krypton 85	Required	Exempt	III
538-2793	6568/BL28	Varian	0.15	Cobalt 60	Required	Exempt	III
538-3862	BL-744	Varian	0.25	Cobalt 60	Required	Exempt	III
538-4709	834	RCA	0.000081	Thorium 232	Not Required	Exempt	III
543-0143	6640/BL60	Varian	0.25	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
543-0693	BL-651	Varian	0.25	Cobalt 60	Required	Exempt	III
543-1142	6249A	Westinghouse	0.016	Radium 226	Required	Exempt	I
547-2928	439A	Western Elec.	3.0	Krypton 85	Required	Exempt	III
548-3802	6034	Varian	0.3	Cobalt 60	Required	Exempt	III
548-3803	6033	Varian	0.3	Cobalt 60	Required	Exempt	III
548-9734	BL62/6378	Varian	0.15	Cobalt 60	Required	Exempt	III
549-0045	5864/ATR321	Varian	0.30	Cobalt 60	Required	Exempt	III
552-1107	812A	RCA	0.000056	Thorium 232	Not Required	Exempt	III
552-1501	CH1067H	Tung-Sol (Chatham)	0.0012	Krypton 85	Not Required	Exempt	III
552-1759	BL-735	Varian	0.25	Cobalt 60	Required	Exempt	III
552-8277	4C35A/6268	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
553-3519	BL-650/6890	Varian	0.3	Cobalt 60	Required	Exempt	III
553-3770	6140	Western Elec.	4.5	Krypton 85	Required	Exempt	III
553-4582	828	RCA	0.00012	Thorium 232	Not Required	Exempt	III
553-7010	6587	Kuthe Labs (ITT)	0.080	Uranium (nat)	Not Required	Exempt	III
553-7091	6542	Tung-Sol (Chatham)	0.0025	Krypton 85	Not Required	Exempt	III
553-7338	BL-670	Varian	0.30	Cobalt 60	Required	Exempt	III
556-1231	2X2A	RCA	0.0000176	Thorium 232	Not Required	Exempt	III
556-1232	1500T	Eimac	0.0013	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
556-1236	100TH	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
556-1238	750TL	Eimac	0.001	Thorium 232	Not Required	Exempt	III
556-1454	811A	RCA	0.000056	Thorium 232	Not Required	Exempt	III
556-1454	811A	Elec. Enter.	0.0002	Thorium 232	Not Required	Exempt	III
556-1455	813	RCA	0.000245	Thorium 232	Not Required	Exempt	III
557-5105	545	United Elec.	0.0001	Thorium (nat)	Not Required	Exempt	III
557-6883	OA2	Raytheon	0.03	Krypton 85	Not Required	Exempt	III
557-6885	OB2	Raytheon	0.04	Krypton 85	Not Required	Exempt	III
557-6926	OA2WA/6626	CBS Hytron	0.02	Cobalt 60	Not Required	Exempt	III
557-6926	OA2WA/6626	Raytheon	0.03	Krypton 85	Not Required	Exempt	III
557-6926	OA2WA	Sylvania	0.013	Krypton 85	Not Required	Exempt	III
557-6926	OA2WA/6626	RCA	0.01	Nickel 63	Not Required	Exempt	IV
561-8230	ML-6544	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
567-4415	810	United Elec.	0.0002	Thorium 232	Not Required	Exempt	III
567-4415	810	RCA	0.0002	Thorium 232	Not Required	Exempt	III
557-3205	6322	Omni-Wave (Metcom)	0.10	Cobalt 60	Not Required	Exempt	III
577-1537	6164	Varian	0.15	Cobalt 60	Required	Exempt	III
577-3205	6322/BL25	Varian	0.15	Cobalt 60	Required	Exempt	III
577-3520	MA3879X	Microwave	0.40	Cobalt 60	Required	Exempt	III
578-1140	413	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
578-114V	GV3B450	Victoreen	1.0	Nickel 63	Required	Exempt	IV
578-1524	4-1000A	Eimac	0.0007	Thorium 232	Not Required	Exempt	IV
578-8701	VXR1800	Victoreen	0.001	Nickel 63	Not Required	Exempt	III
578-8724	BL-357	Varian	0.70	Cobalt 60	Required	Exempt	III
581-5535	6605/BL96A	Varian	0.60	Cobalt 60	Required	Exempt	III
581-5535	6605/BL96	Varian	0.60	Cobalt 60	Required	Exempt	III
581-8178	KX-642	Westinghouse	0.3	Krypton 85	Required	Exempt	III
581-8645	6899/MA349	Microwave	0.4	Cobalt 60	Required	Exempt	III
581-9031	BL-350	Varian	0.15	Cobalt 60	Required	Exempt	III
581-9404	6414	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
581-9594	2-450A	Eimac	0.0012	Thorium 232	Not Required	Exempt	III
583-0613	6164	Varian	0.15	Cobalt 60	Required	Exempt	III
583-4175	BL-622	Varian	0.3	Cobalt 60	Required	Exempt	III
593-2555	EVM-3500	EON Corp.	<0.1	Nickel 63	Not Required	Exempt	IV
605-9192	6829	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
608-1960	BL-652	Varian	0.8	Cobalt 60	Required	Exempt	III
608-2774	6214	Tracerlab, Inc.	0.1	Cobalt 60	Not Required	Exempt	III
608-2774	6214	Varian	0.4	Cobalt 60	Required	Exempt	III
610-8486	BLT-086	Varian	0.4	Cobalt 60	Required	Exempt	III
610-8486	7564/MA-378A	Microwave	0.4	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
613-6796	GV9A-2000	Victoreen	1.0	Nickel 63	Required	Exempt	IV
615-0719	BL-352A	Varian	0.25	Cobalt 60	Required	Exempt	III
615-5047	7152/BL612	Varian	0.60	Cobalt 60	Required	Exempt	III
615-5528	12AT7WB	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
615-5559	830B	RCA	0.000049	Thorium 232	Not Required	Exempt	III
615-5561	810	RCA	0.0002	Thorium 232	Not Required	Exempt	III
615-5561	810	United Elec.	0.0002	Thorium 232	Not Required	Exempt	III
615-5562	809	RCA	0.000029	Thorium 232	Not Required	Exempt	III
615-5565	750TL	Eimac	0.001	Thorium 232	Not Required	Exempt	III
615-5568	1500T	Eimac	0.0013	Thorium 232	Not Required	Exempt	III
615-5607	724B	Varian	0.15	Colbalt 60	Required	Exempt	III
615-5619	8005	RCA	0.00012	Thorium 232	Not Required	Exempt	III
615-5666	253	Eimac	0.0002	Thorium 232	Not Required	Exempt	III
615-5689	4-1000A	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
615-5822	476	Anton (Lionel)	1.0	Carbon 14	Required	Exempt	IV
615-5824	BL-696	Varian	0.15	Colbalt 60	Required	Exempt	III
615-9618	BL-A-034	Varian	0.3	Cobalt 60	Required	Exempt	III
615-9871	8020	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
615-9871	8020	Eimac	0.0002	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
615-9871	8020W	Cetron	0.35	Thorium Oxide	Required	Exempt	III
615-9871	8020W	United Elec.	0.00002	Thorium Oxide	Not Required	Exempt	III
617-3129	BLT-028	Varian	0.25	Cobalt 60	Required	Exempt	III
617-3129	MA-324	Microwave	0.40	Cobalt 60	Required	Exempt	III
617-3129	MA-324B	Microwave	0.40	Cobalt 60	Required	Exempt	III
617-3482	GV5A-3300	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
617-3482	GV5C-3300	Victoreen	1.0	Nickel 63	Required	Exempt	IV
617-3736	BL-362	Varian	0.25	Cobalt	Required	Exempt	III
617-4105	GV5A-2000	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
617-4449	GV5C-4000	Victoreen	1.0	Nickel 63	Required	Exempt	IV
617-4891	3X2500F3	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
617-4911	6135	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
617-5696	MA-306B	Microwave	0.40	Cobalt 60	Required	Exempt	III
617-5806	BL-367	Varian	0.15	Cobalt 60	Required	Exempt	III
617-5806	BL-367A, B, C	Varian	0.15	Cobalt 60	Required	Exempt	III
617-5807	BL-397	Varian	0.15	Cobalt 60	Required	Exempt	III
617-5810	BL43/5810	Varian	0.3	Cobalt 60	Required	Exempt	III
617-5825	GV5A-1200	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 596- 00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
617-6367	OA2WA	CBS Hytron	0.02	Cobalt 60	Not Required	Exempt	III
617-6367	OA2WA	Raytheon	0.03	Krypton 85	Not Required	Exempt	III
617-6367	OA2WA	Sylvania	0.013	Krypton 85	Not Required	Exempt	III
617-6367	OA2WA	RCA	0.01	Nickel 63	Not Required	Exempt	IV
617-8539	833A	RCA	0.00049	Thorium 232	Not Required	Exempt	III
617-8563	250TL	Eimac	0.0006	Thorium 232	Not Required	Exempt	III
617-8569	250TH	Eimac	0.0006	Thorium 232	Not Required	Exempt	III
617-8677	5696	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
617-8685	5651	Raytheon	0.0125	Krypton 85	Not Required	Exempt	III
617-8876	5787WA	Tung-Sol (Chatham)	0.0028	Krypton 85	Not Required	Exempt	III
617-8876	5787WA	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
617-8876	5787WA	Raytheon	0.0067	Krypton 85	Not Required	Exempt	III
617-8973	6626/OA2WA	RCA	0.0105	Nickel 63	Not Required	Exempt	IV
617-9037	834	RCA	0.000081	Thorium 232	Not Required	Exempt	III
617-9056	75TH	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
620-1435	MA-332	Microwave	0.40	Cobalt 60	Required	Exempt	III
620-1435	MA-332B	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
620-4528	BLT-080	Varian	0.15	Cobalt 60	Required	Exempt	III
620-4528	MA-349	Microwave	0.40	Cobalt 60	Required	Exempt	III
620-4528	6899	Microwave	0.40	Cobalt 60	Required	Exempt	III
624-4718	OB2WA	RCA	0.01	Nickel 63	Not Required	Exempt	IV
624-4718	OB2WA	Raytheon	0.04	Krypton 85	Not Required	Exempt	III
624-4718	OB2WA	CBS Hytron	0.05	Nickel 63	Not Required	Exempt	IV
624-4718	OB2WA/6627	Jack & Heintz Inc.	6.0	Radium 226	Required	Exempt	I
624-4718	OB2WA	Tung-Sol (Chatham)	0.005	Radium 226	Not Required	Exempt	I
630-2941	MA306	Microwave	0.4	Cobalt 60	Required	Exempt	III
633-6304	BL693/7309	Varian	0.30	Cobalt 60	Required	Exempt	III
636-1812	5939A	Varian	0.30	Cobalt 60	Required	Exempt	III
636-1812	5939A	Westinghouse	3.30	Radium 226	Required	Exempt	I
636-2217	UX6653	- - -	- - -	- - -	Required	Exempt	II
636-2244	6386	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
636-3613	BL-75	Varian	0.3	Cobalt 60	Required	Exempt	III
646-4613	6265	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960 00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
646-4719	6962/BL665	Varian	0.6	Cobalt 60	Required	Exempt	III
646-4720	6633/BL37	Varian	0.7	Cobalt 60	Required	Exempt	III
646-4756	6829	General Elec.	0.00001	Rhenium 187	- - -	- - -	- - -
661-0339	BL965	Varian	0.15	Cobalt 60	Required	Exempt	III
661-0340	MA-373	Microwave	0.40	Cobalt 60	Required	Exempt	III
665-1057	1B58A	Varian	0.40	Cobalt 60	Required	Exempt	III
665-1057	1B58A	Microwave	0.40	Cobalt 60	Required	Exempt	III
665-3150	R4410	Sylvania	- - -	- - -	Required	Exempt	II
669-6865	6166	RCA	0.0276	Thorium 232	Not Required	Exempt	III
672-3836	BL-366	Varian	0.15	Cobalt 60	Required	Exempt	III
675-3439	GV3A-1500	Victoreen	1.0	Nickel 63	Required	Exempt	IV
676-7979	1K3	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
679-1791	3CW5000F1	Eimac	0.002	Thorium 232	Not Required	Exempt	III
679-6507	MA336-7166	Microwave	0.40	Cobalt 60	Required	Exempt	III
679-8153	GV5A-2500	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
681-8017	ML-7003	Machlett	0.0055	Thorium 232	Not Required	Exempt	III
681-8036	BL-982	Varian	0.25	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
681-8037	BL-973	Varian	0.15	Cobalt 60	Required	Exempt	III
681-9793	7166/BL933	Varian	0.7	Cobalt 60	Required	Exempt	III
681-9793	7166/BL933	Microwave	0.40	Cobalt 60	Required	Exempt	III
682-2771	QK-327/7529	Raytheon	0.19	Thorium 232	Required	Exempt	III
682-2777	5736	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
682-8544	6905/BL613	Varian	0.25	Cobalt 60	Required	Exempt	III
682-8629	827R	RCA	0.00256	Thorium 232	Not Required	Exempt	III
682-8649	GV5A-3000	Victoreen	0.10	Nickel 63	Not Required	Exempt	IV
682-8864	6906/BL643	Varian	0.15	Cobalt 60	Required	Exempt	III
682-9452	6213	Raytheon	0.7	Nickel 63	Required	Exempt	IV
685-8706	7159	United Elec.	0.0001	Thorium (nat)	Not Required	Exempt	III
686-6756	GV3B-600	Victoreen	1.0	Nickel 63	Required	Exempt	IV
687-1034	GV6R-1400A	Victoreen	1.0	Nickel 63	Required	Exempt	IV
688-2414	7310	United Elec.	0.0002	Thorium (nat)	Not Required	Exempt	III
688-3756	7381/BL979	Varian	0.25	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
688-6706	7077	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
688-9031	MA337	Microwave	0.4	Cobalt 60	Required	Exempt	III
688-9031	MA-337A	Microwave	0.4	Cobalt 60	Required	Exempt	III
689-1896	5786	RCA	0.0051	Thorium 232	Not Required	Exempt	III
701-7582	BL-601	Varian	0.3	Cobalt 60	Required	Exempt	III
701-7582	BL-601/8048	Varian	0.3	Cobalt 60	Required	Exempt	III
702-5028	8265	Microwave	0.40	Cobalt 60	Required	Exempt	III
707-0816	MA-356	Microwave	0.4	Cobalt 60	Required	Exempt	III
707-3336	7988/TD44	Signalite	0.06	Radium 226	Required	Exempt	I
709-2031	BL-29	Varian	0.15	Cobalt 60	Required	Exempt	III
712-3891	MA-335B	Microwave	0.4	Cobalt 60	Required	Exempt	III
713-7014	3CH5W	ITT	0.08	Thorium 232	Not Required	Exempt	III
715-1833	1AD2	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
719-5454	BL-31/6637	Varian	0.15	Cobalt 60	Required	Exempt	III
719-7508	BLT-40	Varian	0.15	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
721-2495	487	Anton Labs	1.0	Carbon 14	Required	Exempt	IV
725-4068	MA-325	Microwave	0.40	Cobalt 60	Required	Exempt	III
726-9826	6EZ8	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
727-5618	6455/BL61	Varian	0.25	Cobalt 60	Required	Exempt	III
728-1775	6DT8	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
729-0285	6906/BL643	Varian	0.15	Cobalt 60	Required	Exempt	III
729-1269	7823/MA-356A	Microwave	0.40	Cobalt 60	Required	Exempt	III
729-1269	7823/MLT13	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
729-1719	R1130B/1B59	- - -	- - -	- - -	Required	Exempt	II
729-3424	2X3000F3	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
729-3424	2X3000F	Eimac	0.002	Thorium 232	Not Required	Exempt	III
729-3648	BL613/6905	Varian	0.25	Cobalt 60	Required	Exempt	III
729-5602	GV6A-2000	Victoreen	1.0	Nickel 63	Required	Exempt	IV
731-1742	VXR1500	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
735-4210	1B63A	Varian	0.15	Cobalt 60	Required	Exempt	III
739-7922	BTR-140	Varian	0.15	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-( )-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
740-8350	2041	RCA	0.032	Thorium 232	Not Required	Exempt	III
752-0185	6545	Varian	0.15	Cobalt 60	Required	Exempt	III
752-0594	6334	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
752-0594	6334	Omni-Wave (Metcom)	0.2	Cobalt 60	Required	Exempt	III
752-5239	6644	Tracerlab, Inc.	0.1	Cobalt 60	Not Required	Exempt	III
752-5239	6644/BL95	Varian	0.15	Cobalt 60	Required	Exempt	III
752-5270	1B3GT/1G3GT	General Elec.	0.000001	Rhenium 187	Not Required	Exempt	IV
752-5384	5948A	Tung-Sol (Chatham)	- - -	- - -	Required	Exempt	II
752-5426	6950	RCA	0.249	Thorium 232	Required	Exempt	III
752-5460	7462	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
752-5892	12AT7WB	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
754-5431	BLT-004	Varian	0.3	Cobalt 60	Required	Exempt	III
754-5431	BLT-004A/7902	Varian	0.25	Cobalt 60	Required	Exempt	III
754-5782	7099	Tung-Sol (Chatham)	0.0025	Radium 226	Not Required	Exempt	I
754-9177	BL-960A	Varian	0.15	Cobalt 60	Required	Exempt	III
754-9916	6542	Tung-Sol (Chatham)	0.0025	Krypton 85	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
754-9916	6542	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
754-9916	6542	Raytheon	0.006	Cobalt 60	Not Required	Exempt	III
755-4210	1B36A	Varian	0.3	Cobalt 60	Required	Exempt	III
755-9108	ML-6257	Machlett	0.013	Thorium 232	Not Required	Exempt	III
755-9109	ML-5682	Machlett	0.20	Thorium 232	Required	Exempt	III
760-1786	BTR-121	Varian	0.15	Cobalt 60	Required	Exempt	III
760-1786	MA3157D/8576	Microwave	0.4	Cobalt 60	Required	Exempt	III
762-6682	BTR-183	Varian	0.25	Cobalt 60	Required	Exempt	III
762-6682	MA-375	Microwave	0.40	Cobalt 60	Required	Exempt	III
762-6682	7563/MA375	Microwave	0.40	Cobalt 60	Required	Exempt	III
762-7692	BTR-608	Varian	0.15	Cobalt 60	Required	Exempt	III
762-7692	MA-362E	Microwave	0.40	Cobalt 60	Required	Exempt	III
762-7692	MD-70K8	Microdynamics	0.5	Cobalt 60	Requried	Exempt	III
763-7806	6696A	Eimac	0.054	Thorium 232	Not Required	Exempt	III
763-8807	MA38155	Microwave	0.4	Cobalt 60	Required	Exempt	III
765-4524	MA-354	Microdynamics	0.40	Cobalt 60	Required	Exempt	III
765-4539	MA-331A	Microwave	0.40	Cobalt 60	Required	Exempt	III
765-4540	MA-331B	Microwave	0.40	Cobalt 60	Required	Exempt	III
769-0869	6626/OA2WA	CBS Hytron	0.01	Krypton 85	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
770-1927	4628	RCA	0.003	Thorium 232	Not Required	Exempt	III
774-6338	TG-77	Bendix	<1.0	Cesium 137	Required	Exempt	III
778-3857	KU82/7583	Kuthe Labs(ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
780-7856	BLT-055	Varian	0.15	Cobalt 60	Required	Exempt	III
780-8151	6232/ATR427	Sylvania	0.15	Cobalt 60	Required	Exempt	III
780-8151	6232/TR427	Varian	0.15	Cobalt 60	Required	Exempt	III
780-8151	6232/ATR427	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
780-8151	6232/MA316	Microwave	0.5	Cobalt 60	Required	Exempt	III
781-1808	3-400Z	Eimac	0.0008	Thorium 232	Not Required	Exempt	III
781-8963	BLT-058	Varian	0.15	Cobalt 60	Required	Exempt	III
788-9889	BTR-546	Varian	0.15	Cobalt 60	Required	Exempt	III
788-9889	MCC-17A	Omni-Wave (Metcom)	0.2	Cobalt 60	Required	Exempt	III
799-9471	7821/MPT12	Omni-Wave (Metcom)	- - -	Thorium 232	Required	Exempt	III
799-9471	7821	Varian	0.3	Cobalt 60	Required	Exempt	III
800-0554	6627/OB2WA	Raytheon	0.02	Cobalt 60	Not Required	Exempt	III
800-0554	6627/OB2WA	Jack & Heintz, Inc.	6.0	Radium 226	Required	Exempt	I
800-0554	6627/OB2WA	CBS Hytron	0.05	Nickel 63	Not Required	Exempt	IV

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
800-0556	OC2	Raytheon	0.025	Krypton 85	Not Required	Exempt	III
800-0578	313CC	Western Elec.	0.5	Krypton 85	Required	Exempt	III
800-0578	313CC	Western Elec.	0.01	Radium 226	Not Required	Exempt	I
800-0578	313CC	Cetron	0.5	Krypton 85	Required	Exempt	III
800-0594	BL87/6636	Varian	0.7	Cobalt 60	Required	Exempt	III
800-2357	5950	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
800-3535	BL-954	Varian	0.15	Cobalt 60	Required	Exempt	III
800-3536	BL-377	Varian	0.15	Cobalt 60	Required	Exempt	III
800-3537	BL-374	Varian	0.25	Cobalt 60	Required	Exempt	III
800-4409	TG41A	Signalite	0.9	Cesium 137	Required	Exempt	III
801-5578	313C	Western Elec.	0.5	Krypton 85	Required	Exempt	III
801-5578	313C	Tung-Sol (Chatham)	0.05	Radium 226	Required	Exempt	I
801-5578	313C	Cetron	0.5	Krypton 85	Required	Exempt	III
801-6865	BL-651H	Varian	0.25	Cobalt 60	Required	Exempt	III
801-6865	MA3702	Microwave	0.40	Cobalt 60	Required	Exempt	III
801-6865	MD73X6	Microdynamics	1.0	Cobalt 60	Required	Exempt	III
804-0954	6303	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
804-2215	BL-957	Varian	0.25	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
805-3626	TG-50	Signalite	0.9	Cesium 137	Required	Exempt	III
806-0292	5957	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
806-8155	BL-690	Varian	0.25	Cobalt 60	Required	Exempt	III
807-7374	7152/BL612	Varian	0.60	Cobalt 60	Required	Exempt	III
808-4217	GV6A-1200	Victoreen	1.0	Nickel 63	Required	Exempt	IV
808-4522	8020	Electronic Enterprises	0.0002	Thorium 232	Not Required	Exempt	III
808-4522	8020	Eimac	0.0002	Thorium 232	Not Required	Exempt	III
808-4522	8020W	Cetron	0.0016	Thorium Oxide	Not Required	Exempt	III
808-4522	8020W	United Elec.	<0.00002	Thorium Oxide	Not Required	Exempt	III
808-6977	F-2701	ITT	1.5	Cesium 137	Required	Exempt	III
808-6977	TG-36	Signalite	0.9	Cesium 137	Required	Exempt	III
808-9472	BL-N-003	Varian	0.3	Cobalt 60	Required	Exempt	III
809-3372	ML-6258	Machlett	0.013	Thorium 232	Not Required	Exempt	III
809-7515	BLS-016	Varian	0.25	Cobalt 60	Required	Exempt	III
810-8310	6C21	Eimac	0.00056	Thorium 232	Not Required	Exempt	III
811-6773	MA-340D	Microwave	0.40	Cobalt 60	Required	Exempt	III
811-6773	BL-965	Varian	0.15	Cobalt 60	Required	Exempt	III
811-6838	B4021AL	Burrough	1.0	Krypton 85	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
811-7500	GV5A-1600	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
812-2113	BL-941	Varian	0.15	Cobalt 60	Required	Exempt	III
812-3745	6414	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
812-3745	6414W	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
812-6904	GV3A-2000	Victoreen	1.0	Nickel 63	Required	Exempt	IV
813-0750	423C	Western Elec.	4.5	Krypton 85	Required	Exempt	III
813-0755	6199	Victoreen	1.0	Nickel 63	Required	Exempt	IV
813-5616	TD41	Bendix	0.6	Radium 226	Required	Exempt	I
816-1386	6423	Machlett	0.008	Thorium 232	Not Required	Exempt	III
816-3759	7162	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
817-6181	BLT-033	Varian	0.25	Cobalt 60	Required	Exempt	III
817-6181	BLT033/TR610	Varian	0.9	Cobalt 60	Required	Exempt	III
819-1154	5841	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
819-1154	5841	Vibtoreen	1.0	Nickel 63	Required	Exempt	IV
821-5031	6386	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
821-6134	TG-35	Signalite	0.9	Cesium 137	Required	Exempt	III
822-2494	MA3215-1	Microwave	0.40	Cobalt 60	Required	Exempt	III
822-8875	MA-372	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
824-7834	GV3B-400	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
824-7834	483	Lionel Elec.	0.25	Nickel 63	Required	Exempt	IV
824-8668	BL-970	Varian	0.25	Cobalt 60	Required	Exempt	III
824-8668	MA-358	Microwave	0.40	Cobalt 60	Required	Exempt	III
825-1000	MA-356C	Microwave	0.40	Cobalt 60	Required	Exempt	III
825-4562	7617	Eon Corp.	<0.17 (no radioactive material used after 1975)	Nickel 63	Required	Exempt	IV
825-4999	7615/EP680	Electronic Products	3.0	Nickel 63	Required	Exempt	IV
825-4999	7615	Eon Corp.	<0.1 (no radioactive material used after 1975)	Nickel 63	Not Required	Exempt	IV
826-1280	GV6A-700	Victoreen	1.0	Nickel 63	Required	Exempt	IV
828-8004	TD-58	Bendix	0.06	Radium 226	Required	Exempt	I
833-5515	6844A	National Electronics (Varian)	0.06	Krypton 85	Not Required	Exempt	III
834-0571	7152/BL612	Varian	0.6	Cobalt 60	Required	Exempt	III
834-2902	7166/BL933	Varian	0.70	Cobalt 60	Required	Exempt	III
834-5522	GL-6942	General Elec.	0.03	Thorium 232	Not Required	Exempt	III
835-0057	MA366-2	Microwave	0.40	Cobalt 60	Required	Exempt	III
835-0058	MA366C	Microwave	0.40	Cobalt	Required	Exempt	III
835-0058	MA366-3	Microwave	0.40	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
835-0059	MA366-4	Microwave	0.40	Cobalt 60	Required	Exempt	III
835-1517	GV6A-2100	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
835-2574	BL-934A	Varian	0.25	Cobalt 60	Required	Exempt	III
835-2575	BL-967	Varian	0.15	Cobalt 60	Required	Exempt	III
835-2575	MD70K7	Micro Dynamics.	0.50	Cobalt 60	Required	Exempt	III
835-2576	BL-934	Varian	0.25	Cobalt 60	Required	Exempt	III
836-6273	OG3	Tung-Sol (Chatham)	0.004	Krypton 85	Not Required	Exempt	III
838-8881	GV9A-1420	Victoreen	1.0	Nickel 63	Required	Exempt	IV
839-9525	GV9A-900	Victoreen	0.001	Nickel 63	Not Required	Exempt	IV
840-0766	GV6C-3800	Victoreen	1.0	Nickel 63	Required	Exempt	IV
841-2352	12AX7	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
841-2609	BL-71/6564	Varian	0.25	Cobalt 60	Required	Exempt	III
842-6659	6143	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
842-6660	5864/ATR321	Varian	0.3	Cobalt 60	Required	Exempt	III
842-6660	5864/ATR321	Sylvania	1.0	Cobalt 60	Required	Exempt	III
842-6661	6024/ATR387	Varian	0.3	Cobalt 60	Required	Exempt	III
842-7692	MA3122	Microwave	0.40	Cobalt 60	Required	Exempt	III
843-0702	MA340K	Microwave	0.4	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
843-8063	BL95/6644	Varian	0.15	Cobalt 60	Required	Exempt	III
844-5183	BLT-042	Varian	0.15	Cobalt 60	Required	Exempt	III
844-5183	MA362	Microwave	0.40	Cobalt 60	Required	Exempt	III
845-2633	4-250A	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
845-5743	4CW10000A	Eimac	0.0031	Thorium 232	Not Required	Exempt	III
846-4538	GV3B-700	Victoreen	1.0	Nickel 63	Required	Exempt	IV
847-1319	A15030	RCA	0.498	Thorium 232	Required	Exempt	III
847-3445	BTR-147	Varian	0.3	Cobalt 60	Required	Exempt	III
847-3752	BLT-110	Varian	0.15	Cobalt 60	Required	Exempt	III
847-3752	MA-340B	Microwave	0.40	Cobalt 60	Required	Exempt	III
847-6738	5682	General Elec.	0.2	Thorium 232	Required	Exempt	III
848-8575	BLT-024	Varian	0.25	Cobalt 60	Required	Exempt	III
849-3494	MA-356	Microwave	0.40	Cobalt 60	Required	Exempt	III
849-3494	BL-T-097	Varian	0.7	Cobalt 60	Required	Exempt	III
849-3721	447A	Western Elec.	0.1	Krypton 85	Not Required	Exempt	III
849-3768	430-B	Western Elec.	4.5	Krypton 85	Required	Exempt	III
849-3769	346C	Cetron	4.5	Krypton 85	Required	Exempt	III
849-3769	346C	Western Elec.	4.5	Krypton 85	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
849-3769	346CJW	Western Elec.	4.5	Krypton 85	Required	Exempt	III
849-6864	432B	Western Elec.	4.5	Krypton 85	Required	Exempt	III
850-0788	BTR-540	Varian	0.15	Cobalt 60	Required	Exempt	III
850-0925	6633	Microwave	0.25	Cobalt 60	Required	Exempt	III
850-1522	GV5C-3800	Victoreen	1.0	Nickel 63	Required	Exempt	IV
850-6633	6357	- - -	- - -	- - -	Required	Exempt	II
850-9920	MA-393	Microwave	0.40	Cobalt 60	Required	Exempt	III
851-7848	6213	Raytheon	0.7	Nickel 63	Required	Exempt	IV
852-1514	BL-T-086	Varian	0.40	Cobalt 60	Required	Exempt	III
852-5546	TD-78	Bendix	0.06	Radium 226	Required	Exempt	I
852-5655	KU52/8264	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
852-7334	GV5C-4300	Victoreen	1.0	Nickel 63	Required	Exempt	IV
853-5846	75TL	Eimac	0.00021	Thorium 232	Not Required	Exempt	III
853-6468	1B60	Varian	0.15	Cobalt 60	Required	Exempt	III
855-1853	175A	Eimac	0.0008	Thorium 232	Not Required	Exempt	III
855-8680	TD-36	Bendix	0.9	Cesium 137	Required	Exempt	III
855-8682	TD-61	Bendix	0.06	Radium 226	Required	Exempt	I
855-8790	GV4S-2800	Victoreen	1.5 to 2.0	Nickel 63	Required	Exempt	IV

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
856-8853	BES-048	Varian	0.3	Cobalt 60	Required	Exempt	III
856-9805	MA3133	Microwave	0.40	Cobalt 60	Required	Exempt	III
857-3083	MA-3152	Microwave	0.40	Cobalt 60	Required	Exempt	III
858-4074	GV5A-1300	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
864-7480	10106946	Raytheon	0.90	Cesium 137	Required	Exempt	III
864-7480	4-1000A	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
865-0259	4X500A	Eimac	0.0005	Thorium 232	Not Required	Exempt	III
866-5263	BLT-036	Varian	0.25	Cobalt 60	Required	Exempt	III
866-5264	TD-36A	Bendix	0.9	Cesium 137	Required	Exempt	III
866-5264	7416/TZ36A	Signalite	0.9	Cesium 137	Required	Exempt	III
866-5427	MA3134	Microwave	0.40	Cobalt 60	Required	Exempt	III
873-8884	845W	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
877-6026	MA3132	Microwave	0.40	Cobalt 60	Required	Exempt	III
878-1838	TG-25	Signalite	<1.0	Cesium 137	Required	Exempt	III
878-2510	6679	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
878-2935	6396	Varian	0.3	Cobalt 60	Required	Exempt	III
878-2935	6396	Sylvania	1.0	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
878-6030	577	United Elec.	0.0005	Thorium 232	Not Required	Exempt	III
878-6030	577W	United Elec.	0.00002	Thorium 232	Not Required	Exempt	III
878-6554	GV3A-1200	Victoreen	0.1	Nickel 63	Not Required	Exempt	III
880-8596	6805/BL625	Varian	0.25	Cobalt 60	Required	Exempt	III
882-1994	BL-994	Varian	0.15	Cobalt 60	Required	Exempt	III
882-1994	BL-994A	Varian	0.15	Cobalt 60	Required	Exempt	III
882-1998	BLW-015	Varian	0.4	Cobalt 60	Required	Exempt	III
882-9042	TG-67	Signalite	0.9	Cesium 137	Required	Exempt	III
883-0971	7486	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
883-4793	7161	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
883-4793	7161	Westinghouse	0.7	Uranium 235	Required	Exempt	III
883-7030	6166	RCA	0.276	Thoriumm 232	Not required	Exempt	III
883-7030	6166A/7007	RCA	0.0276	Thorium 232	Not Required	Exempt	III
887-2618	4-250A	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
889-7697	5762	RCA	0.0071	Thorium 232	Not Required	Exempt	III
890-6617	5956	Kuthe Labs	0.08	Uranium (nat)	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 596C-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
892-0862	SS501	ITT	- - -	- - -	Required	Exempt	II
892-0975	GV5A-1400	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
892-3323	BL-650	Varian	0.203	Cobalt 60	Required	Exempt	III
892-3413	6303A	United Elec.	0.0001	Thorium 232	Not Required	Exempt	III
892-3809	6072A	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
893-0151	MA-3722	Microwave	0.40	Cobalt 60	Required	Exempt	III
893-1184	3CX3000A1	Eimac	0.002	Thorium 232	Not Required	Exempt	III
893-1184	3X3000A1	Eimac	0.0017	Thorium 232	Not Required	Exempt	III
893-1757	BL-335	Varian	0.25	Cobalt 60	Required	Exempt	III
893-9153	MA340F	Microwave	0.40	Cobalt 60	Required	Exempt	III
894-7127	MPT-23	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
894-7127	8060/BLT041	Machlett	0.003	Thorium 232	Not Required	Exempt	III
894-7127	BL-T-041	Varian	0.15	Cobalt 60	Required	Exempt	III
894-7128	BLT-059/8061	Varian	0.15	Cobalt 60	Required	Exempt	III
894-7128	MPT-24	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III
895-0802	MA338A	Microwave	0.40	Cobalt 60	Required	Exempt	III
897-5744	MPT-22	Omni-Wave (Metcom)	0.1	Cobalt 60	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
897-6637	BLT-072	Varian	0.15	Cobalt 60	Required	Exempt	III
897-6637	MA-349B	Microwave	0.40	Cobalt 60	Required	Exempt	III
897-6964	7381/BL979	Varian	0.25	Cobalt 60	Required	Exempt	III
897-6964	7381	Microwave	0.30	Cobalt 60	Required	Exempt	III
897-8418	GV4S-410	Victoreen	1.5 to 2.0	Nickel 63	Required	Exempt	IV
897-9177	8312/BL960B	Varian	0.15	Cobalt 60	Required	Exempt	III
899-8118	BLT-015	Varian	0.15	Cobalt 60	Required	Exempt	III
899-9964	KU-21	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
900-3508	705WA	United Elec.	0.0001	Thorium (nat)	Not Required	Exempt	III
900-3508	705WA	United Elec.	0.00002	Thorium (nat)	Not Required	Exempt	III
902-0502	BTR-548	Varian	0.15	Cobalt 60	Required	Exempt	III
902-0941	BES-033	Varian	0.15	Cobalt 60	Required	Exempt	III
903-2852	MPT13	Omni-Wave (Metcom)	1.0	Cobalt 60	Required	Exempt	III
903-2852	8470/BL994A	Varian	0.15	Cobalt 60	Required	Exempt	III
903-2853	8313/BL995B	Varian	0.15	Cobalt 60	Required	Exempt	III
903-3308	BL-A-026	Varian	0.3	Cobalt 60	Required	Exempt	III
903-5816	BLT-077	Varian	0.15	Cobalt 60	Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
905-7498	6646/BL604	Varian	0.25	Cobalt 60	Required	Exempt	III
905-8020	6155	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
905-9126	4CX1500A	Eimac	0.007	Thorium 232	Not Required	Exempt	III
908-7622	8082	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
912-3721	MA3158A	Microwave	0.4	Cobalt 60	Required	Exempt	III
913-3128	BL-N-045	Varian	0.3	Cobalt 60	Required	Exempt	III
914-6268	BLT-099	Varian	0.15	Cobalt 60	Required	Exempt	III
914-6268	MA-3157	Microwave	0.40	Cobalt 60	Required	Exempt	III
943-4392	BTR-183	Varian	0.25	Cobalt 60	Required	Exempt	III
916-3669	BES-048	Varian	0.3	Cobalt 60	Required	Exempt	III
916-3670	BES-046	Varian	0.15	Cobalt 60	Required	Exempt	III
924-5255	KU-17	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
924-9606	BL-967A	Varian	0.15	Cobalt 60	Required	Exempt	III
925-2111	KU82/7583	Kuthe Labs (ITT)	0.08	Uranium (nat)	Not Required	Exempt	III
932-0426	6697	Machlett	0.042	Thorium 232	Not Required	Exempt	III
932-0426	6697A	Eimac	0.054	Thorium 232	Not Required	Exempt	III
932-0426	6697A	Machlett	0.042	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
932-3067	BLT-005B	Varian	0.3	Cobalt 60	Required	Exempt	III
935-0171	6697	Machlett	0.042	Thorium 232	Not Required	Exempt	III
935-0171	6697A	Eimac	0.054	Thorium 232	Not Required	Exempt	III
937-9870	353A	Cetron	0.5	Krypton 85	Required	Exempt	III
937-9870	353A	Western Elec.	0.01	Radium 226	Required	Exempt	I
938-2670	6D10	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
938-4359	MA3821Z	Microwave	0.40	Cobalt 60	Required	Exempt	III
941-2639	6795	Varian	0.15	Cobalt 60	Required	Exempt	III
941-2639	6795	Nuclear Corp.	1.0	Cobalt 60	Required	Exempt	III
942-3980	8317	Machlett	0.089	Thorium 232	Not Required	Exempt	III
942-6407	MA-3192	Microwave	0.40	Cobalt 60	Required	Exempt	III
943-4392	BTR-183	Varian	0.25	Cobalt 60	Required	Exempt	III
945-1833	8515	Victoreen	0.1	Nickel 63	Not Required	Exempt	IV
947-7424	MA3164/3162	Microwave	0.40	Cobalt 60	Required	Exempt	III
948-2686	8437	RCA	0.003	Thorium 232	Not Required	Exempt	III
948-5806	MA-3160	Microwave	0.4	Cobalt 60	Required	Exempt	III
948-9472	BL-N-012	Varian	0.3	Cobalt 60	Required	Exempt	III
950-6085	[illegible]7WA	Eimac	0.0011	Thorium 232	Not Required	Exempt	III
951-6292	QK172/6959	Raytheon	0.22	Thorium 232	Required	Exempt	III
954-4825	3-1000Z	Eimac	0.00073	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
956-2318	BLA-009	Varian	0.3	Cobalt 60	Required	Exempt	III
957-0951	3CX3000F1	Eimac	0.002	Thorium 232	Not Required	Exempt	III
958-3154	4PR-250C	Eimac	0.00066	Thorium 232	Not Required	Exempt	III
958-9146	4-65A	Eimac	0.0001	Thorium 232	Not Required	Exempt	III
958-9147	4-1000A	Eimac	0.0007	Thorium 232	Not Required	Exempt	III
959-7413	MA38G1	Microwave	0.40	Cobalt 60	Required	Exempt	III
962-3345	BL-660	Varian	0.3	Cobalt 60	Required	Exempt	III
966-9469	TG-72	Signalite	0.9	Cesium 137	Required	Exempt	III
968-0500	BLS-029	Varian	0.15	Cobalt 60	Required	Exempt	III
968-5229	TD-42	Bendix	0.6	Radium 226	Required	Exempt	I
972-8990	TG-90	Signalite	<1.0	Cesium 137	Required	Exempt	III
973-7957	BL-P-027D	Varian	0.25	Cobalt 60	Required	Exempt	III
975-2250	6591	Varian	0.3	Cobalt 60	Required	Exempt	III
975-2251	6624	Varian	0.25	Cobalt 60	Required	Exempt	III
983-5684	BL397A, B, C	Varian	0.15	Cobalt 60	Required	Exempt	III
984-6164	7381/BL979	Varian	0.25	Cobalt 60	Required	Exempt	III
984-6164	7381	Microwave	0.30	Cobalt 60	Required	Exempt	III
984-6413	8094/ML199	Machlett	0.003	Thorium 232	Not Required	Exempt	III

Table D-1D - Continued
RADIOACTIVE COMMODITIES MARKING AND LABELING REQUIREMENTS

NSN 5960-00-	Tube Type or Part Number	Manufacturer	Quantity (Microcuries)	Radioisotope	Marking and Labeling Requirements		
					Use and Storage Label	Dot Label (Radioactive)	Dot Transport Group
988-0874	7323	Tung-Sol (Chatham)	0.33	Krypton 85	Required	Exempt	III
988-1583	3CX10000A1	Eimac	0.0041	Thorium 232	Not Required	Exempt	III
989-9810	3CX3000F7	Eimac	0.002	Thorium 232	Not Required	Exempt	III
990-3077	BL-398	Varian	0.15	Cobalt 60	Required	Exempt	III
990-5914	8083	General Elec.	0.00001	Rhenium 187	Not Required	Exempt	IV
993-0695	4W20000A	Eimac	0.03	Thorium 232	Not Required	Exempt	III
993-1702	GV9A-600	Victoreen	1.0	Nickel 63	Required	Exempt	IV
996-5975	4CX5000A	Eimac	0.0031	Thorium 232	Not Required	Exempt	III
980-6749	9994445	Microwave	0.80	Cobalt 60	Required	Exempt	III
990-4631	MA3154	Microwave	0.40	Cobalt 60	Required	Exempt	III
01-013-0079	MA3959Z	Microwave	≤ 50	Tritium (H3)	Required	Exempt	IV

APPENDIX 1

GUIDELINES FOR RADIOLOGICAL MONITORS

10. SCOPE

10.1 This appendix describes the procedures for radiological monitoring for personnel protection, decontamination, storage, and disposition of radioactive commodities.

20. PURPOSE

20.1 The purpose of this appendix is to assure that all personnel who work with radioactive commodities are completely aware of the hazards, or potential hazards, that are introduced into their working environment by inclusion of radioactive materials and of the applicable directives and procedures by which they may conduct their work safely. Applicable directives and safety procedures (e.g. control documentation and standard operating procedures) should be provided for each radioactive commodity or group such as receiving, handling, warehousing, maintenance and inspection. Each individual should receive instructions in his specific operation and all safety procedures before being exposed to the potential radiation hazards.

30. PERSONNEL PROTECTION

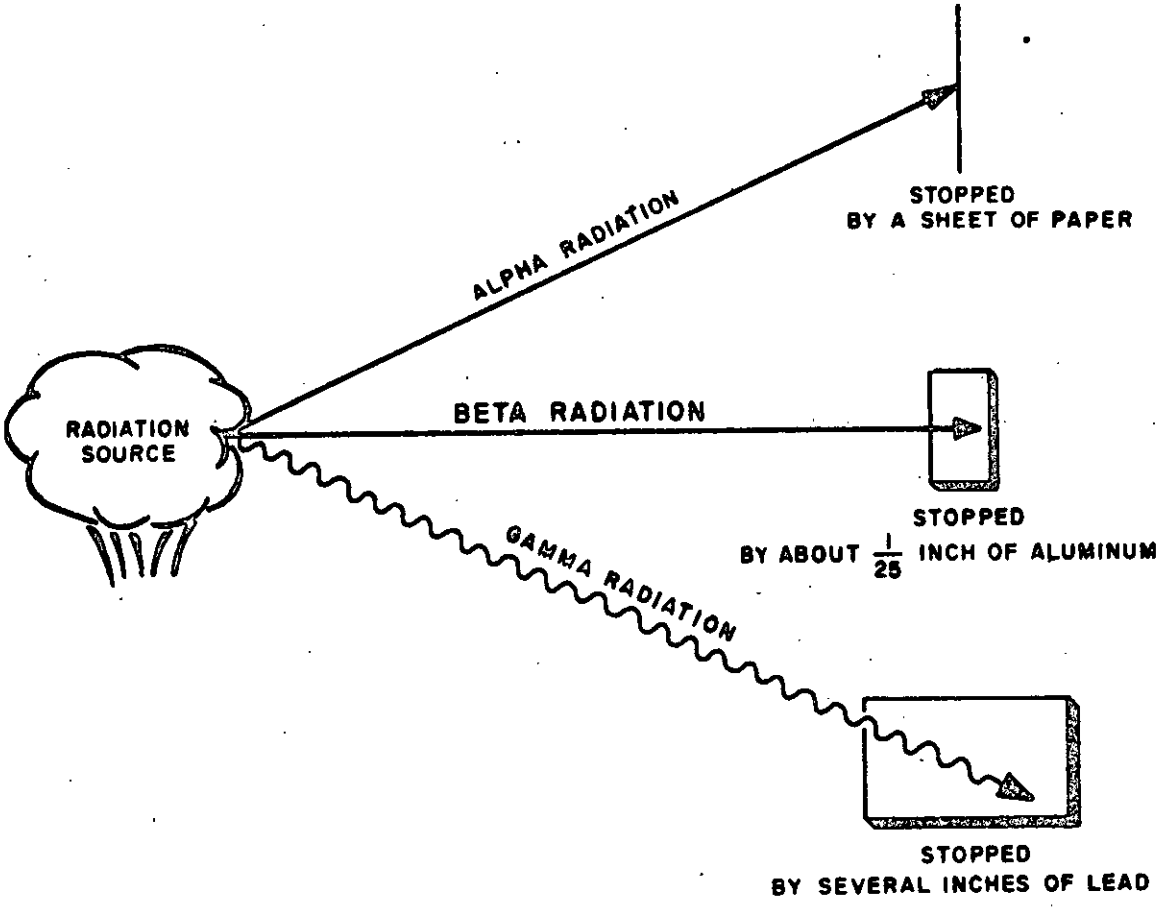
30.1 Aspects of radiation. Radiation is silent, unseen, and unfelt; its presence can be detected only by means of instruments. Some of the damaging effects on the human system may not develop until after many years of exposure. Therefore, radiation hazards cannot be treated like some of the common hazards. The lay mind consequently may have developed a fear that in some cases is inordinate. In most cases, the matter of accidents is well threshed out; most accidents are sudden and only predictable on a probability basis. On the other hand, many radiation injuries are cumulative and gradual, and the hazard measureable.

30.2 Potential radiation hazards. Potential radiation hazards depend on the type or radiation being emitted, e.g., alpha, beta, gamma, etc. (See figure 1-1 and table B-1, column II, for types of radiations emitted for radioactive commodities included herein.)

30.2.1 Alpha radiation. Alpha radiation is not an external hazard because it is not capable of penetrating the skin; however, alpha radiation is a serious internal hazard. Every precaution should be taken to prevent the entry of alpha emitting particles into the body by ingestion, inhalation, or open skin wounds; inhalation being by far the most serious.

30.2.2 Beta radiation. Beta emitting contamination, within the concept of this handbook, is considered an internal hazard; i.e., the contamination must enter the body before it can do appreciable harm. Contamination may gain entry into the body through the mouth, nose, or open wounds. If the contamination is extremely concentrated (on the order of 2000 rems/hr), physical contact with the contaminated surface may produce skin burns. The wearing of cotton gloves will, in most cases, be sufficient to nullify this hazard.

30.2.3 Gamma rays. Gamma rays present the greatest external hazard. They have no mass, travel at the speed of light, and are highly penetrating, their effective range depending on their energy. The effect of air on gamma rays is so small that it is not practical to measure the range, but its penetrating power is measured in terms of the amount of material required to reduce it to some fraction of its original value. Gamma rays can penetrate to an extreme depth in the body, destroying tissues and inflicting serious burns quite rapidly. Therefore, gamma rays consitute a radiation hazard, for the entire body.



Emission	Description	Charge	Approx range in air	Relative penetration	Relative ionization	Hazard
Alpha α	Helium nucleus	+2	4 inch	1	10,000	Internal
Beta β	High velocity electron	−1	15 – 20 feet	100	100	Internal
Gamma γ	Electromagnetic wave of energy	Neutral	*	10,000	1	External

* Dependent upon half-value thickness

FIGURE 1-1. The penetrating power of radiation.

30.3 Maximum permissible exposure levels. Based upon considerable experience by many workers in the field of biological effects of ionizing radiations, it has been determined that an individual may be safely exposed to certain maximal dosages of radiation, either intermittently or over a life span. In setting these dosage levels, it is considered improbable that the cumulative exposure will be sufficient to shorten life, to increase the incidence of pathologic disorders, or to impair vitality and well being. The permissible dosages given herein are for observance during peacetime operations at all installations dealing with ionizing radiation or radioactive materials. They are particularly designed for those constantly and periodically exposed to ionizing radiation in the course of their routine work. The following exposure doses are maximums; however, every effort should be made to minimize the exposure of individuals to radiation as far below these standards as practicable.

30.3.1 Equivalent doses. For the purpose of this handbook, any one of the following is considered to be equivalent to a dose of one rem:

a. A dose of one roentgen due to X- or gamma radiation.

b. A dose of one rad due to X-, gamma, or beta radiation.

c. A dose of 0.1 rad due to neutrons or high-energy protons.

30.3.2 Exposure of individuals to radiation in restricted areas. Except as provided in 30.5.2.1, no person shall possess, use, or transfer licensed material in such a manner as to cause any individual in a restricted area to receive, in any one calendar quarter from radioactive material and other sources of radiation in the person's possession or control, a dose in excess of the limits specified in the following table (10 CFR 20):

Rems per calendar quarter

Whole body; head and trunk, active blood-forming organs; lens of eyes; or gonads	1 1/4
Hands and forearms; feet and ankles	18 3/4
Skin of whole body	7 1/2

30.3.2.1 Exemptions. An individual in a restricted area may be permitted to receive a dose to the whole body greater than those permitted under 30.3.2 provided:

a. During any calendar quarter the dose to the whole body shall not exceed 3 rems; and

b. The dose to the whole body, when added to the accumulative occupational dose to the whole body, shall not exceed 5 (N-18) rems where "N" equals the individual's age in years at his last birthday; and

c. Adequate records are maintained of past and current exposures which show that the addition of such a dose will not cause the individual to exceed the amount authorized in this subparagraph.

30.3.2.2 Exposure of minors to radiation. No person shall permit an individual within a restricted area who is under 18 years of age to receive in any period of one calendar quarter, a dose in excess of the following:

a. Radioactive materials and other sources - - 10 percent of the limits specified in 30.3.2 above.

b. Airborne radioactive material - - - - - - Limits of 10CFR20, appendix B, table II. (The concentration may be average over periods not greater than a week.)

30.3.3 Exposure of individuals to airborne radioactive material. No person shall possess, use, or transfer radioactive material in such a manner as to cause any individual within a restricted area to be exposed to airborne radioactive material in an average concentration in excess of the limits specified in appendix B, table I of 10 CFR 20. "Expose" means that the individual is present in an airborne concentration. No allowance shall be made for protective clothing or equipment, or particle size, except when authorized by the NRC. The limits given in appendix B, table I, are for exposure to the concentrations specified for 40 hours in any workweek of 7 consecutive days. In any such period where the number of hours of exposure is less than 40, the limits specified in the table may be increased proportionately. In any such period where the number of hours of exposure is greater than 40, the limits specified in the table shall be decreased proportionately.

30.3.4 Permissible levels of radiation in unrestricted areas. Except as authorized by the NRC, no person shall possess, use or transfer radioactive material in such a manner as to create in any unrestricted area from radioactive material and other sources of radiation in his possession:

a. Radiation levels which, if an individual was continuously present in the area, could result in his receiving a dose in excess of two millirems in any one hour, or 100 millirems in any seven consecutive days, or

b. Release to an unrestricted area radioactive material in concentrations which exceed the limits specified in appendix B, table II of 10 CFR 20, unless authorized by the NRC.

30.3.5 Service/agency radiation protection standards. Radiation protection standards adopted by the Department of Army (DA) and the Defense Supply Agency (DSA) for the control of occupational exposures to ionizing radiation are included in: AR 40-14, DSAR 4145.24 "Control and Recording Procedures For Occupational Exposure To Ionizing Radiation."

30.3.6 Maximum permissible contamination levels (See DSAM 4145.8, AR 700-64, NAVSUPINST 400.34, AFM 67-8, MCO P4400-105A).

30.3.6.1 Personnel, equipment, and material. Contamination of personnel, equipment, and material will be kept to the absolute minimum. Wipe tests of surfaces of material containers and worktables will not be allowed to indicate any appreciable concentration of alpha, beta, or gamma activity. Radiation levels caused by combined beta-gamma will not exceed twice the normal background level. Body surfaces will be decontaminated when any detectable radioactivity is found and will be continued until the acceptable levels that have been established by the installation or agency are reached.

30.3.6.2 Air and water. Unless otherwise specified, the maximum permissible concentrations of unknown radioisotopes in air and water are as follows (expressed in microcuries per milliliter). (If the identity of the radioisotope is known, refer to Title 10, Code of Federal Regulations, Part 20):

Medium	Beta and gamma emitters	Alpha emitters
Air	0.2×10^{-9}	0.2×10^{-11}
Water	10^{-7}	0.4×10^{-7}

30.3.7 Radiological safety committee. A radiological safety committee should be established at each installation where personnel are engaged in work involving regular exposure to ionizing radiation or handling radioactive materials. The committee should include a medical officer, radiological protection officer, safety officer, and other members as considered necessary by the commander of the installation or activity.

30.3.7.1 Responsibilities. The radiological safety committee will serve as staff advisory council to the commanding officer. As such, it will be responsible for the establishment and review of the general technical policies relating to radiation hazard control. The committee should:

a. Meet quarterly to review radiological safety conditions and to recommend guidelines to the radiological protection officer.

b. Recommend solutions to unsolved problems relating to radiation hazard control.

c. Recommend changes in the radiological safety program, when required.

d. Perform other duties and functions relative to radiation safety as considered necessary.

30.3.7.2 Medical and radiological safety officers. The medical and radiological safety officers should be the action agents for the radiological safety committee. As such, they will be responsible for radiological policies and procedures relative to personnel work safety and health protection. The officers should be guided by the latest regulations and established procedures pertaining to radiation safety. These officers will:

a. Indoctrinate personnel relative to the radiological safety program.

b. Act in a consultant and advisory capacity, on radiation hazard control, to personnel working with or planning to work with radioactive materials.

c. Provide a personnel dosimetry service, including film badges.

d. Designate personnel required to wear dosimetric devices.

e. Designate personnel that will require periodic physical examination.

40. PRECAUTIONARY MEASURES

40.1 Precautions. The following precautions are in addition to those normally observed by personnel engaged in regular storing and handling of equipment and commodities. Special problems and specific information with regard to handling and disposition of radioactive items, not covered in this handbook, should be referred to the medical service or the radiological protection officer.

40.1.1 Personnel requirements. Radioisotopes and contaminated material will be monitored and handled by authorized personnel only. Receiving, storing, and shipping activities will have assigned at least two radiological monitors (see section 50). Monitors will be selected from personnel assigned to the areas (preferably inspection personnel) and trained to accomplish this function. Personnel selected to handle radioisotopes during shipment or storage will be indoctrinated by qualified radiological monitors or by medical personnel on the precautionary measures to be observed. Personnel involved in the actual use of radioisotopes must have formal training in their use, in the precautionary measures to be observed, or on-the-job training under the close supervision of qualified personnel (such as medical service personnel, radiological protection officer, or a qualified radiological monitor).

40.2 Personnel monitoring equipment. "Personnel monitoring equipment" means devices designed to be worn or carried by an individual for the purpose of measuring the dose received. Each installation or agency shall provide appropriate monitoring equipment, such as film badges, pocket chambers, pocket dosimeters, or film rings (see section 60), to, and shall require the use of such equipment by, all personnel working with radioactive materials, or entering radiation areas as described below.

40.2.1 Individuals in restricted areas. Each individual who enters a restricted area under such circumstances that the individual receives, or is likely to receive, a dose in any calendar quarter in excess of 25 percent of the applicable value specified in 30.3.2 herein.

40.2.1.1 Individual under 18 years of age. Each individual under 18 years of age who enters a restricted area under such circumstances that the individual receives, or is likely to receive, a dose in any calendar quarter in excess of 5 percent of the applicable value specified in 30.3.2 herein.

40.2.1.2 Radiation area. "Radiation area" means any area accessible to personnel where radiation exists at such levels that a major portion of the body could receive in any one hour a dose in excess of 5 millirem, or in any 5 consecutive days, a dose in excess of 100 millirem.

40.2.1.3 High radiation area. "High radiation area" means any area accessible to personnel where radiation exists at such levels that a major portion of the body could receive in any one hour a dose in excess of 100 millirem. Each high radiation area shall be conspicuously posted with signs or placards as described in Section 70.4.

40.2.1.4 Airborne radioactivity area. See 70.4.2 herein.

40.2.2 Entry into a high radiation area. Positive measures, such as locked or guarded gates or doors, in addition to placards, shall be established to prevent unauthorized entry into high radiation areas, i.e., an area in which in individual might receive a radiation dose equivalent to 100 milliroentgens in one hour. Entry into a high radiation area, or exposure of a source which would make such a dose possible, shall energize a conspicuous visible or audible alarm signal designed to alert personnel present (see 70.4.1).

40.3 Removal or radioactive material. Personnel will not tamper with or in any way expose or remove an item containing radioactive material from the unit package or shipping container unless required to do so in the performance of duty. Under no conditions will radioactive items be carried in the pockets of clothing worn by personnel.

40.4 Accidentally broken or damaged items. Should an item containing radioactive material be accidentally broken or its container damaged, direct contact with the radioactively-contaminated item will be avoided. The radiological monitor on duty, the medical service, the supervisor, and other concerned personnel will be notified immediately. Thereupon, the following rules and procedures will be observed:

a. Personnel having come in direct contact with broken or damaged radioactive items or containers or radioactively contaminated items will, if possible, have other personnel notify proper authorities; remove self from the immediate area (but will not migrate to other areas) for subsequent monitoring and decontamination, if necessary, by attending radiological monitors.

b. The immediate area will be roped off, monitored, and decontaminated, if necessary (see sections 70 and 80).

c. Broken or damaged items will be monitored and safely packaged under surveillance of the radiological monitor and disposal made in accordance with instructions in this handbook, or other applicable instructions (see section 90).

d. Radioactively contaminated material should not be allowed to come in contact with the body at any time. Rubber or plastic gloves should be worn while handling broken items or damaged containers of radioactive material.

e. Adherence to good personal hygienic practices (such as washing of hands and face before eating and smoking) is mandatory.

f. Food or drink will not be brought into the contaminated area, nor will smoking be permitted.

40.5 Theft or loss. Strict accounting of radioactive commodities and materials is mandatory at all times. Theft and loss of radioactive items shall be reported immediately to the radiological protection officer, medical officer, and other cognizant personnel.

40.6 Fire department provisions. The fire department will be provided with storage locations of all radioactive materials, so that proper precautions may be observed in case of fire (see 80.5).

40.7 Protective clothing. Protective clothing should be available for use by personnel at each installation or agency where radioactive materials or commodities are handled or stored. The type clothing provided will vary with the local situations, but may include:

a. Plastic or hard hat, or other head covering as appropriate.

b. Safety glasses.

c. Suitable washable, or disposable outer garments.

d. Appropriate footwear.

e. Appropriate gloves.

f. Self-contained respirators.

40.7.1 Contaminated clothing. Protective clothing which is contaminated so that it emits a radiation level of 1.0 mR/hr or more of beta-gamma, or is contaminated with any alpha, shall be decontaminated or disposed (see section 80).

40.8 Radiological surveys. Each installation or agency shall conduct surveys as necessary in order to comply with the requirements of 10 CFR 20, and 29 CFR 1910.96 (see section 70). "Survey" means an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive material or other sources of radiation under s specific set of conditions. When appropriate, such evaluation includes a physical survey of the location of materials and equipment, and measurements of the levels of radiation or concentrations of radioactive material present.

40.9 Records and reports of surveys and exposure. Each installation or agency shall prepare and maintain records showing the radiation exposures of all individuals occupationally exposed to ionizing radiation under the conditions of 40.2 herein. These records shall be kept on forms provided by NRC, or DD Form 1141 (see AR 40-14, DSAR 4145-24). Each installation or agency shall maintain records in the same units as specified in 30.3.2 herein and appendix B to 10 CFR 20. Each individual shall be advised of his individual exposure on at least an annual basis.

50. PERSONNEL TRAINING, DUTIES, AND REQUIREMENTS

50.1 General requirements. All personnel involved with radioactive materials, or commodities should be made aware of the hazards, or potential hazards of these materials. They should be aware of the contents of applicable directives and procedures relative to this subject. Directives and safety procedures should be prepared and distributed to involved personnel for each radioactive commodity or group of related commodities and for each particular operation such as receiving, handling, maintenance, inspection, etc. Involved personnel should receive training and instructions prior to being exposed or assigned to a work area that is involved with radioactive materials or commodities.

50.2 Instruction courses for radiological monitors. Personnel assigned radiological monitoring duties should be provided training in this assigned area. Personnel should have received a minimum of 40 hours of instruction covering the subjects outlined below before being considered qualified as a radiological monitor. This instruction shall be provided by qualified personnel. A suggested outline of the radiological monitor course is as follows:

Introduction to Radiation	2 hours
Basic Nuclear Physics	2 hours
Effects of Nuclear Explosions	2 hours
Medical Aspects	2 hours
Detection Equipment (General)	4 hours
Monitoring Procedures	6 hours
Decontamination	2 hours
Use of Instruments	10 hours
Exposure Control	8 hours
Review and Test	2 hours
TOTAL	40 hours

50.2.1 Additional training requirements. In addition to the general subject matter listed above, monitors shall have on-the-job training to acquaint them with the specific materials and conditions with which they will be concerned.

50.2.2 Refresher requirements. Monitors having satisfied the training requirements shall receive a minimum of eight hours of refresher training each year thereafter. The latest information on the topics specified in 50.2 shall be reviewed.

50.3 Duties of radiological monitors. Radiological monitors shall perform the following:

a. Monitor known or suspected radioactive and radioactively contaminated material, completing and attaching the appropriate radiological markers and placards (see 70.4) and notifying proper authorities of radiation levels present.

b. Monitor radioactive storage areas every 30 days or when new shipments are placed in such areas. Where the permissible level of radioactivity is being exceeded, the stocks of items where excessive levels are found should be broken into smaller quantities or moved to other areas in an attempt to reduce the radiation level to within the permissible level. In the event the excessive level cannot be reduced, request immediate guidance from the radiological protection officer or the medical officer.

c. Monitor personnel assigned to work in areas where possible radiation exposure exists.

d. Insure that personnel working such areas observe necessary precautions and adhere to applicable regulations and directives.

e. Provide guidance and assist in the performance of decontamination, and disposal operations, when required.

NOTE

The monitors assigned to operating units are not authorized to change permissible exposure dose limits or deviate from standard precautionary procedures. The radiological protection officer and the medical service will assist or advise the radiological monitors when necessary.

60. RADIOLOGICAL MONITORING EQUIPMENT

60.1 Detection methods. Radiological instruments detect the interaction of radiation with some type of matter. The different principles of radiation detection are characterized by the nature of the interaction of the radiation with the detecting or sensing element. Several types operate by virtue of the ionization produced in them by the passage of charged particles. In other detectors, excitation and sometimes molecular disassociation play important roles.

60.2 Radiological monitoring systems. Radiological monitoring systems have become an integral part of every program where radiation is a threat to health. These systems include instruments to measure exposure levels and devices to warn when permissible levels are exceeded. Warning devices, such as ringing bells, flashing lights, clicking sounds, and fluctuating dials, may be attached to monitoring instruments to give notice of the presence of radiation since radiation penetrating the body causes no pain and one can be injured severly without realizing it. Physical examinations and clinical tests are another phase of monitoring to determine the exposure sustained and the amounts that are permissible.

60.3 Radic instruments. There are two distinct groups of instruments employed in the detection and measurement of ionizing radiation; those that measure total accumulated exposure dose, and those that measure the instantaneous rate of exposure. The first is referred to as a MEASUREMENT (Dosimeters) and the second as a RATE MEASUREMENT (Survey Meters). The two groupings are called "radiac" instruments, derived from the words "radiation, detection, indicator and computation".

60.4 Dosimeters. Dosimeters are divided into several classes depending on their principle of operation. The more common classes are: photographic emulsion, scintillation media, ionization chamber, chemical decomposition, and radiophotoluminscent media.

60.4.1 Film badge. The film badge worn on the outer clothing is the primary dosimetric device and the most common personnel radiation monitor. It is used mainly to detect X- or gamma-radiation and the more energetic beta radiation; it may be used also for neutron detection. The typical badge consists of a metal or plastic jacket with an identification photo or nameplate insert. An index number is usually engraved on the back of the jacket or on the nameplate (see figure 1-2).

60.4.1.1 Film pack. The film pack may contain one, two, or three films with varying sensitivites. One film emulsion, for example, may measure up to 20 roentgens, another up to 50 roentgens, and a third up to 600 roentgens. Each film is coded with the index number. With the film badge shown in figure 1-2, this is done by passing X-radiation through the perforated number at the base of the front filter (other systems for coding films, however, may be used). The coding process is performed for identification purposes. After the film badge is worn for a period of time, usually 1 week, the film is developed to determine the quantity of radiation received by the wearer of the badge. A densitometer, which measures the density of a photographic image, determines the relative density on the film. This density is compared with densities of known quantities of radiation of given energies and is then converted into appropriate units.

60.4.2 Film badge service. Film badge service for the Department of Army (DA) and the Defense Supply Agency (DSA) shall be provided as specified in AR 40-14, DSAR 4145.24, and for other services activities as specified by the directives of these activities.

60.5 Survey meters. The ionization chamber, proportional counter, and Geiger-Mueller counter are common portable monitoring instruments. (They may also be used in fixed applications.) The essential features of the three types are:

(1) A positive and negative electrode to attract negative and positive ions; and

(2) An appropriate gas or mixture of gases in an ionization chamber through which the radiation must pass; and

(3) An applied voltage to the chamber.

60.6 Recommended monitoring equipment. The following dosimeters and survey instruments are recommended for monitoring purposes at most activities. However, since there are many variations, the actual equipment required at each installation or agency should be determined by the responsible service officer(s).

TABLE 1-1. Recommended monitoring equipment.

NSN	Nomenclature	Range	Purpose
6665-00-561-5787	Radiac set AN/PDR-27 ( )	0-500 mR/hr	Gamma measuring, beta-gamma detection, personnel monitoring
6665-00-526-5336	Radiac set AN/PDR-39	0-50 R/hr	Gamma (high intensity), area monitoring
6665-00-106-7554	Radiac set AN/PDR-43E	0-500 R/hr	Gamma measuring, beta-detecting
6665-00-581-2227	Radiac set PAC-2GA	0-100,000 cpm	Alpha detection
*6665-00-526-7174	Radiacmeter	0-200 mR/hr	X- and gamma detecting
*6665-00-526-7169	Radiac detector (dosimeter)	0-200 mR	X- and gamma detecting
*6665-00-526-8230	Charger, radiac detector		Dosimeter charging

*These items to be used only if considered necessary by the installation or agency.

NOTE
Film badges will be obtained through the medical service.

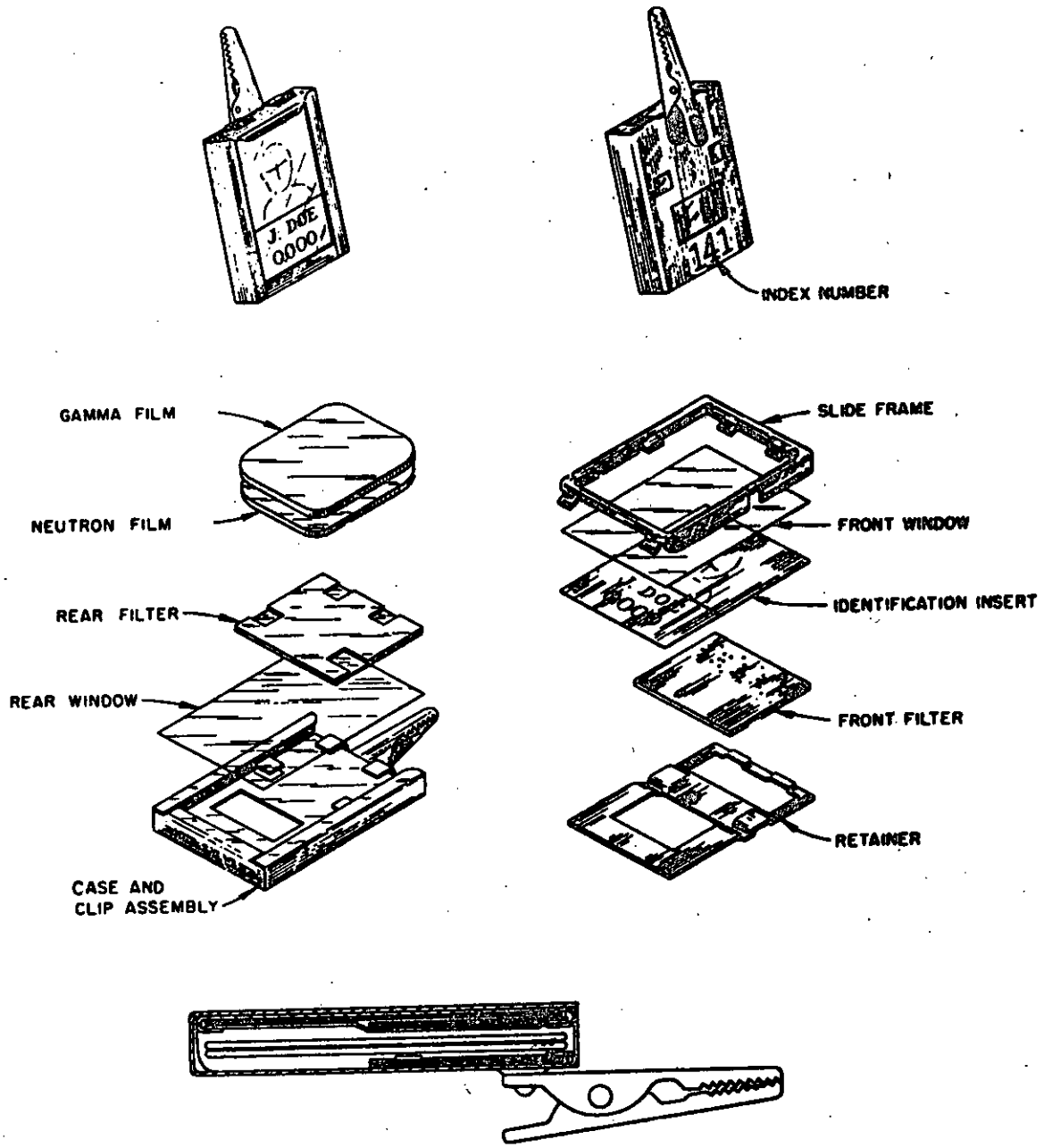


FIGURE 1-2. Film badge.

60.6.1 Calibration and certification of instruments. All survey instruments should be maintained in a serviceable condition at all times, calibrated and certified by qualified personnel in qualified laboratories at intervals specified by service or Agency directives.

70. RADIOLOGICAL MONITORING TECHNIQUES AND OPERATIONS

70.1 Importance of monitoring. The radiological program for personnel protection and safe handling of radioactive materials must be based on facts. Radiological monitoring provides the facts required by medical and safety personnel in case of emergency, or other operations. The information provided by qualified radiological monitors is the key to decisions on what to do and how to do it.

70.2 Purpose of monitoring. Radiological monitoring is defined as the detection and measurement of radiation. With the information gained through monitoring we can: (1) determine extent and location of radiation; (2) validate predictions about radiation; and (3) decide on a course of action.

70.3 Types of monitoring. There are two types of radiation monitoring: personnel and area. Personnel monitoring is the use of instruments to determine the exposure received by the individual. Area monitoring is the use of instruments to determine the levels of radiation in an area and to give alarm when permissible levels are exceeded.

70.3.1 Personnel monitoring. There are two types of personnel monitoring instruments: instruments that can be read directly and instruments that require supplemental processes or supplemental readings and are a measure of exposure-levels over a period of time (see sections 40 and 60).

70.3.1.1 Personnel-monitoring procedures. Procedures for personnel monitoring are as follows:

a. Use the AN/PDR-27 or equivalent. Attach the headphones as this allows the monitor to visually follow and, thus better control the position of the probe while monitoring. The headphone also responds more quickly to changes in radiation levels than the meter.

b. Check the operability of the instrument.

c. Place the probe in a light plastic bag or cover of light-weight material to prevent contamination. This is desirable, but not mandatory.

d. Select a reception location for conducting the monitoring operation. Precautions should be taken to prevent contamination of the area.

e. Determine the background radiation level periodically at the location where the monitoring is to take place. If the meter indication is above 50 mR/hr with the probe shield open, find a better shielded location that will bring the meter indication below 30 mR/hr. This might be done by selecting a different location, or by sweeping the area several times to reduce possible contamination.

f. Open the shield on the probe of the AN/PDR-27 or equivalent and put on the headphone.

g. Place the probe about two inches from the person's body being careful not to touch him. Starting at top of the head, move the probe downward on one side of the neck, collar, shoulder, arm, wrist, hand, underarm, armpit, side, leg, cuff, and shoe. Monitor the insides of the legs and the other side of the body in the same fashion. Monitor the front and back of the body. Pay particular attention to the feet, seat, elbows, armpit, and hary or moist areas (see figure 1-3). Record the exposure (see 40.9 herein).

h. Decontaminate personnel found to be contaminated (see section 80).

i. Monitor all personnel after decontamination to determine that contamination has been effectively removed. Repeat decontamination procedures if required.

70.3.1.2 Monitoring radioactive commodities. Personnel monitoring procedures are also applicable for monitoring commodities that exhibit low intensities, or for contamination detection.

70.3.2 Area monitoring. Area monitoring is used to locate zones of radiation and contamination and to determine the dose rates in these zones. The monitor shall: (1) be advised by the radiological protection officer of the allowable dose rate and the importance of the mission; (2) wear a protective mask, gloves, head covering, and sufficient clothing to cover the skin area when dusty conditions prevail; and (3) have paper, pencil, maps, and contamination signs, if areas are to be marked.

70.3.2.1 Equipment required. The following equipment will be required:

a. AN/PDR-39 or equivalent. If the dose rates are expected to be below 500 mR/hr, also carry the AN/PDR-27 or equivalent.

b. PAC-2GA or equivalent for alpha detection.

c. Film badge and the appropriate self-reading dosimeter (see section 60).

70.3.2.2 Area monitoring procedures. The procedures for area monitoring are as follows:

a. Zero the dosimeter and place in a pocket to protect it from possible contamination.

b. Check the operability of the AN/PDR-39 and AN/PDR-27, if it is to be used.

c. Take readings at about three feet (belt high) above the ground or floor.

d. Record the dose rate, the time and location for each reading. If readings are taken within a vehicle, this should be noted in the report.

e. Post markers, if required by the mission. The marker should face away from the restricted area. Write the date, time, and dose rate on the back of the marker (see 70.4).

f. Read the pocket dosimeter at frequent intervals to determine when to depart the area.

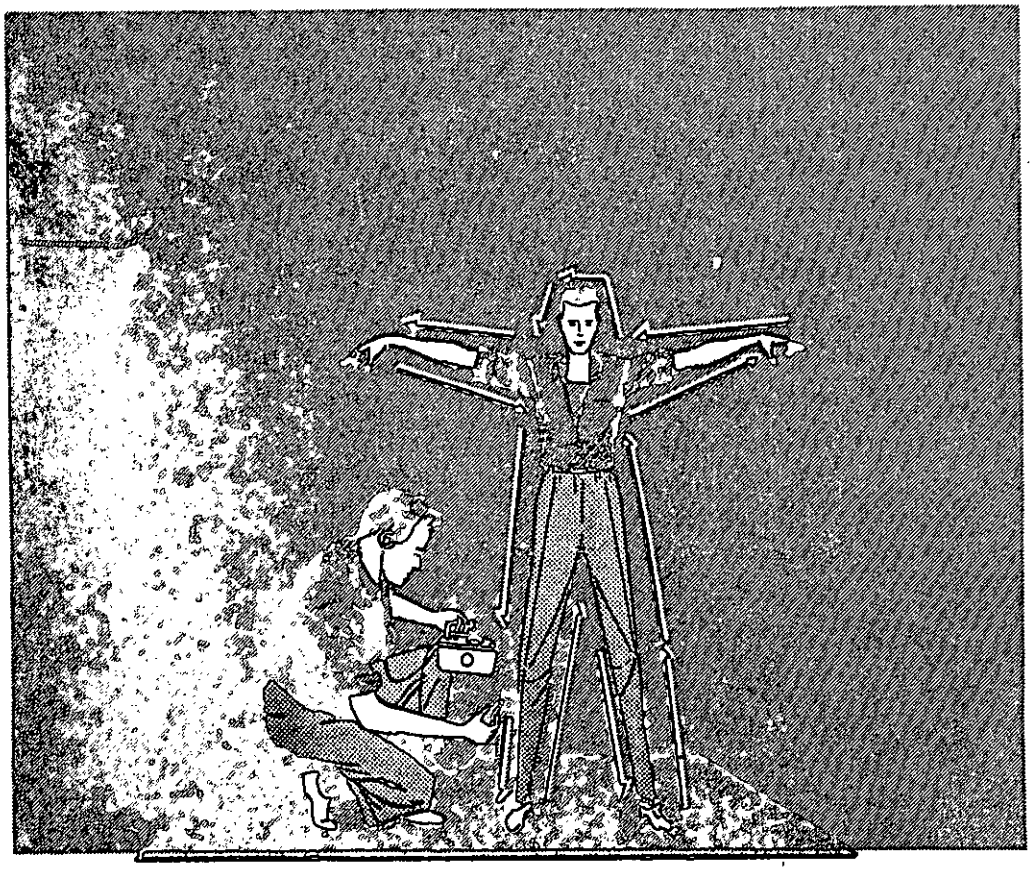


FIGURE 1-3. Personnel monitoring.

g. Remove outer clothing on return and check all personnel for contamination. Decontaminate, if required (see section 80).

h. Record the radiation exposure and report results of the survey (see 40.9).

70.4 Area identification (caution signs, labels, signals and controls. Appropriate signs or placards shall be conspicuously posted at each entrance to a radiation area or at intervals of not less than 20 feet around the perimeter of an open area where concentrations of radioactive materials are located. The signs or placards can be constructed if preprinted ones are not available (see figure I-4) and shall bear the Nuclear Regulatory commission (NRC) standard radiation symbol and the words as appropriate:

CAUTION (or DANGER)

RADIATION AREA (or HIGH RADIATION AREA or AIRBORNE RADIOACTIVITY AREA or RADIOACTIVE MATERIALS)

70.4.1 High radiation area. Each high radiation area shall be equipped with a control device which shall either cause the level of the radiation to be reduced below that at which an individual might receive a dose of 100 millirems in 1 hour upon entry into the area or shall energize a conspicuously visible or audible alarm signal in such a manner that the individual entering and the guard or supervisor of the activity are made aware of the entry. In the case of a high radiation area established for a period of 30 days or less, such control device is not required.

70.4.2 Airborne radioactivity area. Each airborne radioactivity shall be posted as specified in 70.4. "Airborne radioactivity" as used in this section, means:

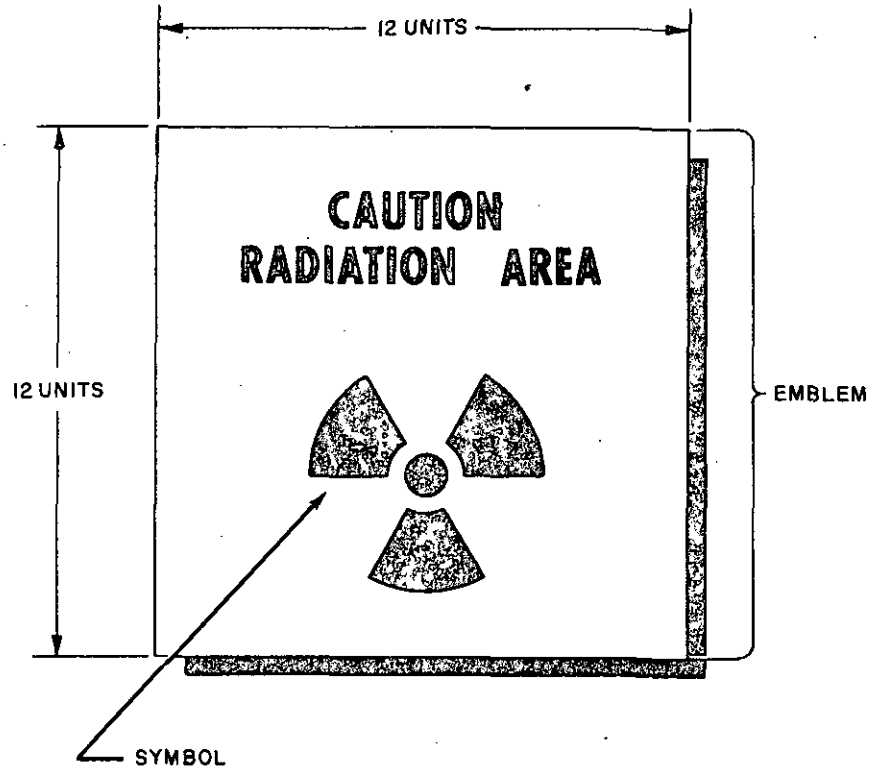
a. Any room, enclosure, or operating area in which airborne radioactive materials, composed wholly or partly of radioactive material in contration exceeding the limits specified in 10 CFR 20, appendix B, table 1, or
b. Any room enclosure or operating area in which airborne radioactive material exist in concentrations which when averaged over the number of hours in any week during which individuals are in the area, exceeds 25 percent of the values specified in 10 CFR 20, appendix B, table 1.

70.4.3 Additional requirements. Each room or area shall be posted as specified in 70.4 where radioactive material (excluding natural uranium or thorium) is used or stored in any amount exceeding 10 times the quantity of such material specified in table A-1, column IV herein, or in which natural uranium or thorium is used or stored in quantities exceeding 100 times the quantity of such material specified in table A-1, column IV herein.

70.4.4 Container labels. See 11.2.1 herein.

80. DECONTAMINATION

80.1 Cooperation requirement. Closely allied with the problem of monitoring, discussed in section 70, is the problem of decontamination. The two are, in fact, closely linked and cooperation between monitors and decontamination personnel (if different) is a basie requirement if wasted effort or unnecessary hazard is to be avoided.



THE PROPORTIONS OF THIS EMBLEM ARE BASED UPON THE VALUE OF ONE UNIT.
ONE UNIT EQUALS THE DIAMETER OF THE CENTER CIRCLE OF THE SYMBOL.
THE EMBLEM IS TWELVE UNITS HIGH BY TWELVE UNITS WIDE.
THE SYMBOL IS CENTERED IN THE LOWER TWO-THIRDS OF THE EMBLEM.
THE SYMBOL IS CONSTRUCTED OF THREE CONCENTRIC CIRCLES.
THE OUTER CIRCLES BEING DIVIDED INTO SIX SECTORS, ALTERNATE SECTORS COLORED.
THE CIRCLES HAVE RADII IN THE PROPORTIONS OF ONE TO ONE AND ONE-HALF AND ONE TO FIVE.
THE LETTERS ARE OF BLOCK TYPE, ONE UNIT HIGH, AND CENTERED IN THE UPPER ONE-THIRD OF THE EMBLEM.
BACKGROUND COLOR OF THE EMBLEM IS YELLOW.
SYMBOL COLOR IS MAGENTA OR PURPLE.
LETTERS ARE BLACK.

FIGURE 1-4. Standard radiation hazard warning emblem.

80.2 Contamination behavior. Contamination results when radioisotopes attach themselves to dust particles or water droplets. It behaves physically like any other dirt or moisture. In fact, the phenomena of radioactive contamination is exactly the same as getting "dirty" except this dirt is radioactive and only small quantities are required to produce a hazard.

80.3 Purpose of decontamination. The objective of radiological decontamination is to reduce the contamination to an acceptable level with the least possible exposure of personnel to radiation. Radioactivity cannot be destroyed or neutralized, but in the event of accident, the radiation hazard can be reduced or eliminated by removing radioactive particles from a contaminated surface and safely disposing of them, by covering the contaminated surface with shielding material, such as earth, or by isolating the contaminated object and waiting for its radiation to decrease through the process of natural radioactive decay.

80.4 Decontamination procedures. In the event of accidents involving radioactive materials, immediately notify the radiological protection officer and the medical service of the incident. The following procedures for decontamination will proceed under their guidance:

NOTE

All decontamination personnel will wear protective gloves, and other protective apparatus as prescribed by the radiological safety officer and the medical officer (see 40.7 herein).

a. Pick up the large fragments with forceps and place them in a metal shipping container, NSN 8110-00-254-5715, or similar item for subsequent disposal. If forceps are not available, use rubber or cotton gloves.

WARNING

Do not stir up dust as this may cause the radioactive materials to permeate the atmosphere and produce an airborne hazard.

b. Carefully clean the area with an industrial type vacuum cleaner equipped with an exhaust filter. The exhaust stream will be analyzed by the medical service to insure that an airborne hazard is not being produced. Upon completion, the exhaust filter and collecting bag will be placed in the container with the fragments for subsequent monitoring.

c. Using a cloth dampened with water, wipe across the contaminated area making one swipe at a time. (Do not rub the radioactive material into the surface by the use of pressure or a back-and-forth motion.) The cloth will be folded in half after each swipe. Upon completion or when it becomes too small, the cloth will be placed in the waste container with the fragments.

d. Monitor the area with a AN/PDR-27 or equivalent to determine the effectiveness of the decontamination and to insure that no contamination has been spread beyond the breakage area. If levels or radiation are below 1.0 mR/hr, the area will be considered clean and returned to normal use. If the levels or radiation are above 1.0 mR/hr, repeat the above procedures as outlined until the radiation level present is acceptable.

e. All benches and floors in the decontamination area will be monitored, and decontaminated if necessary. Rags and mops soaked in cleaning solvent will generally do a thorough job of cleaning benches and floors. The rags and mops may be rinsed in cleaning solvent to remove any contamination.

f. Personnel performing the decontamination, and their work clothing will be monitored to determine if they have become contaminated (see 70.3.1). If contamination above 1,000 counts per minute (CPM) or 1 mR/hr is found on the clothing, the clothing will be removed and all exposed skin surfaces and underclothes will be surveyed. If underclothes are contaminated above permissible levels, they will be removed and the person will be required to take a shower. After showering, the person will be surveyed for contamination. Areas where radiation remains will be washed until clean. The contaminated clothing will be placed in a separate container for subsequent decontamination.

g. The forceps, gloves, or other equipment which have been used for decontamination will be monitored. If contaminated, the forceps and other equipment may be wiped with a damp cloth until the contaminants have been removed. If the gloves are contaminated, they will be placed in the same container with the contaminated clothing for subsequent decontamination or disposal.

h. The waste container will then be monitored for external contamination by use of wipe samples. If contaminated, a damp cloth will be used to wipe off the contaminates. The cloth will then be placed in the container and the container will be sealed and marked for subsequent disposal (see section 90).

80.5 Fire control. Fire in any area where radioactive commodities are handled or stored will be brought under control by using established fire fighting procedures, and if possible, under direct guidance of the fire protection activity.

80.5.1 Monitoring of fire-damaged area. All fire damaged areas will be monitored immediately after the fire is under control to determine the radiation levels present, and the necessity for decontamination. Firefighting operation may disperse radioactive materials into areas that initially were not a part of the incident site. The drainage of liquid from firefighting operations should be noted and avoided by personnel unless they are wearing appropriate protective clothing. Additional measures should be taken as necessary to cope with any resulting hazards.

80.5.2 Isolation of fire-damaged area. The area will be roped off and isolated for decontamination, if required. The ropes will be placed at positions where the level of radiation intensity is less than 1 milliroentgen per hour.

80.5.3 Monitoring of personnel and equipment. Personnel and equipment will be monitored and decontaminated, if necessary, utilizing the procedures specified in 80.4.

80.5.4 Additional monitoring and decontamination. Personnel and equipment will be returned to the fire station for additional monitoring and decontamination (showers, etc), if required.

90. DISPOSITION OF RADIOACTIVE MATERIALS

90.1 Radioactive waste. Radioactive waste will be disposed of as indicated in individual Nuclear Regulatory Commission licenses, authorizations, or instructional directives, and:

a. Defense supply Agency. DSAR 4145.30, Disposal of Unwanted Radioactive Material.

b. Department of the Army. AR 755-15, Disposal of Unwanted Radioactive Material.

c. Department of the Navy. NAVMED P5055, Radiation Health Protection Manual.

d. Department of the Air Force. T. O. 00-110N-2, Radioactive Waste Disposal.

e. Marine Corps. MCO P4400.19, Marine Corps Supply Manual, Volume I.

90.2 Provisions for disposal. Waste disposal will be accomplished by the installations division in accordance with instructions from the medical service. Disposal by means of sewers will be avoided, unless specifically authorized by the medical service. In such cases, where sewer disposal is authorized, necessary laboratory analysis will be performed to determine that the level of activity discharged is below the prescribed limits of the Nuclear Regulatory Commission, and local and state authorities. Samples of waste water at various locations in the sewage system should be collected by the medical service, and the radioactivity determined to insure that compliance with standards has been met. Liquid waste may be allowed to decay to acceptable levels (10 microcuries per milliliter) and disposed of as normal waste. Alternate methods of disposal will be to: (1) dispose of the liquid after it has been diluted to the acceptable level; or (2) meter the liquid into normal waste disposal channels at a rate such that the acceptable levels are not exceeded. For additional information of disposal of solid or liquid waste, reference should be made to 10 CFR 20 and to local and state laws pertinent to the subject.

90.3 Metal container for solid-radioactive wastes. The following metal containers will be used to ship or store solid-radioactive wastes. Activities will choose a container of the appropriate size for the amount of solid radioactive waste they normally generate.

NSN	Volume
8110-00-254-5715	1 cu ft
8110-00-254-5717	2 cu ft
8110-00-254-5718	2.5 cu ft
8110-00-285-6125	4 cu ft
8110-00-281-8966	5.7 cu ft
8110-00-281-8967	7 cu ft

90.3.1 Warning labels for metal containers. Attach two radiation warning labels (see figure 1-4) on opposite sides of the metal container. Place the container in a convenient location, where it is readily accessible; however, keep it at least 6 feet away from work areas such as desks, work benches, etc.

90.3.2 Generated waste. Always place radioactive waste in the metal container as it is generated. Keep the container covered with its lid.

NOTE

Due to the high cost of radioactive waste disposal, nonradioactive waste will not be placed in these containers. However, if radioactive waste in the minimum size container must be disposed of, wadding may be used to fill the void (see 90.3.4).

90.3.3 Periodic monitoring of waste containers. The waste containers will be monitored periodically to determine the intensity buildup of the radioactive waste contents. Use an AN/PDR-27 or equivalent. The radiation levels should not exceed 200 mR/hr at the outside surface of the container, or 10 mR/hr at 3 feet from the surface. If these levels are exceeded, see 90.3.4 for instructions. When monitoring the container, wipe-samples will be taken also to determine if there is any contamination of the outside surface. One-inch discs may be cut from filter paper or paper towels and these discs used for the purpose of taking wipe-samples. Exterior surfaces of containers should not be contaminated to levels greater than 0.1 mR/hr per 100 cm^2 removable beta-gamma contamination by wipe-test or 50 d/m per 100 cm^2 removable alpha contamination. If these limits are exceeded, wipe container outside surfaces with a rag dampened with solvent (such as P-S-661) and place the rag inside the container; repeat wipe-sampling procedure. The wipe-samples may be read with the AN/PDR-27, or equivalent, to determine beta-gamma contamination and PAC-1S or PAC-2GA radiac meter to determine the amount of alpha contamination. Monitoring of radioactive waste disposal containers will be accomplished by assigned radiological monitors, medical service personnel, or the radiological safety officer.

90.3.4 When to seal the container. If an intensity of 200 mR/hr on the outside surface of the container or 10 mR/hr at 3 feet from the surface is reached before the container is full, pack the void with wadding and seal the container. This will apply only to the minimum size container (1 cu ft). When using containers larger than the minimum size and the limits specified above are reached before the container is full, the contents will be transferred to a smaller container of appropriate size but no smaller than the 1 cubic foot container.

90.3.5 Sealing the container. When the metal shipping container is filled with radioactive waste, seal the container, insuring that the rubber gasket is in place to provide an airtight seal, then perform the following:

a. Monitor the outside surfaces as outlined in 90.3.3.

b. The previously attached radiation warning labels will be properly filled out with the required information as specified by the label.

90.3.6 Disposition of radioactive waste container. Forward the radioactive waste container to the transportation officer upon receiving instructions from authorized officials. This may be accomplished by notifying the installations engineer to pick up and deliver the container, or the container may be delivered by unit personnel, whichever is deemed appropriate.

90.3.7 Information to be forwarded with container. Forward the following information to the transportation officer along with the container:

Type of radioactive waste - This information will include the nomenclature, part number, quantity(s) (if applicable), radioisotope and total ratio activity of the waste in microcuries.

100. RECEIVING

100.1 Notification of user. Upon receipt of commodities containing radioactive material, the individual user or appropriate storage activity will be notified immediately, in order that preparations for storing and handling can be made. Procedures for pickup, receipt, opening, monitoring, recording, and reporting radioactive commodity shipment shall be in accordance with 10 CFR 80.

100.2 Inspection and identification. The containers will be monitored by a radiological monitor or the medical service. The intensity of radiation on the external surfaces of the container will be checked and noted on the required forms which will be attached to the container in a conspicuous place. The detachable stub on the form will be filled in with the same data, detached and forwarded to the medical service. A visual inspection of the container will be made by the monitor to insure that the seals (when applicable) have not been broken or tampered with and that the container has not been damaged in transit.

100.3 Forwarding commodities. Properly packaged and tagged radioactive commodities will be forwarded immediately to the using activity or the appropriate storage area, whichever is applicable.

100.4 Damaged shipments. In the event shipments are received damaged with seals broken or tampered with, or with intensity readings above Nuclear Regulatory Commission limitations, the container will be isolated and the radiological protection officer and the medical service contacted to assist in determining subsequent action. Possible accidental exposures will be thoroughly investigated.

100.5 Radioactively contaminated items. When items found to be or known to be contaminated are delivered to receiving personnel, the containers will be monitored and the information on the attached labels will be verified or corrected. The intended recipient and authorized service personnel will be called to determine action to be taken (see 80.4).

110. STORAGE

110.1 Properly packaged, marked, and identified. Commodities properly packaged, marked and identified shall be stored in accordance with instructions contained in this handbook, and instructions from the medical officer or radiological protection officer (see 70.4). Maximum permissible exposure will be the same as in 30.3.

110.2 Storage precautions. Radioactive materials shall be stored or kept in such a manner as to insure that the dose rate therefrom shall not exceed the appropriate limits specified in this handbook, or other applicable directives. Radioactive materials stored in a nonradiation area shall be secured against unauthorized removal from the place of storage.

110.3 Normal storage provisions. Radioactive items can be kept in normal storage provided the intensity at 1 foot from the container does not exceed 1 milliroentgen per hour (unless otherwise directed by the installation or agency directives) and the containers are properly marked.

110.4 Storage requirements. Radioactive items exhibiting intensities greater than 1 milliroentgen per hour at 1 foot must be stored in marked areas, storerooms, or buildings. The areas, storerooms, or buildings must be controlled to prevent entry of unauthorized personnel. The exterior of each such area shall be marked with the appropriate warning symbols. The area must be remonitored every 30 days. The reading at 1 foot from the exterior of the storage area must not exceed 1 milliroentgen per hour. If this level is exceeded, the radioactive material will be rearranged to bring the radiation level within limits, or the size of the storage area increased.

WARNING

Fragile commodities will not be stored loose in boxes or containers, as this increases the possibility of breakage and subsequent contamination of storage facilities.

110.5 Workroom requirements. Radioactive materials in a workroom or other location where persons are regularly or frequently present shall be enclosed in containers of such thickness, material, and construction, or otherwise shielded in such thickness, material, and construction, or otherwise shielded in such manner, that no person will be exposed to radiation in amounts greater than those indicated in section 30.3 of this appendix.

110.6 Ventilation of vaults or storage rooms. Vaults or rooms used for storing materials that may emit radioactive gases shall be suitably ventilated in such a manner that the gases do not constitute a radiation hazard.

110.7 Secondary tray or catchment. When there is any possibility that chemical, radiation, or other action might weaken or rupture the container of radioactive material sufficiently to cause leakage therefrom, the container shall be provided with a suitable secondary tray or catchment adequate to retain the entire amount of radioactive material.

110.8 Identification of material and user. Each container of radioactive material in storage shall, in addition to the standard radiation-hazard symbol, be labeled in such manner that the kind and quantity of material, the date of measurement, and the name of the person responsible for the material can be easily and quickly determined.

110.9 Material in excess of 1 curie. Storage containers for radioactive material in excess of 1 curie shall be designed to be resistant to fire and earthquake damage, and to maintain reasonable temperatures. Containers shall be structurally sound over the period of intended use with due regard to corrosion, radiation, and temperature effects that may develop.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

   ☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED